HEWLETT PACKARD

October 1993

Product data sheets
for Hewlett-Packard
networking solutions

HP Networking Communications Specification Guide

Important
Information about this Specification Guide

1. This edition replaces the May 1992 *HP Networking Communications Specification Guide* and all other previous networking specification guides.

2. Please see page iv for a description of how the this guide is organized.

Notice

The information contained in this document is subject to change without notice.

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Introduction

This specification guide contains technical data sheets for HP networking products.

See page iv for further description of the guide's organization.

A note on production

This edition of the *HP Networking Communications Specification Guide* was produced entirely by electronic means. Text was typeset using an HP-standard word processor and formatted according to HP design style guidelines. Graphics and artwork were created using HP Graphics Gallery, Lotus® Freelance, and HP scanners. The final document was printed from HP LaserJet output. For further information on the production of this guide, contact Christine Martino at HP's Information Networks Division in Cupertino, CA.

The Table of Contents has two sections: a category index and an index by product number.

The product number index lists each HP networking product in ascending numerical order. Data sheets covering two or more products are referenced separately for each product number in the data sheet.

The category index divides product data sheets into eleven functional categories:

1. HP Domain Systems
2. HP 9000 Systems
3. HP 3000 Systems
4. HP 1000 Systems
5. HP Vectra Personal Computers
6. Network Hardware
7. Voice and Data Integration
8. Network and System Management
9. Network Consulting and Support Services
10. Network Education
11. Apple Macintosh Connectivity

Within the first five categories, products are grouped by the following categories:

1. Terminal/Printer/Device Connectivity
2. Local Area Links
3. Wide Area Links
4. OSI/De Facto Multivendor Services
5. HP Services
6. IBM Connectivity Services
7. IBM Connectivity Links

Within the remaining categories, products are grouped according to appropriate functional areas.

HP Domain Systems

Local Area Links

Wide Area Links

OSI/De Facto Multivendor Services

IBM Connectivity Services

IBM Connectivity Links

HP 9000 Systems

Terminal/Printer Device Connectivity

HP 3000 Systems

Terminal/Printer Device Connectivity

Local Area Links

Wide Area Links

OSI/De Facto Multivendor Services

HP Services

Network Education

Apple Macintosh Connectivity

HEWLETT® PACKARD

Apollo IEEE 802.5 (IBM Token-Ring)

Technical Data

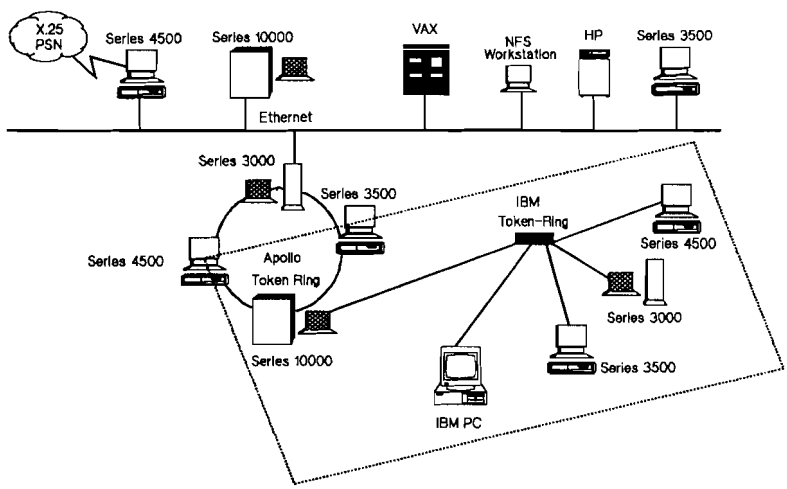
Product Number
A-NET-ITR

Description

The industry-standard 4 Mbit-per-second IBM Token-Ring Network (IEEE 802.5) connects as many as 260 devices on a single network. The Token Ring Network uses a concentrator that attaches up to eight workstations or peripherals over connections called lobes, which use either shielded or unshielded twisted-pair cable. Lobes can be up to 330 feet in length. Workstations are connected to lobes through an 802.5 network controller.

Each concentrator can implement an individual eight-device token-passing ring network. Or, multiple concentrators can be connected in a closed loop to create larger networks. Up to 260 devices can be connected in a single network. Repeaters can be used to extend the distance between attached concentrators to as far as two kilometers.

The IBM Cabling System specifies several twisted-pair cable types for use as lobe media, including Types 1, 2, and 3.



Access to the IBM Token-Ring Network is controlled by a token that is passed from node to node around the network. A node is permitted to transmit data only when it has control of the token, so only one transmission takes place at any instant. Transmission collisions are avoided, eliminating the inefficiencies of collision detection and data retransmission.

Apollo on the IBM Token-Ring

Because of its network-independent architecture, the Apollo computing environment is functionally identical regardless of the type of network on which it is implemented. This means that the flexibility, high performance, and transparency provided by a distributed single-image file system, diskless node support, and demand-paged virtual memory are all part of the IBM Token-Ring Network implementation of Apollo's Domain Distributed Services.

Hardware

The 802.5 Network Controller-AT (Apollo model # A-NET-ITR) provides a high-speed, reliable connection between an Apollo workstation with an AT bus and an IBM Token-Ring Network. The controller board functions in any Apollo workstation with a primary-system AT bus, including:

- DN/DSP 2500—10000
- HP 9000 Series Models 400, 400t, 425t, 400s, 433s

Controller Features

- IEEE 802.5-compatible
- Uses a single IBM AT slot
- Uses the TMS380 token ring chip set
- Media interfaces include a 9-pin subminiature D-connector and an RJ11 connector for support of cable Types 1, 2, and 3
- High performance assured by use of 16-bit-bus master mode and DMA transfers
- DMA channels and interrupt levels are jumper selectable

Configurations and Components

Depending on expansion slot capacity, Domain/OS workstations support up to four network controllers and up to two of any one network type. So an AT bus-based Apollo workstation can act as a router of packets between various networks, thus extending the Apollo computing environment over all Apollo workstations in the internet. For example, one DN4500 that contains an 802.5 Network Controller-AT, an 802.3 Network Controller-AT, and an ATR Network Controller-AT will route both Domain and TCP/IP packets between the networks and extend Apollo's transparent computing environment across all three.

A workstation with an 802.5 Network Controller-AT supports both Domain Distributed Services and industry-standard TCP/IP communications. So the workstation can communicate with other members of the Apollo computing environment as well as with other workstations on the IBM Token-Ring Network that use TCP/IP. Both functions are supported concurrently through one network controller.

Apollo's IBM Token-Ring product set includes all the components necessary to install an IBM Token-Ring Network, including the concentrator devices and several types of IBM Cabling System cable. These IBM Token-Ring Network accessories are available in Apollo's Instant Apollo catalogue.

Ordering information

A-NET-ITR 802.5 Network Controller-AT

Documentation

D-14448-O Installing the 802.5 Network Controller-AT
D-9916-B Planning Domain Networks and Internets

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Apollo IEEE 802.3 (Ethernet)

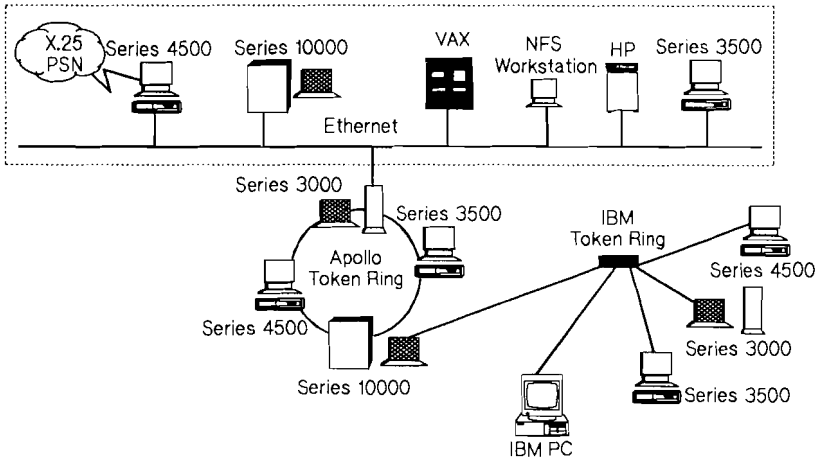
Technical Data

Product Numbers
A-NET-ETH
V-NET-ETH

Description

Because of its network-independent architecture, the Apollo computing environment is functionally identical regardless of the type of network on which it is implemented. This means that the flexibility, high performance, and transparency provided by a distributed single-image file system, diskless node support, and demand-paged virtual memory are all part of the IEEE 802.3 (Ethernet) network implementation of Domain Distributed Services (DDS).

For communications over Ethernet networks, Apollo offers a selection of controller products—the 802.3 Network Controller-AT and the 802.3 Network Controller-VME PLUS. These controllers allow the full range of Apollo workstations to be connected to standard Ethernet networks.



The IEEE 802.3 network (Ethernet) is an industry-standard, 10 Mbit/second bus network. The IEEE 802.3 standard specifies two media types for network implementation—Ethernet baseband coaxial cable and thin Ethernet baseband coaxial cable.

Physically, an IEEE 802.3 network is bus-based, with nodes attached at intervals along the bus. But the logical topology and the specific method of workstation attachment vary depending on the medium used. In standard Ethernet, thin Ethernet nodes are connected in a logical bus topology.

There are currently three widely used implementations of Ethernet. The original Ethernet network and its successor are respectively known as Ethernet Version 1 and Ethernet Version 2. The third implementation is the IEEE 802.3 industry-standard network. Each requires slightly different hardware, but many of today's network

controllers provide jumper-selectable support for all three network variations.

Controller Features

802.3 Network Controller-AT

- Is IEEE 802.3-compatible and supports Ethernet Versions 1 and 2
- Requires a single AT bus slot
- Supports external transceiver connections to standard Ethernet and Ethernet networks implemented on broadband coaxial cable and twisted-pair cable
- Supports connection to thin Ethernet via an onboard transceiver
- Includes a 15-pin D-type connector for connection of a standard transceiver cable and one PNXT connector for thin Ethernet connection
- Provides switch-selectable interrupt levels, bus address, and DMA channels
- The 802.3 Network controller is NOT recommended for use in the HP/Apollo 9000 Series 400 machines. Use the built-in Ethernet adapter in these machines.

802.3 Network Controller-VME Plus

- Requires a single, industry-standard VME bus slot
- Supports external transceiver connection to standard Ethernet and Ethernet networks implemented on broadband coaxial and twisted-pair cables
- Includes a 15-pin D-type connector for connection of a standard transceiver cable

Configurations

Depending on expansion slot capacity, Domain/OS workstations may support up to four network controllers, in total, and up to two of any one network type. So an Apollo workstation can act as a router of packets between various networks, extending the computing environment over all Apollo workstations in the internet. For example, an Apollo DN4500 Workstation containing an 802.3 Network Controller-AT, an 802.5 Network Controller-AT, and an Apollo Token Ring Network Controller-AT will route both Domain and TCP/IP packets between the networks and extend the Apollo computing environment across all three.

A workstation with any of the Ethernet controllers described above supports DDS, industry-standard TCP/IP communications, and Apollo/TECHnet. So the workstation can communicate with other members of the Apollo computing environment, as well as with other stations on the IEEE 802.3 network. All functions are supported concurrently through one network controller.

Ordering Information

A-NET-ETH 802.3 Network Controller-AT
V-NET-ETH 802.3 Network Controller-VME

Documentation

D-10614-C Installing the 802.3 Network Controller-AT
D-9916-B Planning Domain Networks and Internets

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Apollo Token Ring Network

Technical Data

Product Numbers
A-NET-ATR
V-NET-ATR

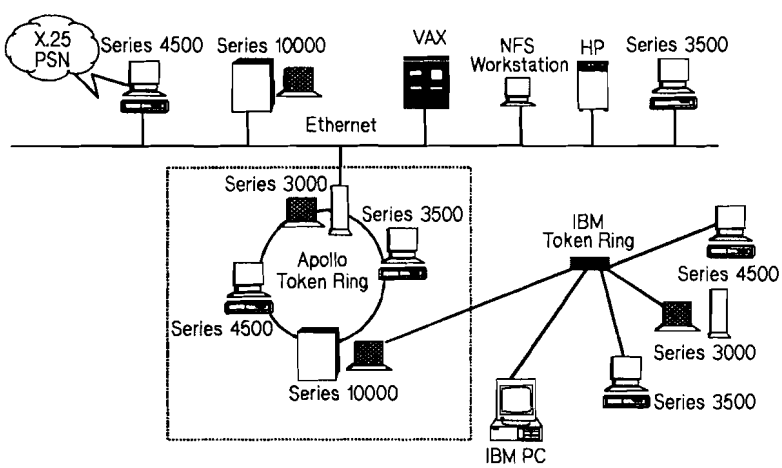
Description

The Apollo Token Ring Network is a 12 Mbit-per-second token-passing ring network optimally designed to support Apollo's distributed computing environment.

Cabling for Apollo Token Ring may consist of either 75 ohm coaxial cable, or shielded twisted-pair (such as IBM Type 1), with optional balun.

Network switches allow ring networks to be built in a logical star topology. Individual loops or subnetworks can be switched out of the network for purposes of maintenance, risk isolation, and security.

HP/Apollo offers a selection of bridge products to permit the connection of geographically separated Apollo Token Ring Networks into one large computing environment. Such internetworking allows a user in one Apollo Token Ring network to transparently access files and resources on the other networks. Media used to connect the individual networks include T1 telephone service in North America, G703 telephone service in Europe, 75 ohm coaxial cable, Ethernet, and fiber-optic cable.



Flexible, High-performance, Transparent Distributed Computing

The HP/Apollo network-independent architecture means the Apollo computing environment is functionally identical on all network types. Apollo's Token Ring Network implementation of Domain Distributed Services (DDS) provides users with a distributed, single-image file system, diskless node support, and demand-paged virtual memory. This ensures extreme flexibility, high performance, and transparency.

Controller Features

The ATR Network Controller-AT provides a high-speed, reliable connection between an AT bus-based Apollo workstation and an Apollo Token Ring (ATR) Network. In turn, the ATR Network Controller-VME is designed specifically to support the powerful Series 10000 Personal Supercomputer.

ATR Network Controller-AT (A-NET-ATR)

- A single AT format slot
- A 9-pin D-subminiature connector providing an interface to the Apollo Token Ring Network through the Domain Quick Connect (DQC) system
- Used in: DN 2500—5500, DSP 3500—5500, 9000/400 Series workstations with ISA or EISA expansion slot(s) running Domain/OS.

ATR Network Controller-VME (V-NET-ATR)

- Compatibility with the VME bus, Revision C.1, IEEE P1014 standard
- Double-height Eurocard form-factor
- A 15-pin D-subminiature connector providing the controller-to-network interface through the DQC system
- DMA supported
- Used in : DN/DSP 10000 series.

Twisted-Pair Balun (K2121)

- Connects an ATR network controller to IBM Cabling System wall socket. Wall sockets must be wired with shielded twisted-pair cable (IBM Type 1).

Configurations

Depending on expansion slot capacity, Domain/OS workstations may support up to four network controllers, in total, and up to two of any one network type. As a result, an AT bus-based Apollo workstation can act as a router of packets between various networks, extending the computing environment over all Apollo workstations in the internet. For example, one DN 4500 Workstation containing two ATR Network Controller-ATs and an 802.3 Network Controller-AT will route both Domain and TCP/IP packets between the networks and extend the computing environment across all three.

HP also references the Proteon P4100+ router as a unit capable of connecting to Apollo Token Ring and routing Domain packets. Proteon is located in Westborough, MA.

Ordering Information

A-NET-ATR Apollo Token Ring Network Controller-AT
V-NET-ATR Apollo Token Ring Network Controller-VME
K2121 Apollo Token Ring Twisted-Pair Balun

Documentation

D-10616-O Installing the Apollo Token Ring Network Controller-AT
D-9916-B Planning Domain Networks and Internets

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Apollo/X.25

Technical Data

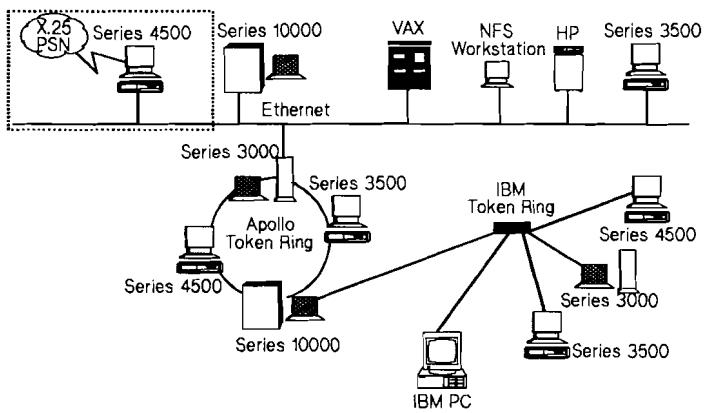
Product Number
LA67A

Description

Apollo/X.25 enables Apollo workstations to communicate over packet-switched wide area networks (WAN). Since X.25 is an international standard, the Apollo/X.25 protocol allows Apollo systems to communicate with a wide variety of products from other vendors, including mainframes, minis, workstations, and PCs. Apollo/X.25 users are able to conduct long distance communications for file transfer, electronic mail, remote log in, and remote program execution.

Apollo/X.25 is based on the 1980 recommendations of the CCITT (Consultative Committee for International Telephony and Telegraphy). Apollo/X.25 is yet another example of Apollo's commitment to openness and standards.

The Apollo/X.25 applications will run on a 68K workstation or server using a COM-SCAT card. Any Apollo workstation, including the DN10000, attached to a LAN running Domain Distributed Services (DDS) is able to use the server/workstation's X.25 capabilities.



Features

- Provides shared X.25 gateway services to a community of Apollo workstations attached to Apollo Token Ring, Ethernet, or IBM Token Ring LANs.
- Conforms to CCITT 1980 recommendations.
- Supports X.28, X.29, and X.3 PAD functionality.
- Operates at up to 64 Kbytes per second.
- Supports glass TTY and VT100 virtual terminal emulation.
- Simultaneously provides more than 128 virtual circuits (X.25 sessions).
- Provides a call library that allows users to write Pascal, C, and Fortran 77 applications that use X.25 virtual circuits.
- Allows Apollo-to-Apollo file transfer.
- Public carrier subscription parameters are set at the time of X.25 software initialization.
- Supports standard and non-standard window sizes and packet sizes.
- Supports bidirectional or one-way logical channels.
- Allows use of Create Remote Process (CRP) in the inbound log-in server.

Hardware Options

Apollo/X.25 uses the Serial Controller-AT communications controller, which can be used in any 68000-based Apollo workstation with an AT-compatible bus. The Serial Controller-AT provides two communications lines with speeds up to 64 Kbits. Each port can be configured for one of three supported physical interfaces: RS232, RS422/449, and V.35. Interfaces and line speeds can be mixed between the ports without restriction. Refer to the Serial Controller-AT product brief for more information. The Serial Controller-AT can be installed in either a dedicated server or a standalone workstation.

Virtual Terminal and File Transfer Capabilities

Apollo/X.25 conforms with the X.28, X.29, and X.3 PAD standards to provide line-oriented communications. These features allow users to write programs that may call upon the services of minis and mainframes from several different vendors.

An interactive terminal emulation built upon the X.28, X.29 and X.3 standards provides Apollo users with glass TTY or VT100 terminal services. These services allow the user to log into systems that support X.25 for the purpose of running programs, querying databases, or exchanging mail messages.

Also included in the standard Apollo/X.25 product is the Apollo File Transfer Service (FTS). This feature gives Apollo users the ability to transfer files reliably from one Apollo system to another via the X.25 PSN. In the event of a temporary failure of the communications line, the FTS application automatically detects the problem, suspends operations, and then ensures that the file is transmitted in its entirety once the line is restored.

Ordering Information

LA67A License, Media, and Documentation for 68K SR10
BAC 9 track magnetic tape
BAD cartridge tape

Documentation

D-13586-C Planning for Apollo/X.25
D-13588-C Managing Apollo/X.25
D-13587-C Using Apollo/X.25

Domain TCP/IP

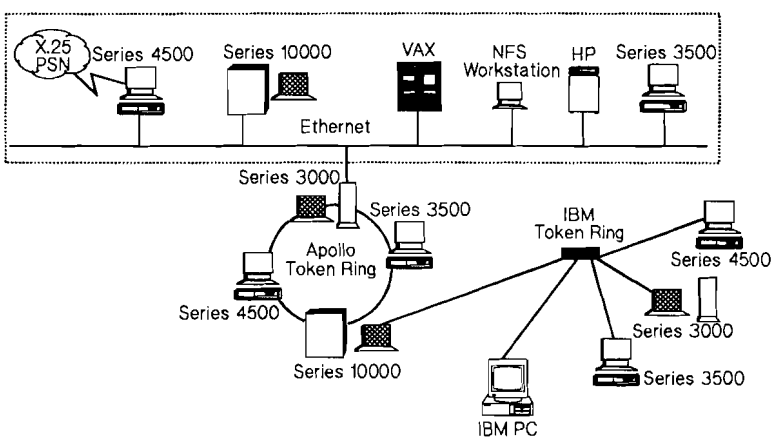
Technical Data

Description

Domain TCP/IP provides Apollo workstation users with shared access to a large number of heterogeneous computing systems attached to a TCP/IP internetwork. Such systems include mainframes, minicomputers, superminicomputers, personal computers, as well as other workstations. Apollo systems utilize Domain TCP/IP in conjunction with either the Apollo Token Ring or one of a variety of Ethernet cable plants, including thick-wire, thin-wire, fiber-optics, twisted-pair, and broadband. In addition, Domain TCP/IP services can be run in a single gateway node which can serve an entire community of Apollo workstations locally running Apollo's Domain/OS distributed operating environment.

The communications protocols provided by Domain TCP/IP include the Internet Protocol (IP) at the Network Layer and Transport Control Protocol (TCP) and/or the User Datagram Protocol (UDP) at the Transport Layer.

Application Layer services provided in Domain TCP/IP include File Transfer Protocol (FTP) for highly reliable bidirectional file transfer, Telnet for bidirectional virtual terminal services, and Simple Mail Transfer Protocol (SMTP) using Domain sendmail. All of these services are based on industry standards and hence are able to operate with systems from multiple vendors.



Domain TCP/IP provides shared access to heterogeneous systems, including mainframes, superminicomputers, personal computers, and other workstations.

Features

- Provides bidirectional file transfer and virtual terminal services between Apollo and non-Apollo systems.
- Conforms to industry standards and will coexist in large multivendor networks.
- Supports cost effective and reliable TCP/IP-based gateway services.
- Supports fully functional routing daemon as well as subnet routing.
- Maps host names to internetwork addresses.
- Provides full-duplex connections.

Components and Configuration

Domain/OS, version SR10 and later, includes Domain TCP/IP as an integral part of that code. Any system which is purchased with or upgraded to SR10 will include Domain TCP/IP at no extra charge. A software license and a full set of documentation are included. Domain TCP/IP is supported on the Apollo Token Ring as well as all versions of Apollo's Ethernet controllers, Apollo's IBM Token Ring controller, and workstation serial ports, and includes the following software components:

- **File Transfer Protocol (FTP)**
  FTP is an Application Layer protocol that lets users and programs copy files between systems attached to a TCP/IP internetwork. The FTP program can be invoked from either the sending or receiving system, or from a third system.
- **Telnet Protocol**
  Telnet is an Application Layer protocol that lets users log on to a remote system attached to a TCP/IP internetwork as if the user's node were a workstation physically attached to that system. Domain TCP/IP Telnet also supports in-bound log on so that remote systems can log on to Apollo systems.
- **User Datagram Protocol (UDP)**
  UDP is a Transport Layer protocol that provides a connectionless, transaction-oriented datagram service. This service lets programs direct datagrams to specific processes running on other systems attached to the TCP/IP internetwork. The UDP service is essential for datagram oriented services such as Apollo's Network Computing System (NCS).
- **Transmission Control Protocol (TCP)**
  TCP is a Transport Layer protocol that provides a connection-oriented byte-stream service that is reliable and flow-controlled. The TCP protocol manages the virtual connection over the Internetwork. On the sending end of a transaction, TCP provides the orderly disassembly of messages into network-manageable datagrams (packets). On the receiving end, it provides for the orderly reassembly of datagrams back into complete messages.
- **Internet Protocol (IP) and Serial Line IP (SLIP)**
  IP is a Network Layer protocol that transparently provides the necessary mechanisms to route a message through gateways connecting multiple internetworks. IP serves either the TCP or UDP upper layer protocols by offering any and all pathways to a desired end-node target. SLIP consists of IP provided over a serial line.
- **Simple Network Management Protocol (SNMP)**
  SNMP is the network management protocol used by TCP/IP based systems. Domain TCP/IP allows its host workstation or server to be managed by SNMP management application programs, such as HP's OpenView.

These integrated components provide users easy-to-use, high-level services to interact with other heterogeneous computing systems. Coupled with a wide range of physical communications media, Apollo's Domain TCP/IP provides a universal means for building large, geographically dispersed data communications networks.

File Transfer Services

The File Transfer Protocol allows users and programs to bidirectionally transfer files to and from Apollo systems and other systems attached to a TCP/IP network. FTP also allows the remote transfer of files from a third-party system—that is a system other than the sending or receiving system). Using Domain FTP, users are able to access or store binary or ASCII files in remote system disks with full fidelity. ASCII or binary files can be transferred and stored in a form that is accessible to the system on which they are stored. FTP also allows users to obtain current status information about remote file systems.

The interactive FTP commands provide a variety of capabilities to help users effectively and efficiently execute the following:

- Access Control Commands—to let users identify themselves to a remote host.
- Data Transfer Commands—for describing the format of data being transferred.
- Service Commands—to let users transfer data and request the remote host to perform various functions.

Telnet Services

The Telnet virtual terminal protocol lets users log on to a remote host attached via Ethernet-TCP/IP. Users can then access remote host services as if on a local ASCII TTY terminal. In addition, remote host users can log on to Apollo nodes.

Telnet has two modes of operation: command and data. In command mode, Telnet commands are used to describe the user's connection to the remote host and to control the transfer of data with the host. In data mode, users can send and receive data to and from a remote host. All data typed at the keyboard is sent to the remote host and the received data is then sent to a transcription pad. Users can change Telnet operating modes with a single function key.

Ordering Information

Domain TCP/IP is included at no charge with every copy of Domain/OS.

Documentation

D-10483-A Planning For TCP/IP (SR9.7)
D-8543-E Configuring and Managing TCP/IP Products
D-8667-E Using TCP/IP Network Applications

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Apollo/Integrated SNA 3770 Versions 1.2 and 1.2.p

Technical Data

Product Number
LAA30BAD

Description of the Software

Apollo/Integrated SNA 3770 is a Remote Job Entry (RJE) emulation product that allows you to send batch jobs to, and receive print and punch output from a remote IBM SNA host computer. Apollo/Integrated SNA 3770 emulates an IBM multiple logical unit (MLU) workstation supporting a combination of IBM 2502 Card Readers, IBM 3521 Card Punches, printers, diskettes, and a console.

The new 3770 product uses the server and gateway functions of the Apollo/Integrated SNA Facility. This means that the 3770 product no longer requires or provides its own gateway, but uses the Apollo/Integrated SNA Facility instead. The new gateway facility expands the capabilities of 3770 by supporting multiple serial links, depending on the number and configuration of the communications controllers.

Requirements

The following is a list of the hardware and software requirements for Apollo/Integrated SNA 3770, Version 1.2 or 1.2.p:

- SR10.3.5 or a later version of Domain O/S, running on an Apollo MC680x0-based workstation or server (for Version 1.2).
- SR10.3.5.p or a later version of Domain O/S, running on an Apollo Series 10000 workstation or server (for Version 1.2.p).
- Apollo/Integrated SNA Facility Version 1.2, 1.2.p, or later installed on a gateway node on the network.

The gateway node must be equipped with a PC AT compatible bus with at least one of the following installed:

- a Serial Controller-At Revision 8 and driver Version 2.1.
- an IEEE 802.5 Controller-AT. (Series 2500 workstations can only accommodate the IEEE 802.5 Controller-AT.)

Note: Series 2500, 3000, 3500, 4000, 4500, and DN10000 workstations all contain a PC AT bus.

Performance is best if the Apollo gateway node has at least 8 MB of memory.

Documentation

The document set that supported the previous Domain/SNA products has been revised substantially to support the Apollo/Integrated SNA products.

007760-A01—*Planning for the Apollo/Integrated SNA Facility.* There is one planning manual for all products.

007763-A01—*Configuring and Managing the Apollo/Integrated SNA Facility.* There is one manual that tells how to configure and manage the gateway function of the Apollo/Integrated SNA Facility.

012881-A01—*Using Apollo/Integrated SNA 3770.* The book that supports Apollo/Integrated SNA 3770. Each layered product has its own manual that tells how to use the product.

General Documentation Information

You can call the Tech Pubs Connection with questions or comments about any of the documentation, or to find out about new manuals.

In the U.S.A., call 1-800-441-2909. Outside the U.S.A., call (508) 436-4965.

To order manuals, call Apollo Direct Channel at 1-800-225-5290. Outside the U.S.A., please contact your local sales office.

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Apollo/Integrated SNA 3270

Technical Data

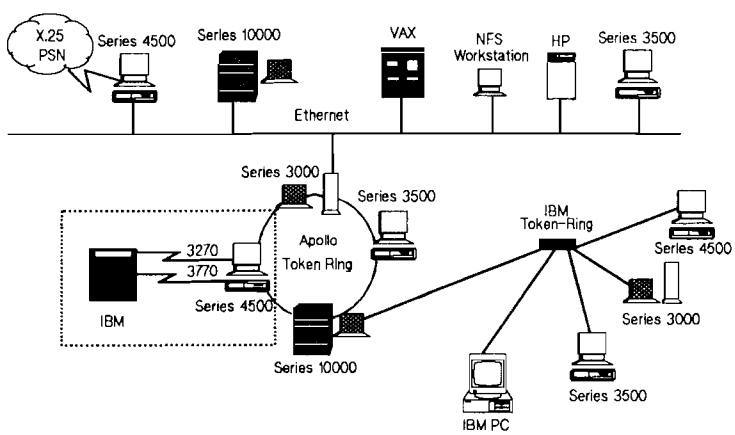
Product Number
LAA20

Description

Apollo/Integrated SNA 3270 allows interactive communications between an Apollo workstation and an IBM System/370-compatible mainframe using SNA 3270 protocols, handling 8-bit data streams. Apollo workstations running SNA 3270 emulate the functions of IBM 3278 terminals (Models 2,3,4, and 5).

Workstation users can select any of the emulation functions available and can have multiple logical sessions active simultaneously. Logged into the IBM computer as a terminal, an Apollo user can perform all functions normally done at an actual IBM terminal.

These Apollo/Integrated SNA products allow access to 3270 applications on the mainframe such as TSO, CMS, and CICS.



Features

- Allows Apollo workstations to emulate the major features of IBM 3278 terminals (models 2,3,4, and 5). Terminal access can be through the standard Apollo workstations supported options (bit-mapped display, serial interface, multiplexer).
- The file transfer utility enables interactive file transfers of eight-bit data streams on the Apollo workstations to IBM systems running TSO, CICS, or CMS. File transfer requires the "IND$FILE" support on the mainframe.
- Multiple session capability enables the user to control multiple host sessions on the same workstation.
- Support for extended color (eight-color) and extended attributes: underlining, reverse video, and blinking fields.
- Keyboard mapping utility to change keyboard layout, map 3270 functions onto the workstation keyboard.

Features not supported

- For the 3270 display: Programmed symbols, alt cursor, test key, keyclick, entry assist, encryption

Customer Installation Responsibility

The product is customer-installable. User installation aids such as an automated installation procedure are provided, along with the manual "Configuring and Managing the Apollo/Integrated SNA Facility," which is shipped with the Integrated SNA Facility product. Additional assistance can be provided by an HP System Engineer on a time-and-materials basis. For additional information, contact your Hewlett-Packard sales representative.

Ordering information

Requires Apollo/Integrated SNA Facility gateway LAA0A and SNA communications controller (Serial Controller-AT or an IBM Token-Ring card). Apollo/Integrated SNA 3270 is licensed per CONCURRENT SESSION. Instructions for obtaining licenses are included in the documentation.

Customer must order LAA20 and one option from media and documentation group, and one option from corporate license option group.

LAA20 Apollo/Integrated SNA 3270 for Apollo workstations

License, Media, and Documentation

Options
BAC:SR10, magnetic tape
BAD:SR10, cartridge tape
BBC:Prism, magnetic tape
BBD:Prism, cartridge tape
LBA2000 Corporate License

Requires previous installation of LAA0A Apollo/Integrated SNA Facility.

Documentation

7760-A01 Planning for Apollo/Integrated SNA
7763-A01 Configuring and Managing the Apollo/Integrated SNA Facility
7762-A01 Using Apollo/Integrated SNA 3270

HEWLETT® PACKARD

Apollo/Integrated SNA LU 6.2

Technical Data

Product number
LAA1A

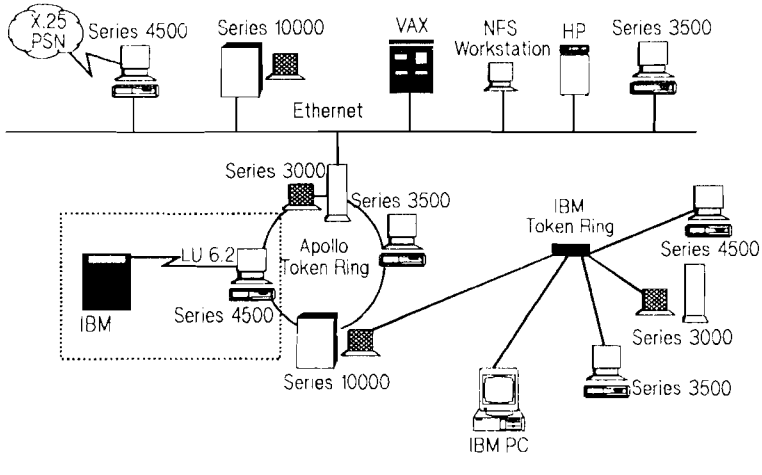
Description

Apollo/Integrated SNA LU 6.2 is a Systems Network Architecture (SNA) communications product that extends Apollo's networking to include IBM's Advanced Program-to-Program Communications (APPC).

The product is a developer's kit which enables Apollo workstation customers to develop an application program on the workstation. The program can then communicate with a related application on an IBM processor, such as a System/370 mainframe, AS/400, or other physical unit 2.1 node on the network.

Apollo/Integrated SNA LU 6.2 provides a high level of support for LU 6.2 and handles the most sophisticated program-to-program applications. Apollo/Integrated SNA LU 6.2 is ideal for Original Equipment Manufacturers (OEMs), third parties, and end users looking for a long term investment in an applications development platform.

On the Apollo workstation, the application is written using the Apollo/Integrated SNA LU 6.2 verbs. The verbs implement the base function set plus a number of option sets of the LU 6.2 architected basic verbs defined by IBM. The LU 6.2 verbs are used by the application transaction program to carry on a conversation with a partner transaction program on another PU 2.1 node.



Features

- Supports Apollo workstation applications and system calls written in Fortran, C, or Pascal.
- Supports UNIX®, BSD 4.3, System V.3, or Aegis environments.
- Takes full advantage of APPC through a powerful API that provides transport layer access for the application.
- Supports LU 6.2's basic set of conversation verbs and nine defined option sets.
- Can be tailored to the application and processor being used.

- Implements its verb set through system calls.

PU 2.1

Physical Unit 2.1 (PU 2.1) and PU 2.0 are available through Apollo/Integrated SNA Facility, depending on the network configuration. PU 2.1 applies when Apollo/Integrated SNA LU 6.2 is installed in peer-to-peer configurations, such as connecting an Apollo network to a nonmainframe computer (such as an AS/400) running LU 6.2 or when two Apollo workstations are connected as peers. PU 2.0 is normally used when connecting to IBM mainframes under existing IBM host access software. However, depending upon the configuration, Apollo networks will run PU 2.1 for connections to the IBM System/370-compatible mainframe.

With PU 2.1, both parallel and multiple sessions are supported. Parallel sessions permit a single LU 6.2 session to be designated for an application, such as electronic mail, and support any number of simultaneous users. This eliminates each user having a separate session for the same application. Multiple sessions permit a single LU 6.2 session to access an application running concurrently at different sites, such as electronic mail running on separate computers. PU 2.1 supports up to 254 LU 6.2 sessions.

Systems Administration

Apollo/Integrated SNA Facility offers a comprehensive system administration capability that uses LU 6.2 control operator verbs as well as mouse- and menu-driven control and configuration functions. The operator interface allows system administrators to access network, session, and configuration services, along with control and management functions.

Option Sets

- Immediate allocation of a session
- PIP data (both local and remote support)
- Flush the LU's send buffer
- Prepare to receive
- Long locks
- Post on receipt with wait
- Post on receipt with test for posting
- Test request-to-send received
- Get conversation attributes

Customer Installation Responsibility

The product is customer-installable. User installation aids such as an automated installation procedure are provided, along with the manual "Configuring and Managing the Apollo/Integrated SNA Facility" which is shipped with the Integrated SNA Facility product. Additional assistance can be provided by an HP System Engineer on a time-and-materials basis. For additional information, contact your Hewlett-Packard sales representative.

Ordering information

Requires previous installation of Apollo/Integrated SNA Facility gateway LAA0A and SNA communications controllers (Serial Controller-AT or Channel Controller-AT).

Customer must order LA1A and one option from media and documentation group.

LAA1A Apollo/Integrated SNA LU 6.2 for Apollo workstations

License, Media, and Documentation

Option
BAC:SR10, magnetic tape
BAD:SR10, cartridge tape
BBC:Prism, magnetic tape
BBD:Prism, cartridge tape

Apollo/Integrated SNA LU 6.2 verbs are summarized in the following table:

allocate	Establishes a mapped conversation between two transaction programs (TP).
confirm	Sends a confirmation request to the remote TP and waits for a reply.
confirmed	Sends a confirmation reply to the remote TP in response to receiving a confirmation request.
deallocate	Ends a mapped conversation between TPs.
get_attributes	Returns information pertaining to a mapped conversation.
flush	Flushes the LU's send buffer.
prepare_to_receive	Changes the conversation from send to receive state in preparation for receiving data.
receive_and_wait	Waits for information to arrive on the mapped conversation and then receives the information. The information can be date, conversation status, or request for confirmation.
request_to_send	Notifies the remote TP that the local TP is requesting to send data for the mapped conversation.
send_data	Sends data to the remote TP.
send_error	Informs the remote TP that the local TP has detected an error.
lu62_waitcv	Waits for the receipt of information on one or more conversations.
getlu	Acquires ownership of an SNA LU-LU session for a local TP.
lu62_dactses	Frees an LU-LU session that was acquired by, or allocated for, a TP.
lu62_atoe	Converts ASCII data to EBCDIC.
lu62_etoa	Converts EBCDIC data to ASCII.

Documentation

7760-A01 Planning for Apollo/Integrated SNA
7763-A01 Configuring and Managing the Apollo/Integrated SNA Facility
10017-A01 Apollo/Integrated SNA LU 6.2 Transaction Verb Reference

HEWLETT® PACKARD

Apollo/Integrated SNA Facility

Technical Data

Product Number
LAA0A

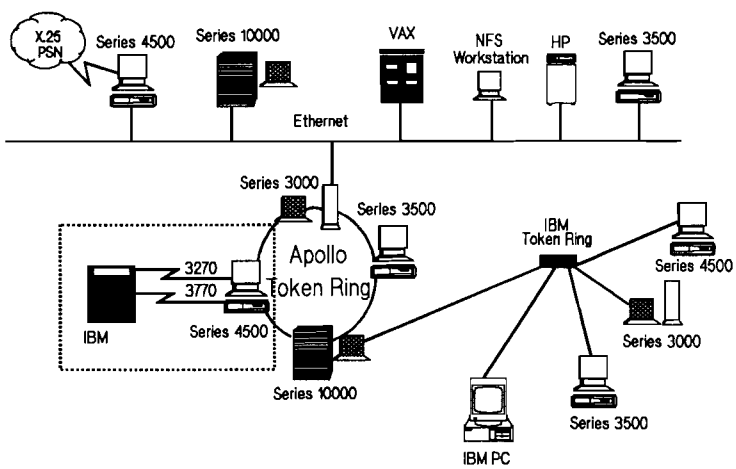
Description

The Apollo/Integrated SNA Facility, when used in conjunction with an SNA communications controller, provides communications between an Apollo workstation and an IBM System/370 or compatible mainframe using SNA protocols. The Apollo/Integrated SNA Facility manages the SDLC line or channel connection to the host and emulates the major features of the appropriate IBM cluster control unit using the lower four layers of SNA. The product supports Physical Unit Types 2 and 2.1 (PU 2, PU 2.1), and Logical Unit Types 1, 2, 3, and 6.2 (LU1, LU2, LU3, LU6.2).

The Apollo/Integrated SNA Facility supports and is used in conjunction with one or more presentation services: Apollo/Integrated SNA 3270, 3770, and Apollo/Integrated SNA LU 6.2. These products allow Apollo workstation users to connect instantly and simultaneously to IBM SNA host computers, access applications and databases, and perform file transfers—all while efficiently and effectively working on local Apollo resident files.

The Apollo/Integrated SNA Facility product requires an SNA communications controller, either the Serial Controller-AT communications controller in an AT bus-equipped gateway node, or an IBM Token-Ring card.

The Serial Controller-AT communications controller provides two high-speed serial communication ports (up to 64 Kbits per second) and supports the following interfaces: RS232, RS422/449, and V.35. Line speeds and interfaces can be mixed between two ports without any restrictions.



Features

- Apollo/Integrated SNA Facility allows the Apollo workstation to emulate the major features of a physical unit type 2.1 (PU 2.1) using SNA protocols.
- Apollo/Integrated SNA Facility supports multiple logical units (LUs) as terminals and printers concurrently. The number of LUs available is 255 per SNA communications controller connection.
- The microprocessor-based SNA communications controller offloads communications line activity, resulting in zero CPU overhead on the Apollo workstation when data is not being transmitted or received.
- Transparent access to IBM System/370 and compatible mainframes without having to disconnect from existing work.
- The Apollo/Integrated SNA Facility functions as a non-dedicated gateway. Depending on the customer's specific application requirements, Apollo/Integrated SNA Facility easily operates on an Apollo workstation while running other Domain applications.
- The Apollo/Integrated SNA Facility and Serial Controller AT communications controller support dual lines at 64 Kbps over switched or leased lines.
- Basic transmission unit size of either 265 bytes or 521 bytes for SDLC links.
- Message encoding: supports NRZ (Non Return to Zero) and NRZI (Non Return to Zero Inverted).

Functional Specifications

When used with the Apollo/Integrated SNA 3270 or LU 6.2, the Apollo/Integrated SNA Facility and SNA communications controller emulate a 3274 cluster controller.

The Apollo/Integrated SNA Facility allows communication with an IBM 370 or compatible mainframe running VM or MVS operating systems and ACF/VTAM through an IBM 37X5 communications controller running ACF/NCP. It also allows peer-to-peer communications with other physical unit 2.1 nodes in the network, using LU 6.2. The product includes run-time code to implement LU 6.2 verbs, which means that customers whose LU 6.2 applications already include the LU 6.2 verb calls can run the application directly on the Facility product. The Apollo/Integrated LU 6.2 product is not required in this case.

A Controller-AT communications controller requires one slot.

The Serial Controller-AT communications controller supports synchronous modem speeds up to 64 Kbits per second.

Apollo/Integrated SNA Facility, when used with the Serial Controller-AT communications controller, requires synchronous modems that support the following handshake signals: DTR, DSR, RTS, CTS, CD, RI. Modems must also provide transmit and receive clocks for the SDLC interface and ensure ground isolation between the communications systems.

Message encoding: supports NRZ (Non Return to Zero) and NRZI (Non Return to Zero Inverted).

Customer Installation Responsibility

The product is customer-installable. User installation aids such as an automated installation procedure and the manual "Configuring and Managing the Apollo/Integrated SNA Facility" are provided. Additional assistance can be provided by an HP System Engineer on a time-and-materials basis. For additional information, contact your Hewlett-Packard sales representative.

Ordering Information

Requires concurrent installation of an SNA communications controller (Serial Controller-AT or Channel Controller-AT).

Customer must order **LAA0A** and **one** option from media and documentation group.

LAA0A Apollo/Integrated SNA Facility for Apollo workstations

License, Media, and Documentation

Options
BAC:SR10, magnetic tape
BAD:SR10, cartridge tape
BBC:Prism, magnetic tape
BBD:Prism, cartridge tape
LBA0A000 Corporate License

Documentation

7760-A01 Planning for Apollo/Integrated SNA
7763-A01 Configuring and Managing the Apollo/Integrated SNA Facility

HEWLETT® PACKARD

Serial Controller-AT

Technical Data

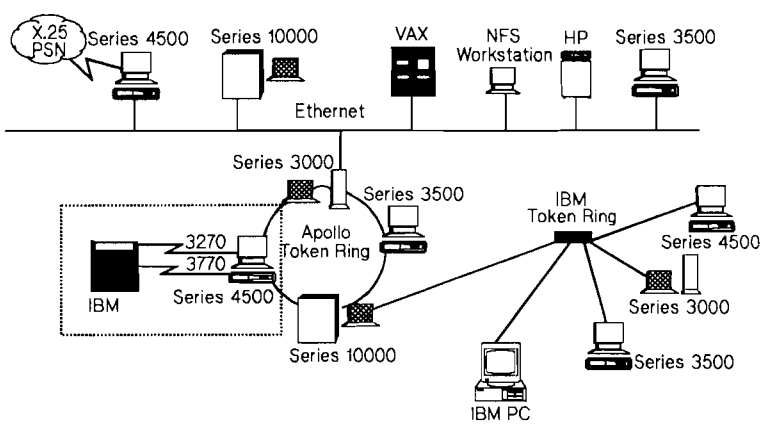
Product Number
SCAT10

Description

The Serial Controller-AT is a dual-port, microprocessor-controlled serial communications control card for Apollo's AT bus-compatible workstations. It provides two high-speed data communications channels supporting such Apollo software communications products as Apollo/Integrated SNA Facility, LU 6.2, and X.25.

Built around Intel's 80186 microprocessor, the Serial Controller-AT works with Apollo's entry-level and high-end workstations—from the Series 3000 and Series 3500 Personal Workstations to the Series 4000 and Series 4500 Personal Super Workstations and HP 9000 Series 400 workstations with optional ISA interface slots to the Series 10000 Personal Supercomputer—to provide a communications gateway to IBM mainframe computers. The Serial Controller-AT also provides X.25 connectivity to public data networks (PDN), such as Telenet, PSS, Datapak, and Datex-P. Private X.25 networks are also accessible.

The Serial Controller-AT supports two communication ports. The ports operate simultaneously, and each supports up to 64 Kbits per second. Each port can be configured for one of three interfaces: RS232, RS422/449, and V.35. Interfaces and speeds can be mixed between the two ports without any restrictions.



Features

- Supports Apollo Integrated SNA Facility and Apollo/LU 6.2
- Can be used individually or layered for multiapplication support
- Supports X.25, conforming to CCITT 1984 specifications
- Up to four Serial Controller-AT cards can be installed on a single workstation

- Connections can be made from multiple cards to the same front-end processor (FEP) or to multiple computers, depending on network requirements
- Each card can be configured for interrupt levels and bus I/O addresses
- Each card's default setting can be modified to avoid conflicts with other AT bus operations taking place in a workstation

Specifications

Length: 35.2 cm (13.86 in)
Width: 2.1 cm (0.83 in)
Height: 12.6 cm (4.96 in)

Power Requirements

+5 VDC 1.8A
-5 VDC 0.1A
+12 VDC 0.025A
-12 VDC 0.025A

Documentation

D-11904-O Installing the Serial Controller-AT

Ordering Information

	cable1	cable2
SCAT10NN-*	none	none
SCAT10R2N-*	RS232	none
SCAT10R2R2-*	RS232	RS232
SCAT10R2R4-*	RS232	RS422
SCAT10R2V-*	RS232	V.35
SCAT10R4N-*	RS422	none
SCAT10R4R4-*	RS422	RS422
SCAT10R4V-*	RS422	V.35
SCAT10VN-*	V.35	none
SCAT10VV-*	V.35	V.35

where * can be: C magnetic tape
D cartridge tape
designating media type for driver software.

HEWLETT® PACKARD

HP-PB Asynchronous Multiplexer Family

Technical Data

Product Numbers
HP J2092A, J2093A, J2094A, J2096A

The family of HP Asynchronous Multiplexers is composed of three 16-channel products, and one 32-channel product, each of them using on standard slot of the HP-PB based HP 9000 systems.

The 16- and 32-channel Asynchronous Multiplexers provide a means to connect up to thirty-two asynchronous serial devices to PA-RISC HP 9000 Series 800 computers which use the HP-PB (Hewlett-Packard Precision Bus) as their primary system input/output bus and have HP-UX operating system version 8.0 or later installed.

Based on on-board microprocessor and memory, the Multiplexers handle data transmission and control, inbound and outbound traffic flow control, and modem signals control. It is thus an intelligent and powerful I/O card freeing the system CPU of traffic overhead and guaranteeing data integrity and no character loss.

The 16- and 32-channel multiplexers provide one of the following solutions:

J2092A: 16 RS-232-C compatible ports for direct connection

J2093A: 16 RS-423-A compatible ports for direct connection requiring long distance cabling

J2094A: 16 RS-232-C compatible ports for direct and remote connection with support of full duplex modem control

J2096A: 32 RS-232-C compatible ports for direct connection. The J2096A product is functionally identical to the J2092A product, but with 32 ports.

A wide range of configurable transmission modes and formats permits hardwired and remote connection of various CRT terminals, printers, plotters, and other asynchronous devices.

Features

Feature set common to the four products:

- Programmable data-rate for each channel
- Programmable character size: 7 or 8 data bits
- Programmable number of stop bits: 1 or 2
- Parity, overrun, framing error check detects transmission faults
- Break detection and generation
- Automatic and programmable device XON/XOFF handshaking to pace MUX input and output data transmission
- Programmable parity: odd, even, or none
- On-board buffering to send/receive data to/from host for multiple ports
- Firmware based self tests executed at "power-on"
- A customer diagnostic utility is available to verify hardware/ software and data path integrity for each port
- Online diagnostic tools are also available to support engineers to troubleshoot the card

Features specific to the J2092A and J2096A products:

- EIA RS-232-C and V24/V28 compatibility for data only connections (no modem control) on default RJ-45 female standard connectors provided with the product
- Line speed up to 38.4 kb/s
- Remote support of the card is possible through the use of the diagnostic tools

Features specific to the J2093A product:

- EIA RS-423-A and V10 compatibility for data only connections (no modem control) on the default RJ-45 female standard connectors provided with the product. This allows the operation of RS-423 and RS-422 devices such as HP terminals (HP 700/32, HP 700/92, HP 700/94, HP 2392A) and HP printers (HP LaserJets) at distances up to 1200m
- Line speed up to 38.4 kb/s

Features specific to the J2094A product:

- EIA RS-232-C and V24/V28 compatibility for connection of terminals, modems, or serial printers on DB-25 female standard connectors
- All lines support full-duplex modem control (8 signals per channel) which permit point-to-point dialup or leased line operation
- Three types of modem protocol are supported:
  - Bell protocol, 2 signals: DTR and DCD
  - CCITT protocol, 6 signals: DTR, DCD, DSR, RTS, CTS, RI
  - No protocol, user can handle 8 signals (4 input/4 output)
- Line speed up to 19.2 kb/s
- Hardware flow-control capability through the use of CTS/RTS signals
- Remote support of the card and connection panels is possible through the use of the diagnostic tools

Functional Description

The 16- and 32-channel Asynchronous Multiplexers comprise three major functional assemblies:

- The MUX card: A single width HP-Precision Bus card that interfaces with the system backplane
- The link cable between the MUX bulkhead and the distribution panel(s) (4 meters)
- The distribution panel(S), for peripheral attachment:
  - For the J2092A and J2093A, one 16-port direct distribution panel (DDP) offering standard RJ-45 female connectors is provided
  - For the J2096A, two 16 port direct distribution panels are provided, offering 32 standard RJ-45 female connectors
  - For the J2094A, two 8 port modem distribution panels (MDP) are provided, each providing 8 standard DB-25 female connectors

These distribution panels can be rack mounted in standard 19" bays. (For more details refer to the section "Rack installation" of this data sheet.

Note: Customized cabling scheme or other distribution panels can be used with the direct connect products (J2092A, J2093A, J2096A).

At the heart of the HP 16- and 32-channel multiplexers is a circuit card that contains a 68000 microprocessor and associated PROM and RAM memory. The 128 Kbyte PROM contains the power-up self-test and system support code. The code downloaded from the host is stored in the 256 Kbyte RAM. Download operation and card diagnostics are performed through a special supervisor on-card buffer.

Functional Specifications

Buffering: On-card buffering to send/receive data for multiple ports to increase throughput and reduce host CPU load.

Transmit Buffer Size: 255 bytes per port

Receive Buffer Size: 511 bytes per port

Software: HP 9000 Series 800 HP-UX revision 8.0 or later

Communications

Signals available on the RJ-45 connectors of the DDP or the DB-25 connectors for the RS-232-C products.

RS-232-C	V.24	Abbrev.	Description	Input/ Output	Connector Pin Nos. on ADP II	Connector Pin Nos. on DDP
AA	101		Protective Ground	N/A	1	N/A
AB	102	SG	Signal Ground	N/A	7	6
BA	103	SD	Transmit Data	O	3	3
BB	104	RD	Receive Data	I	2	1
CA	105	RS	Request to Send	O	8	N/A
CB	106	CS	Clear to Send	I	22	N/A
CC	107	DM	Data Set Ready	I	20	N/A
CD	108	TR	Data Terminal Ready	O	6	N/A
CF	109	RR	Data Carrier Detect	I	4	N/A
CH	111	SR	Signal Rate Selector	O	23	N/A
CE	125	IC	Ring Indicator	O	9	N/A
--	--	GPO	Gen. Purpose Output	O	5	N/A

Signals available on the RJ-45 connectors of the DDP for the RS-423A product for connection of RS-423 or RS-422 devices.

Description	Input/ Output	Connector Pin Nos on DDP
Protective Ground	--	N/A
Transmit Data (+)	O	3
Transmit Data (-)	O	6
Receive Data (+)	I	1
Receive Data (-)	I	2

To allow flexible and customized cabling scheme using connectors other than the default RJ-45 connectors distribution panels, the direct connect products—J2092A, J2093A, J2096—offer a single sub-D high density 78 pins connector (female) on the MUX card.

Data Rates: Baud rate defaults to 300 and is software programmable to any of the following rates: 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200. In addition, 38400 bits/s is supported with J2092A, J2093A, and J2096A products.

cross talk between pairs	bits/sec	meters/(feet)
1 volt (RS 423 recommendation)	0 to 38400	300/(1200)
2 volts (with HP peripherals)	0 to 19200	1200/(4000)
	38400	300/(1200)

Note regarding the J2093A product: The maximum baud rates/distances supported are the following:

Throughput: The 16- and 32-channel Multiplexer hardware and firmware is able to support an inbound data throughput of 19.2 K baud simultaneously on each channel (or 38.4 K baud simultaneously on 8 channels), without character loss when flow control is activated, or an outbound data throughput of 19.2 K baud simultaneously on each channel. However, the global system performance of the system is dependent on the customer application and on the HP 9000 HP-PB Series 800 computer load and performance.

Communication Mode: Bit serial, asynchronous

Break Detection and Transmission: Break condition is recognized by the interface, and message is sent to the host. Break condition can also be generated by the MUX at the request of the host.

Device Handshakes: The MUX is capable of pacing both inbound an outbound data via an "XON/XOFF" type of protocol. The "XON/XOFF" characters are programmable. The host may program the MUX card to automatically manage "XON/XOFF" flow control, thus avoiding any character loss. The "XON/XOFF" may also be under application control, but no data loss is guaranteed only

if the MUX is responsible for flow-control.

In the J2094A product, in addition to the XON/XOFF flow control mode, inbound and outbound data flow can be managed by the MUX card through the use of CTS/RTS modem signals.

Edit Functions: Edit functions such as backspace, character delete, and line delete are passed to the host and managed by the host operating system.

Installation and Support

The J2092A and J2096A products are usually installed into the system when purchased with the system. However, they may also be purchased as an add-on products, as can the J2093A and J2094A products. All products are customer installable. Customers may choose to purchase installation services from Hewlett-Packard.

Diagnostics: A self-test is performed at power-on by the system on all cards. Visual status indicators exist on the MUX panel. Two LED indicators monitor the MDP status (power-on and link) of the J2094A.

A customer diagnostic utility is available to perform verification of each port.

Additional online diagnostics and reset capabilities are provided through the system diagnostic environment (DUI) for use by an HP Customer Engineers.

Support Services: Hardware/Software support services available for this product are included in the System Support services.

Ordering Information

The RS-232-C direct connect multiplexers (J2092A, J2094A) are bundled with the HP 9000 Series 800 systems when ordered with the system option 60x (refer to the HP 9000 configuration guide). For add-on cards or other configurations, use the following:

J2092A HP-PB 16 channel RS-232-C Direct Connect Asynchronous Multiplexer

J2093A HP-PB 16 channel RS-423-A Direct Connect Asynchronous Multiplexer

J2094A HP-PB 16 channel RS-232-C MODEM Connect Asynchronous Multiplexer

J2096A HP-PB 32-channel RS-232-C Direct Connect Asynchronous Multiplexer

Physical Specifications

	Height	Width	Depth	Weight
MUX card (P/N J209x-60001)	29.5 mm (1.15 in)	100 mm (3.90 in.)	220 mm (8.58 in.)	0.25kg
MDP box (P/N 5062-3054)	257 mm (10.12 in.)	110 mm (4.29 in.)	32 mm (1.25 in.)	0.4kg
DDP box (P/N 0950-2431)	44.4 mm (1.75 in.)	483 mm (19.02 in.)	22 mm (0.87 in.)	0.7kg

Electrical Specifications

Direct Current Requirements:

Voltage	J2092A MAX current	J2093A MAX current	J2094A MAX current	J2096A MAX current
+5	1.10 A	1.10 A	1.70 A	1.60 A
+12	0.08 A	0.20 A	0.30 A	0.15 A
-12	0.08 A	0.15 A	0.15 A	0.15 A

Note for the J2093A: max current on -12V is 0.25 A if a multireceiver configuration is used.

Software media options (**must** add one of them for use of:
- 16-channel MUX on systems running HP-UX 8.0
- 32-channel MUX on systems running HP-UX 8.0 opr 8.02

AA0 software on ¼-inch cartridge tape
AA1 software on ½-inch magnetic tape
AAH software on DDS cartridge
AA4 software on QIC cartridge

The **J2092A** includes the following assemblies:
- 1 * MUX card: J2092-60001
- 1 * link cable: 5062-3100
- 2 * RJ-45 DDP: 0950-2431
- 1 * installation manual: 5961-0386

The **J2093A** includes the following assemblies:
- 1 * MUX card: J2093-60001
- 1 * link cable: 5062-3100
- 2 * RJ-45 DDP: 0950-2431
- 1 * installation manual: 5961-0386

The **J2094A** includes the following assemblies:
- 1 * MUX card: J2094-60001
- 1 * link cable: J2094-60004
- 2 * ADP: 5062-3054
- 1 * installation manual: 5959-4972

The **J2096A** includes the following assemblies:
- 1 * MUX card: J2096-60001
- 1 * link cable: 8120-6162
- 2 * RJ-45 DDP: 0950-2431
- 1 * installation manual: 5961-4972

Rack Installation

The Direct Distribution Panels (DDP) are designed to be rack-mounted in a standard EIA 19" cabinet (such as the 46298B/C, EIA 19-inch x 1m or x 1.tm). Each DDP occupies 1 EIA unit (1u).

The Modem Distribution Panels (MDP) supplied with the J2094A are standalone only. An MDP rack installation kit is available to rack up to 5 MDPs in an EIA 19-inch cabinet. The MDP rack installation kit occupies 7 EIA units (7u). Refer to the J2084A product.

Recommended Peripheral Cables

DDP (RS-423) connected to an RS-423 or RS-422 device: The cable length and the terminal-end connector type are highly dependent upon the layout of system and peripherals and upon the terminal used. Therefore, customized cables should be made using the pin-out given in the functional specifications above.

MDP connected to a device using the "hardware flow control": A cable should be made using the MDP pin-out in the functional specification above. In addition to the data signals, the RTS/CTS signals (pins 8/22 of the MDP) must be connected to the CTS/DTR (pins 5/20) of the device.

	Recommended	Also supported
MDP connected to a modem	40233A	92219Q
MDP connected to a terminal (without hardware flow control)	40234A	40242Y, 13242Y 40242M, 13242M 13242N

Note: A DDP port (RS-232-C) will be considered as:
- an HP standard DTE at the termination of a 40233A cable
- an HP standard DCE at the termination of a 40234A cable

Description of the cables:

40234A 5m (16ft), 25-pin M to 25-pin M connector
40233A 5m (16ft), 25-pin M to 25-pin M connector
13242M 5m (16ft), 25-pin M to 25-pin M connector
13242N 5m (16ft), 25-pin M to 25-pin M connector
13242Y 5m (16ft), 25-pin M to 25-pin M connector
40242Y 5m (16ft), 25-pin M to 25-pin M connector, RFI filtered
40242M 5m (16ft), 25-pin M to 25-pin M connector, RFI filtered
92219Q 1m (3.3ft) 25-pin M to 25-pin M connector

Note: Cables like the 13242M/N, 40242M, and 92219Q have the line 23 connected. Pin 23 is tested during the J2094A MUX internal loopback self-test. If the device attached to the cable monitors line during the self-test, it could result in a MUX self-test error message. If the device attached to the cable drives this line, it could result in MUX hardware damage. Therefor, when connecting to devices which drive/monitor pin 23, these cable are **not** recommended.

Note that RS-232-C standard is limited by cable capacitance. HP will support the use of non-HP RS-232-C cables provided that the cables used are compliant with RS-232-C recommendations.

HEWLETT® PACKARD

SCSI Peripheral Host Adapter

Technical Data

For HP 9000 Series 300 DIO-I Computers Product Number HP 98658A

The Small Computer System Interface (SCSI) is a widely accepted ANSI standard for connecting host computers to peripherals. SCSI peripherals available in the market today include floppy and Winchester disks, cartridge and reel-to-reel tape drives, CD-ROM, WORM drives, helical scanners, and a wide range of other peripherals. The HP 98658A can support 7 devices on one interface although performance and cable restrictions will apply.

The HP 98658A host adapter provides a standard 8-bit SCSI bus for HP 9000 Series 300 DIO-I* systems and is capable of performing 16-bit DMA transfers. When connected with the 7957S, 7958S or 7959S SCSI 5.25" disks from Disc Memory Division, it provides a high performance solution for direct access storage. By itself, the 98658A provides the flexibility of an industry standard and allows connection to compatible peripherals.

Note: HP 9000 Models 310 and 320 are not supported.

Features

- Industry-standard interface
- Fully ANSI X3T9.131-1986 compliant
  - support of bus arbitration
  - full parity across the interface
  - single-ended transceivers
  - disconnect/reconnect
- High-speed throughput:
  - asynchronous or synchronous mode
  - 16-bit DMA transfers

Note: System level performance is application dependent and may not reflect the higher I/O rate achievable with SCSI.

- Connects up to 7 devices per adapter
  - 1-meter cable ships with the adapter card
  - cable uses Alt 2 male connectors on each end
- Up to 6 meters connectivity distance
- Compatible with HP's 7957S, 7958S, and 7959S disks
- Support on HP-UX only, refer to HP 9000 Series 300 Configuration Guide, P/N 5951-6796, for supported configurations.
- Customer installable

Functional Specifications

Software

The SCSI drivers provided in the HP-UX kernel implement a subset of the Common Command Set outlined in the ANSI publication X3T9.2/85-52, Rev4B. Supported commands and messages include:

Commands Supported	HEX
Test Unit Ready	00
Request Sense	03
Format Unit	04
Inquire	12
Mode Sense	1A
Read Capacity	25
Read	28
Write	2A

Messages Used	HEX
Command Complete	00
Save Pointer	02
Restore Data	03
Pointer	04
Disconnect	06
Abort	07
Message Reject	08
No Operation	80-OFF

Ordering Information

Software Reference Manuals

98658-90001 DIO-I SCSI Adapter Installation Manual
98265-90010 HP 9000 Series 300 SCSI Technical Reference Manual
98577-90010 HP-UX Driver Development Guide

97005-90000 HP 9000 Series 300 Peripheral Installation Guide

Hardware

The HP 98658A includes:

98658-66501 DIO-I SCSI Adapter
98658-90001 DIO-I SCSI Adapter Installation Manual
1252-2297 1 SCSI terminator
8120-5158 1-meter shielded twisted-pair cable with two 50-pin Alt 2 connectors

Note: Cable length may not exceed 6 meters in a daisy-chain configuration. For cable extension, female to male cables are available through Direct Marketing Division.

HP 98658A Option:

001 Adds self-test hood connector (5061-6565)

Warranties and Disclaimers

Standard HP 90-day warranty with purchase of the product.

HP fully supports SCSI for use with HP peripherals. Use of the SCSI adapter with non-HP peripherals is at the users own risk and is not HP supportable. Hardware and/or software may require modification for system/peripheral compatibility. Upon modification of the software, HP waives all responsibility for proper operation including transaction accuracy and data integrity. Modification of software should only be taken on by users experienced with HP-UX drivers and SCSI implementations.

HP specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. In addition, HP specifically disclaims all responsibility for the operation of the SCSI interface software with non-HP products, and for results or data loss in connection with use of the software.

Power Requirements

Input Voltages:
+5 volts: 4.78 to 5.25
+12 volts: 11.5 to 12.7
-12 volts: -11.5 to -12.7

Consumption: 5.3 watts maximum

Termpower: 0.4 amps at 5 volts for external termination

Environmental Range

Operating Temperature: 0°C to +55°C (+32°F to +131°F)
Storage Temperature: -40°C to +70°C (-40°F to +158°F)
Relative Humidity: 15% to 95% at 40°C (104°F) noncondensing

MTTR: Less than one hour for failure isolation and card replacement

Dimensions

Height: 15.8 cm (6.25 in)
Width: 19.7 cm (7.75 in)
Thickness: 3.30 cm (1.31 in)
Net Weight: 0.31 kg (0.68 lbs)

Sister Products

From Disk Memory Division:

7957S 107 Mbytes SCSI Disk
7958S 161 Mbytes SCSI Disk
7959S 323 Mbytes SCSI Disk

From Fort Collins Division:

98242A 4-Slot DIO-I Backplane–converts two DIO-II slots to two pairs of DIO-I slots.
98242B 2-Slot DIO-I Backplane–converts one DIO-II slot to one pair of DIO-I slots.

Note: See HP 9000 Series 300 Price Guide.

Technical information in this document is subject to change without notice.

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HEWLETT® PACKARD

Direct I/O RS-232 Serial Interface

Technical Data

For HP 9000 Series 200/300 Computer Systems
Product Number
HP 98644A

The HP 98644A Serial Interface is an RS-232-C* compatible interface used for simple asynchronous I/O applications with HP 9000 Series 200 or 300 systems. This includes driving terminals, line printers, and modems.

* RS-232-C is a data communication standard established and published by the Electronic Industries Association (EIA). Copies of the standard are available from the association at 20001 Eye Street N.W., Washington D.C. 20006. Its equivalent for European applications is CCITT V.24.

Features

- Inexpensive serial interface
- EIA RS-232-C (CCITT V.28/V.24) compatibility
- Modem control
- Data rates from 50 to 19,200 baud
- Software selectable character length and number of stop bits
- Software selectable parity configuration
- Software selectable baud rate
- Interface to Series 200/300 RS-232-C compatible peripherals–terminals, modems, printers
- Support of remote keyboard enable
- Interrupt capability through status or modem signal lines
- Standard 25-pin connector compatibility

Functional Specifications

Physical Specifications

Length: 14.6 cm (5.75 in)
Width: 19.2 cm (7.56 in)
Thickness: 2.95 cm (1.16 in)
Weight: 0.94 kg (0.43 lbs)
Shipping Weight: 2.29 kg (1.04 lbs)

Environmental Specifications

Temperature: 0°C to 55°C (32°F to 131°F)
Relative Humidity: 5% to 95% at 40°C (104°F)
Altitude: 4,572 meters (15,000 feet)

Electrical Specifications

+5 V supply	2.03 watts
+12 V supply	0.30 watts
-12 V supply	0.03 watts

Total Power Consumption: 2.36 watts RMS. This card does not have battery backup capabilities.

Data Rates

Standard software selectable data rates (bits/second) available:

50	75	110	134.5
150	200	300	600
1200	1800	2400	3600
4800	7200	9600	19200

The HP 98644A interface is recommended for use in character mode applications only.

Pin and Signal Assignment

1	Frame Ground
2	Transmitted Data
3	Received Data
4	Request to Send
5	Clear to Send
6	Data Set Ready
7	Signal Ground
8	Carrier Detect
20	Data Terminal Ready
22	Ring Indicator
23	Data Rate Select

Comparison with HP 98626A RS-232-C Interface

- The HP 98644A uses a standard 25-pin female DTE connector instead of the 50-pin connector used in the HP 98626A.
- The HP 98644A will not support the following connection products: HP 13265A 300 Baud Mode or 13266A Current Loop Interface. These products are supported with the 98626A serial interface. They take their power via the 50-pin interface connector. The HP 98644A does not provide power through its 25-pin connector.
- The HP 98644A has no switches for setting the baud rate and the character format. These parameters are software programmable.

Ordering Information

Earliest Language Version Recommended: BASIC 3.0, Pascal 3.0, HP-UX 2.1.

The 98644A RS-232 Serial Interface includes:

98644-66502 Serial Interface Card
98644-90002 Installation and Reference Manual

Recommended Cables:
Cables must be ordered from HP.

HP 13222Y 5-meter cable for 262X Terminals (25-pin male to 50-pin male)
HP 13232Y 4.5-meter cable for 264X Terminals (25-pin male to 264X)
HP 13242G 5-meter cable for Terminals and 2601A printer (25-pin male to 25-pin male)
HP 13242N 5-meter for Modems (25-pin male to 25-pin male)

The test connector (P/N 98644-67950) is available from HP's Corporate Parts Center (CPC).

HEWLETT® PACKARD

Four-Channel Asynchronous Multiplexer

Technical Data

For HP 9000 Series 200/300 Computer Systems
Product Number
HP 98642A

The HP 98642A Multiplexer provides 4 asynchronous RS-232-C compatible ports on a single interface. Three ports are intended for local or direct connection. The fourth port can be used either locally or to interface to RS-232-C compatible modems. A wide range of configurable transmission modes and formats permits three hardwired and one remote connection of various CRT terminals, printers, plotters, and other asynchronous devices.

Features

- Four full-duplex asynchronous serial I/O ports
- One port with 10 wire full-duplex modem control capability
- EIA RS-232-C, CCITT V.28 compatibility
- Programmable data rates for each port up to 19.2 K baud
- Programmable character size: 7 or 8 bits/character
- Programmable parity: odd, even, none
- Programmable number of stop bits: 1 or 2
- Parity, overrun, framing error check detects transmission faults
- Firmware-based self-test helps assure interface integrity
- Onboard buffering
- Programmable interrupt interval
- Special character recognition
- System console support

Functional Description

The HP 98642A Four-Channel Asynchronous Multiplexer is used for interfacing up to four EIA RS-232-C compatible devices to the HP Direct I/O backplane. As a Z-80A microprocessor-based interface, the 98642A MUX accesses the 8-Kbyte EPROM which contains a power-up self-test and the code necessary to manage the onboard FIFO buffers.

Data will be passed between the card and the host in circular FIFO data buffers. This buffering scheme allows the host to receive multiple characters per interrupt, thus decreasing the interrupt servicing overhead of the host.

The 98642A includes three cables providing convenient local connection via the RJ-11/25-pin male connector/adapters. The product also includes a 5-meter 25-pin male-to-25-pin male modem interface cable.

Functional Specifications

Capacity

Channels: Four full-duplex channels (3 direct connect and 1 modem/direct connect). Full-duplex refers to the card's ability to simultaneously transmit and receive data. However, this may be limited by the half-duplex nature of the Direct I/O backplane.

Buffering: There are a total of eight circular FIFO data buffers; four (128 character) receive buffers and four (16 character) transmit buffers (one for each port).

Software

Multiuser HP-UX 5.0 or later.

Communications

Supported Signal Lines: See table 1.

Interface Level: RS-232-C; CCITT V.28

Data Rates: The default baud rate on all four ports is 9600 baud. However, each of the four ports are software programmable to any of the following baud rates: 110, 134.5, 150, 300, 600, 1200, 2400, 4800, 9600, or 19.2 K.

Throughput: The 98642A Four-Channel MUX will support 4 interactive terminal users running character mode at 19.2 K baud. Other RS-232 applications which may simultaneously send and receive data over all four ports should be run at 9600 baud or slower. Aggregate MUX throughput may be limited by the load present on the host processor.

Supported Signal Lines *Table 1*

RS-232-C V.24	Common Abbreviation	Description	Input/ Output
AB	102	SG	Signal Ground	
BA	103	SD	Transmitted Data	O
BB	104	RD	Received Data	I
CA*	105	RS	Request to Send	O
CB*	106	CS	Clear to Send	I
CC*	107	DM	Data Set Ready	I
CD*	108.2	TR	Data Terminal Ready	O
CF*	109	RR	Received Line Signal Detector	I
CH*	111	SR	Signal Rate Selector	O
CE*	125	IC	Ring Indicator	I

* These signals are only supported on the modem port.

Communication Mode: Asynchronous, bit serial

Break Detection and Transmission: A break condition is recognized by the interface and results in sending an interrupt to the host. A break condition can also be generated by the MUX at the request of the host.

Interrupts

Host-to-Card (nonspecific):
- Modem Output Change
- Timer Off/On
- Self-Test On

Host-to-Card (port-specific):
- Configuration Data Change
- Transmit Buffer not Empty
- Send Break

Card-to-Host (nonspecific):
- Timer Interrupts host every 16 milliseconds. This signals the host to receive any characters that might be in the receive buffers.
- Modem Input Change
- Self-Test Complete

Card-to-Host (port-specific):
- Special Character Received
- Received character matches host programmed bit map character
- Transmit Buffer Empty

Handshaking: All handshaking is deferred to host control.

Edit Functions

Edit functions such as backspace, character delete, and line delete are passed to the host and managed by the host operating system.

Electrical Specifications

Direct Current Requirements:

Voltage	Typical Current	Two-Standard Deviation Current
+5	0.950 A	1.142 A
+12	0.057 A	0.067 A
-12	0.005 A	0.007A

Physical Specifications

Dimensions: 13.7 cm long by 17.0 cm wide (5.4 in by 6.7 in)

Weight: Interface card, 255 grams (9 oz)

Environmental Characteristics

Operating Temperature: 0°C to 55°C (32°F to 131°F)

Operating Humidity: 5% to 95% relative humidity at 40°C (104°F)

Ordering Information

The HP 98642A includes:

98642-66502 Four-Channel Multiplexer Printed Circuit Assembly
98642-66505 15-meter RJ-11 cables (3)
98642-66506 5-meter 25-pin male modem cable
98642-66508 RJ-11/25-pin male connector/adapters (3)
98642-90002 Installation Manual

HP 98642A Option

001 Deletes all cables and connectors

Recommended Cables

The **HP 92219R** 25-pin M to 25-pin M direct connect cable for the modem port is available from HP's Direct Marketing Division (DMK). The other cables and connectors are also available from DMK.

HP 92219R 15-meter 25-pin male-25-pin male direct connect cable (98642-66507)
HP 92219SD 5-meter 25-pin male-25-pin male modem cable (98642-66506)
HP 92219T 15-meter RJ-11 cable (98642-66505)
HP 92219U RJ-11/25-pin male connector/adapter (98642-66508)

Self-test loopback connectors are available for optional use with the on-Card self-test. Order three RJ-11 Test Hoods (98642-67950) and one 98644-67950 EIA 25-pin Test Hood from the HP Corporate Parts Center.

Recommended Modems

- Bell 212A
- HP 37212A Stand-alone Modem
- HP 92205A Hayes Smart Modem 1200
- Bell 202T 4-wire leased line Modem

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Direct I/O Asynchronous 8-Channel Multiplexer

Technical Data

Product Number
HP 98638A

The HP 98638A Multiplexer (MUX) provides 8 asynchronous EIA RS-232-C compatible ports with full duplex modem control capability or an optional RS-422 interface in a direct connect mode. It connects up to 8 devices to the HP 9000 Series 300 DIO-II systems. A wide range of configurable transmission modes and formats permits hardwired and remote connection of various CRT terminals, printers, plotters, and other asynchronous devices.

Features

- 8 full-duplex asynchronous serial I/O ports with 10-wire modem control capability, with the RS-232-C interface, satisfying European license requirements
- EIA RS-232-C, V.24 and V.28 compatibility
- Full-duplex modem support
- Programmable data rates for each channel up to 19.2 Kbaud
- Programmable character size: 7 or 8 data bits
- Parity, overrun, framing error check detects transmission faults
- Programmable parity: odd, even, or none
- Programmable number of stop bits: 1 or 2
- Firmware-based self-test helps assure interface integrity
- Programmable device Xon/Xoff handshaking to pace MUX input and output transmission
- Device CTS handshaking to pace MUX input and output data transmission
- Onboard buffering
- Programmable interrupt interval
- Special Character recognition
- System console support

Functional Description

The HP 98638A MUX is used for interfacing either up to 8 EIA RS-232-C, or up to 8 RS-422 compatible devices to the HP Direct I/O backplane (all RS-232-C or all RS-422). The MUX provides a Z-80A microprocessor-based interface and accesses the 8K x 8 EPROM which contains power-up, self-test, and code necessary to manage the onboard FIFO buffers.

Data will be passed between the card and the host in circular FIFO data buffers. This buffering scheme allows the host to receive multiple characters per interrupt, thus decreasing the interrupt servicing overhead of the host.

Functional Specifications

Capacity

Channels: 8 full duplex channels modem connect ports, with the RS-232-C interface. Full duplex refers to the card's ability to simultaneously transmit and receive data. However, this may be limited by the half-duplex nature of the Direct I/O backplane.

Buffering: There are a total of sixteen circular FIFO data buffers; eight (127 character) receive buffers and eight (16 character) transmit buffers (one for each port).

Software: Supported on all HP 9000 Series 300 computers running HP-UX version 6.5 or later.

Communications

Interface Level: RS-232-C, CCITT V.24 and V.28. RS-422, V.11.

Data Rates: Baud rate defaults to 9600 and is software programmable to any of the following rates: 110, 134.5, 150, 300, 600, 1200, 2400, 4800, 7200, 9600, 19200.

Modem Support includes:

- 2 modem modes: simple and CCITT
- 2 senses: originate mode/auto answer mode
- Timers available:

	CCITT Mode	Simple Mode
Connection timer	X	
DCD lost timer	X	
No-activity timer	X	
Hang-up timer	X	X

Throughput: The 98638A8-Channel MUX will support 8 interactive terminal users running character mode at 19.2K baud. Other RS-232 applications which may simultaneously send and receive data over all eight ports should be run at 9600 baud or slower. Aggregate MUX throughput may be limited by the load present on the host processor.

Handshaking: The MUX card is capable of pacing both inbound and outbound data via CTS handshaking or via an Xon/Xoff type of protocol. The Xon/Xoff characters are software programmable and can be managed by a user application. Alternatively, the host can program the MUX card to automatically manage Xon/Xoff flow control, thus avoiding any character loss. Since Xon/Xoff may be under application control, no-data-loss is guaranteed only if the MUX is responsible for automatically managing flow control. CTS handshaking is available on all ports. Simple or unbuffered RS-232-C devices that use hardware handshaking can be connected.

Communication Mode: Asynchronous, bit serial

Break Detection and Transmission: Break condition is recognized by the interface and results in sending and interrupt to the host. Break condition can also be generated by the MUX at the request of the host.

Interrupts

Host-to-Card (non-specific):

- Modem Output Change
- Timer Off/On
- Self-Test On

Host-to-Card (port-specific):

- Configuration Data Change
- Transmit Buffer not Empty
- Send Break

Card-to-Host (non-specific):

- Timer
- Interrupts host every 16 milliseconds. This signals the host to receive any characters that might be in the receive buffers.
- Modem Input Change
- Self-Test Complete

Card-to-Host (port-specific):

- Special Character Received
- Received character matches host programmed bit map character.
- Buffer Empty

Edit Functions

Edit functions such as backspace, character delete, and line delete are passed to the host and managed by the host operating system.

Supported Signal Lines - *Table 1.*

RS-232-C	V.24	Default	Description	I/O
AB	102	SG	Signal Ground	N/A
BA	103	SD	Transmitted Data	O
BB	104	RD	Received Data	I
CA	105	RS	Request to Send	O
CB	106	CS	Clear to Send	I
CC	107	DM	Data Set Ready	I
CD	108.2	TR	Data Terminal Ready	O
CF	109	RR	Received Line Signal Detector	I
CH	111	SR	Signal Rate Selector	O
CE	125	IC	Ring Indicator	I

Electrical Specification

Direct Current Requirements RS-232:

Voltage	Typical Current	Two-Standard Deviation Current
+5	1.8A	1.8A
+12	0.12A	0.14A
-12	0.12A	-

RS-232 (Option 1C8):

Voltage	Typical Current	Two-Standard Deviation Current
+5	1.8A	1.88A
+12	0.30A	0.33A
-12	0A	

Total Power Consumption: 10 watts (maximum)

Physical Specifications

Dimensions: 290 mm (11.42 in) long, by 210 mm (8.27 in) wide.

Weight: Interface Card, 580 grams (20.7 oz); Cable and ADP panel, 740 grams (26.4 oz).

Environmental Characteristics

Operating Temperature: 0°C to 70°C (32°F to 158F). It survives (non-operating) from -40°C to 85°C (-40°F to 185°F).

Operating Humidity: 5% to 95% Relative Humidity at 40°C (104°F)

Ordering Information

98638A 8 Port MUX for S/300 DIO-II Systems. Eight port asynchronous MUX with RS-232 interface and modem control on all ports. The base product includes the printed circuit assembly, cables, installation manual, and a distribution panel with an RS-232 interface.

Interface Option (optional)

This option replaces the RS-232 interface with an RS-422 interface. 1C8 RS-422 Interface

Media Options (must order one)

Software contains the Loopback Test Utility required for HP-UX 6.5 onwards, and 7.X. **must** order **one** option AA0 per system that is running HP-UX 6.5 onwards, and 7.X. **Option 1AW** may be ordered for additional MUX's on the same SPU.

AA0 ¼-inch Cartridge Tape. For HP-UX 6.5 onwards, and 7.X This option is **not required** for HP-UX version 8.0 or later.

1AW Delete Software

This option should be ordered if the MUX is used with HP-UX 8.0 or later.

Connection to RS-232 Modems

40233A 5-meter 25-pin M-25-pin M

Computer End Pin Number	Data Set End Pin Number
1	1
2	3
3	2
4	8
6	20
7	7
8	4
9	22
20	6
22	5

Related Products

Recommended Peripheral Cables

For direct connection to RS-232 terminals, printers, plotters, etc.

40234A 5-meter 25-pin M-25-pin M, pins 1-8, 20 wired end-to-end.
92219R 15-meter 25-pin Male to 25-pin Male direct connect cable (98642-66507).
92219SD 5-meter 25-pin Male to 25-pin Male modem cable (98642-66506).

The cables listed above are available from HP.

Self-test loopback connectors are available for optional use with the on-card self-test. Order 5181-2030 EIA 25-pin Test Hood from the HP Corporate Parts Center.

Recommended Modems

- HP 37212A Standalone Modem
- 92205A Hayes Smart Modem 1200
- Racal-Milgo MPS 1222 (Europe)
- US Robotics 2400 Baud
- Bell 212A

HEWLETT® PACKARD

Data Communications Interface

Technical Data

For HP 9000 Series 300 Computer Systems
Product Number
HP 98628A

The HP 98628A Data Communications Interface enables your workstation to communicate with any device that is compatible with standard asynchronous or HP Data Link data communication protocols. Devices can include various modems or link adapters, as well as equipment with standard RS-232-C* or current loop links.

Features

- Asynchronous Serial Communications including RS-232-C (CCITT V.28/V.24), RS-449, RS-423, and RS-422
- Distributed System Network/Data Link support for communication to HP 1000
- Terminal emulation software compatibility for communication with other computers
- Data formats of 5, 6, 7, or 8 bits/character and 1, 1.5, or 2 stop bits
- Selectable odd, even, or no parity and fixing parity bit to 0 or 1

* RS-232-C is a data communication standard established and published by the Electronic Industries Association (EIA). Copies of the standard are available from the association at 20001 Eye Street N.W., Washington D.C. 20006. Its equivalent for European applications is CCITT V.24.

Functional Specifications

Data Rates

Standard data rates available with internal clocking:

50	75	110	134.5
150	200	300	600
1200	1800	2400	3600
4800	7200	9600	19200

Interrupt Capability

The HP 98628A Serial Interface Card can be programmed to interrupt the computer on the following conditions:

Async:

- Data or control block available
- Prompt received
- Framing and/or parity error
- Modem line change (DSR, DCD, CTS, RI)
- No activity timeout
- Lost carrier or connection timeout
- End-of-line received
- Break received

Data Link:

- Data block available
- Space available for new transmission block
- Receive or transmit error
- Modem line change (DSR, DCD, DTS, RI)
- No activity timeout
- Lost carrier or connection timeout

Buffer Size

The HP 98628A card contains the following buffer sizes:

Async:

- Tx control is 11 blocks of 50 bytes each
- Tx data is 549 bytes
- Rx control is 99 blocks of 7 bytes each
- Rx data is 699 bytes

FDL:

- Tx control is 11 blocks of 50 bytes each
- Tx data is 549 bytes
- Rx control is 11 blocks of 95 bytes each
- Rx data is 1049 bytes

Switch Configuration

The following switches are configurable:

Async/Data Link

Select Code: The factory setting is 20; valid select codes are 8 to 31.

Interrupt Level: The factory interrupt priority level setting is 3; valid settings are 3 to 6.

Async/Data Link: Selects between Async or Data Link personality; the factory setting is Asynchronous.

Note: The settings listed below are not all switch selectable. However, all values are selectable through the CONTROL statement. Values selected through the CONTROL statement override the switch settings.

Async:
These settings are active when the ASYNC/DATA LINK switch is set to its ASYNC position.

Parity-Bits/Character:
A 2-bit switch selects between the following Parity-Bits/Character combinations: None/8, None/7, Odd/7, Even/7; the factory setting is Odd/7.

Hardware Handshake:
A 2-bit switch selects:

- Handshake Off, Non-modem Connection
- Full-duplex, Modem Connection
- Half-duplex, Modem Connection
- Handshake On, Non-modem connection

The factory setting is Full Duplex, Modem Connection.

Baud Rate: A 3-bit switch selects between the following combinations of baud rates/stops bit settings: 110/2, 150/2, 300/1, 600/1, 1200/1, 2400/1, 4800/1, 9600/1. The factory setting is 300/1.

Data Link

These settings are active when the ASYNC/DATA LINK switch is set to its DATA LINK position.

DID: A 3-bit switch selects the following value for the HP 98628's device address: @, A, B, C, D, E, F, or G.

Baud Rate: A 2-bit switch selects the following baud rates: 300, 1200, 9600, or 19200.

Hardware Handshake:
A 2-bit switch selects between:

- Handshake Off, Non-modem Connection
- Full-duplex, Modem Connection
- Half-duplex, Modem Connection
- Handshake On, Non-modem Connection

Electrical Specifications

Card Power Consumption:

+5 V	at 710 μA typical
+12 V	at 37 μA typical
-12 V	at 60 μA typical

POD Power Consumption
(supplied by computer):

Data Link Adapter, HP 13264A

+5 V	30 μA
+12 V typical	160 μA
-12 V	23 μA

300 Baud Modem, HP 13265A

+5V	100 μA
+12V typical	45 μA
-12V	45 μA

Current Loop Interface, HP 13266A

+5 V	200 μA
+12 V typical	90 μA
-12 V	80 μA

Ordering Information

Earliest Language Version Required: BASIC 2.0, Pascal 1.0, HPL 2.0, AND HP-UX 2.0.

The HP 98628A includes:

98628-66504 Data Communications Card
98046-90005 Data Comm Manual
98628-90001 Installation Manual

HP 98628A Options

001 4.9-meter (16 ft) RS-232-C DTE (male) cable (P/N 5061-4215) with test connector (P/N 1251-6625)

002 4.9-meter (16 ft) RS-232-C DCE (female) cable (P/N 5061-4216) with test connector (P/N 1251-6624)

003 4.9-meter (16 ft) RS-449/423 DTE (male) cable (P/N 5061-4250) with test connector (P/N 5061-4220)

Supported Connection Products:

HP 13264A Data Link Adapter for use in HP 1000- or HP 3000-based Data Link network applications
HP 13265A Modem for asynchronous connections up to 300 baud, including built-in autodial capability.
HP 13266A Current Loop Adapter for use with current loop links or devices.

Fuse for Replacement/Spare: 2110-0712

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HEWLETT® PACKARD

Direct I/O Serial Interface

Technical Data

For HP 9000 Series 300 Computer Systems Product Number HP 98626A

The HP 98626A Serial Interface is an RS-232-C* compatible interface used for simple asynchronous I/O applications such as driving line printers and terminals.

* RS-232-C is a data communication standard established and published by the Electronic Industries Association (EIA). Copies of the standard are available from the association at 2001 Eye Street N.W., Washington D.C. 20006. Its equivalent for European applications is CCITT V.24.

Features

- EIA RS-232-C (CCITT V.28/V.24) compatibility
- Data rates from 50 to 19,200 baud (bits/second)
- Software selectable baud rate
- Series 300 terminal emulation software compatibility
- Software selectable character length and number of stop bits
- Software selectable parity configuration
- Interface to terminals, modems, and current loop pod

Functional Specifications

Maximum Transfer Rates

BASIC 2.0 and HPL:

Handshake	
Input	19,200 baud
Output	19,200 baud

Data Rates

Standard switch selectable data rates (bits per second) available are:

50	75	110	134.5
150	200	300	600
1200	1800	2400	3600
4800	7200	9600	19200

Interrupt Capability

The HP 98626A Serial Interface Card can be programmed to interrupt the computer on the following conditions:

Under BASIC 2.0:

- Receiver buffer full
- Transmitter buffer empty
- Receiver buffer overrun error
- Received break indication
- Received character parity error
- Received character framing error
- Carrier detect line change
- Clear-to-send line change
- Data-set-ready line change
- Ring indicator change from on to off

Under HPL:

- Input buffer full
- Output buffer empty

Interrupt buffer transfers are supported by the BASIC Advanced Programming Binary for the 98626A Serial Interface.

Switch Configuration

The following switches can be configured on the interface card:

Select Code: The factory select code setting is 9; valid select code settings are:

BASIC & Pascal	8-31
HPL	1-6, 8-15

Interrupt Level: The factory interrupt priority level setting is 3; a valid interrupt level settings is from 3 to 6.

Parity: A 3-bit switch is available to enable or disable parity, select even or odd parity, or select fixed '1' or fixed '0' parity bit; the factory setting is disable, odd, and fixed '0' parity.

Character Length: A 2-bit switch selects between 5, 6, 7, or 8 bits per character length; the factory setting is 8 bits per character length.

Baud Rate Select: Allows power up/reset selection for the baud rate. Refer above to the baud rates available for switch selection; the factory setting is 2400 baud.

Stop Bits: A 1-bit switch selects between 1 stop bit per character or 1.5 stop bits per character. If the number of bits per character is 6, 7, or 8, then the stop bits switch selects between 1 stop bit per character or 2 stop bits per character; the factory setting is 2 stop bits per character.

Modem Line Disconnect: A 4-bit switch allows the Ring Indicator, Data Set Ready, Clear To Send and/or Carrier Detect lines to be disconnected and tied high; the factory setting is disconnected.

Ordering Information

Earliest Language Version Required: BASIC 1.0, Pascal 2.0, HPL 1.0, and HP-UX 2.0

The HP 98626A Interface includes:

98626-66501 Serial Interface Card
98626-90000 Service Manual

HP 98626A Options

001	4.9-meter (16 ft) cable with DTE male connector (5061-4215)
002	4.9-meter (16 ft) cable with DCE female connector (5061-4216)

Supported Connection Products

HP 13265A 300 Baud Modem
HP 13266A Current Loop Interface

Fuse for Replacement/Spare: 2110-0712

HEWLETT® PACKARD

High-Speed Disk Interface

Technical Data

For HP 9000 Series 300 Computer Systems
Product Number
HP 98625B

The HP 98625B High-Speed Disk Interface is intended for connection of disk drives and other HP-IB devices to HP 9000 Series 300 computers. All data transfers may be handled through the use of DMA for increased speed.

The HP 98625B will be compatible with HP 98625A drivers and will also offer a mode for doing word-wide DMA transfers.

Features

- Connection of DIO computers to HP CS/80 Disk Drives and other HP-IB devices
- Up to 7 disk drives on one 98625B
- Total cable length up to 15 meters
- DMA capability for fast transfers
- HP 98625A compatibility
- Allows status register access during DMA transfers
- Switch selectable system controller/nonsystem controller
- Switch selectable high speed/low-speed HP-IB

Functional Specifications

Transfer Rates

The 98625B will allow data to be transferred in bursts at a rate of 1 megatransfer/second (2 Mbytes/second in word mode). The average transfer rate will be equal to the transfer rate of the attached disk.

DMA Capability

The 98625B utilizes DMA (direct memory access) and is recommended for use with the HP 98620A/B DMA Controller card for operation.

Switch Configuration

Select Code: The factory setting is 14, but can be set to any nonconflicting value.

Interrupt Level: The factory setting is 6. Unlike the HP 98625A card, other cards may share the interrupt level of the HP 98625B card. This is recommended only with HP-UX 5.0 and later versions.

Ordering Information

Earliest Language Version Supported: Pascal 2.0, BASIC Extensions 2.1, HP-UX 2.0, and SRM environments.

The HP 98625B includes:

98625-66502 High-Speed Disk Interface
98625-90001 Installation Manual

Compatible Cables (from Direct Marketing Division):

HP 10833A 1-meter (3.3 ft) cable
HP 10833B 2-meter (6.6 ft) cable
HP 10833C 4-meter (13.2 ft) cable
HP 10833D 0.5-meter (1.6 ft) cable

Fuse for Replacement/Spare: 2110-0712

HEWLETT® PACKARD

GPIO Interface

Technical Data

For HP 9000 Series 300 Computer Systems Product Number HP 98622A

The HP 98622A General Purpose I/O (GPIO) Interface is a flexible parallel interface that will send and receive up to 16 bits of data to a variety of devices. Several handshake modes are available to permit interfacing to a variety of equipment. Extended control and status lines are available for applications that require transferring control and status information outside the data path.

Features

- 16 latched input lines
- 16 latched output lines
- Selectable handshake modes
- 10 handshake, control, and status I/O lines
- DMA compatibility for fast transfers
- Configurable data-in clock source
- Connections for flexible disk drive, multiprogrammer, or thermal printer interrupt capability

Sample of Transfer Rates *Table 1*

	Input (bytes/s)	Output (bytes/s)
BASIC 2.0		
Handshake	63 K	65 K
BASIC Advanced Program Binary Capability		
Interrupt, burst	65 K	75 K
Fast handshake	115 K	115 K
DMA, regular	540 K	480 K
DMA, burst	770 K	670 K
HPL 2.0		
Interrupt	8 K	8 K
Fast read/write	89 K	100 K
DMA, regular	540 K	480 K
DMA, burst	770 K	670 K

Functional Specifications

Maximum Transfer Rates

The sample of transfer rates in table 1 are the maximum rates that can be attained with the type of data transfer specified. Any delay generated by the peripheral or by additional program statements or options will cause the actual data transfer rate to be lower.

Data, Status, Control Lines

The 16 output lines provide high current/voltage drivers using open-collector buffers. Either positive- or negative-true logic is selectable. The 16 input lines are terminated by a resistive divider of 3 kW to +5 V and 62 kW to ground accepting standard TTL signal levels. Ten lines provide control, status, and handshake information between the peripheral and the GPIO Interface.

Status and Control Lines Definitions

PCTL Peripheral Control
Handshake output, driven by interface; indicates the computer is ready for input data or new output data is available on output lines. PCTL is reset by a ready-to-busy transition on PFLG or by an interface reset.

PFLG Peripheral Flag
Handshake input, driven by peripheral; indicates the peripheral has completed the data transfer; also used to request peripheral interrupt when enabled.

PSTS Peripheral Status
Status input, driven by peripheral; indicates to the computer the readiness of the peripheral. PSTS is sampled by the computer whenever communication with the peripheral is requested.

ST10, ST11 Extended Status
Status input, driven by peripheral; sensed by computer; may be used for any purpose; examined by reading the HP 98622A peripheral status register.

CTL0, CTL1 Extended Control
Control output, driven by computer; sensed by the peripheral; may be used for any suitable purpose by the user; asserted by writing to the HP 98622A peripheral control register.

I/O Direction
Handshake output, driven by card; indicates to the peripheral the direction of type current data transfer.

PRESET Peripheral Reset
Control output, driven by card; used to initialize a peripheral when the computer is turned on, when the RESET key or CLEAR I/O key is pressed, or when the HP 98622A peripheral reset register is written to.

EIR External Interrupt Request
Control output, driven by peripheral; used to generate an interrupt request based on some external event or termination of a DMA buffer transfer. The current state can be examined by reading the HP 98622A peripheral status register. The interrupt is level detected, not edge sensitive. EIR should be held low until the interrupt is serviced.

Electrical Characteristics
(See table 2.)

DMA Capability

The HP 98622 can carry out DMA transfers via the optional two-channel HP 98620A DMA controller card. Word or Byte Mode as well as Regular or Burst DMA transfers are supported. The burst feature allows a higher data transfer rate and a shorter latency time.

Interrupt Capability

Proper interrupt level settings allow a higher level request to interrupt a lower level data transfer. The HP 98622A is capable of generating interrupts to the computer under the following conditions:

- PCTL clear
- PCTL clear & PFLG ready
- EIR asserted

Electrical Characteristics *Table 2*

	Minimum	Maximum
Data Output and Control Output Lines		
Output Low Voltage @ 16 mA		0.4 V
Output Low Voltage @ 40 mA		0.7 V
Output High Voltage (open collector)		30.0 V
Output Low Current		40.0 mA
Output High Current @ Output High Voltage		0.25 mA
Data Input Lines		
Input Low Voltage		0.7 V
Input High Voltage	3.0 V	
Input Current @ Input Low Voltage = 0.4 V		-2.3 mA
Control Input Lines		
Input Low Voltage		0.5 V
Input High Voltage	3.0 V	
Hysteresis	0.4 V	
Input Low Current @ Input Low Voltage = 0.4 V	-3.3 mA	

Switched Configuration

Select Code: The factory select code setting is 12; valid select codes are:

HPL	1-6, 8-15
Pascal & BASIC	8-31

Interrupt Level
The factory setting is 3; a valid interrupt level setting is from 3 to 6.

Output Data Line Sense
A 1-bit switch allows the input data lines to use either positive-true or negative-true logic even with fast read/write and DMA transfers.

PFLG Line Sense
A 1-bit switch allows the peripheral flag line to use either positive-true or negative-true logic.

PCTL Line Sense
A 1-bit switch allows the peripheral control line to use either positive-true or negative-true logic.

PSTS Line Sense
A 1-bit switch allows the peripheral status line to use either positive-true or negative-true logic.

Handshake Mode
A 1-bit switch allows selection of full or pulsed handshake mode.

Data-In Clock Source
A 6-bit switch allows selection of 3 different clocking transitions for input data. The upper input byte (8 lines) and lower input byte (8 bits) can have separate clock sources. The input bytes can be clocked when the register is read, on the ready-to-busy transition of PFLG, or on the busy-to-ready transitions of PFLG.

Ordering Information

Earliest Language Version Required: BASIC 1.0, HPL 1.0, Pascal 1.0

The HP 98622A includes:

98622-66501 General Purpose I/O Card
98622-90000 Installation Manual

HP 98622A Options:

001	4.6-meter (15 ft) unterminated cable (5061-4209)
003	4.6-meter (15 ft) terminated cable for HP 6940A/B Multiprogrammer (98622-66504, 50-pin, male connector)

Fuse for Replacement/Spare: 2110-0712

HEWLETT® PACKARD

Channel I/O Asynchronous 16-Channel Multiplexer

Technical Data

Product Number
HP 98190A

The HP 98190A Multiplexer (MUX) provides 16 asynchronous EIA RS-232-C compatible ports with full duplex modem control capability or an optional RS-422 interface in a direct connect mode. It connects up to 16 devices to the HP 9000 Series computer models 825, 835, 840, 845, 850, 855, 870, 635, and 645. A wide range of configurable transmission modes and formats permits hardwired and remote connection of various CRT terminals, printers, plotters, and other asynchronous devices.

Features

- 16 full-duplex asynchronous serial I/O ports with 10-wire modem control capability satisfying European license requirements
- EIA RS-232-C, V.24 and V.28 compatibility
- Full-duplex modem support
- Programmable data rates for each channel
- Programmable character size: 7 or 8 data bits
- Programmable number of stop bits: 1 or 2
- Parity, overrun, framing error check detects transmission faults
- Programmable parity: odd, even, or none
- Firmware based self-test helps assure interface integrity
- Programmable device XON/XOFF handshaking to pace MUX input and output data transmission
- On-board buffering with DMA capability to send/receive data to/from host for multiple ports in a single transfer

Functional Description

The HP 98190A MUX is used for interfacing either up to 16 EIA RS-232-C, or up to 16 RS-422 compatible devices to the HP Channel I/O backplane (all RS-232-C or all RS-422). The MUX provides a microprocessor-based interface. It monitors the download process and verifies the integrity of the code. The download application software has been optimized for character-at-a-time I/O.

Functional Specifications

Capacity

Channels: 16 channels—full duplex

Buffering: On-board buffering with DMA capability to send/receive data for multiple ports in a single transfer and to increase throughput and reduce host CPU interrupts

Transmit Buffer Size: 255 bytes per port

Receive Buffer Size: Two 8K byte buffers which are dynamically allocated over all sixteen ports

Software: Supported on all HP-UX based HP 9000 Series 800 computers running HP-UX version 6.2 or later

Communications

Interface Level: RS-232-C, CCITT V.24 and V.28

Data Rates: Baud rate defaults to 9600 and is software programmable to any of the following rates: 75, 150, 300, 600, 1200, 2400, 4800, 9600, and 19200.

Modem Support includes
- 2 modem modes: simple and CCITT
- 2 senses: originate mode, auto-answer mode
- available timers:

	CCITT Mode	Simple Mode
Connection timer	X	
DCD lost timer	X	
No-activity timer	X	
Hang-up timer	X	X

Throughput: Support data throughput of 19.2K baud simultaneously on each channel. The global performance of the MUX is dependent on the HP 9000 Series 800 computer performance.

Handshaking: The MUX card is capable of pacing both inbound and outbound data via an "XON/XOFF" type of protocol. These "XON/XOFF" characters are software programmable and can be managed by a user application. Alternatively, the host can program the MUX card to automatically manage "XON/XOFF" flow control, thus avoiding any character loss. Since "XON/XOFF" may be under application control, no-data-loss is guaranteed only if the MUX is responsible for automatically managing flow control.

Table 1: **Supported Signal Lines**

RS-232-C	V.24	Default	Description	I/O
AB	102	SG	Signal Ground	N/A
BA	103	SD	Transmitted Data	O
BB	104	RD	Received Data	I
CA	105	RS	Request to Send	O
CB	106	CS	Clear to Send	I
CC	107	DM	Data Set Ready	I
CD	108.2	TR	Data Terminal Ready	O
CF	109	RR	Received Line Signal Detector	I
CH	111	SR	Signal Rate Selector	O
CE	125	IC	Ring Indicator	I

Supported Signal Lines: (See table 1)

Communication Mode: Asynchronous, bit serial

Edit Functions

Edit functions such as backspace, character delete, and line delete are passed to the host and managed by the host operating system.

Electrical Specification

Direct Current Requirements RS-232:

Voltage	Typical Current	Two-Standard Deviation Current
+5	1.5A	1.6A
+12	0.24A	0.28A
-12	0.12A	0.14A

RS-422 (Option 1C8):

Voltage	Typical Current	Two-Standard Deviation Current
+5	1.2A	1.3A
+12	0.30A	0.33A
-12	0A	

Physical Specifications

Dimensions: 17.3 cm (6.8 in.) long, by 17.2 cm (6.75 in.) wide.

Weight: Interface Card, 270 grams (9.5 oz); Cable and RS-232 panel, 723 grams (26 oz).

Environmental Characteristics

Operating Temperature: 0° C to 55° C (32° F to 131° F)

Operating Humidity: 5% to 95% RH @ 40 C (104° F)

Ordering Information

HP 98190A Channel I/O Asynchronous 16-Channel MUX The base product contains the following components:

- 16-Channel MUX Printed Circuit Assembly (PCA)
- Installation manual
- Two RS-232-C Active Distribution Panel (ADP)
- 3 Meter Y-Cable, PCA to ADP

Media Options

(must order one)
Software contains a driver support for HP-UX 7.X. MUST order ONE option "AA0" or "AA1" per system that is running HP-UX 7.X. Option "1AW" may be ordered for additional MUX's on the same SPU.

AA0 ¼-inch Cartridge Tape. This option is not required for HP-UX 8.0 or later.

AA1 ½-inch Magnetic Tape (1600 bpi). This option is not required for HP-UX 8.0 or later

1AW Delete Software. This option should be ordered if the MUX is used with HP-UX 8.0 or later.

Cable Option

(may order one)

001 Replace cable with 10 Meter Extension Cable

Interface Option

(may order one) This option replaces the two RS-232 ADPs with two RS-422 ADPs and adds one loopback test hood.

1C8 RS-422 Interface

Related Products

Recommended Peripheral Cables for direct connection to RS-232 terminals, printers, plotters, etc., minimum wiring requires pins 1, 2, 3, 7 to be wired end-to-end.

13242M 5-meter 25-pin M-25-pin M, pins 1-8, 12, 15, 17, 20, 22, 24 wired end-to-end.

13242N 5-meter 25-pin M-25-pin M, pins 1-8, 12, 15, 17, 20, 22, 24 wired end-to-end; 11 and 19 are switched.

13242Y 5-meter 25-pin M-25-pin M, pins 1-3, 7 wired end-to-end.

92219G 3.8-meter 25-pin M-25-pin M, pins 1-8, 11, 12, 19, 20, 22, 23, 25 wired end-to-end.

40234A 5-meter 25-pin M-25-pin M, pins 1-8, 20 wired end-to-end.

Connection to RS-232 Modems

92219Q 6-meter 25-pin M-25-pin M

Computer End Pin Number	Data Set End Pin Number
1	1
2	3
3	2
4	8
6	20
7	7
8	4
9	22
20	6
22	5
23	23

40233A 5-meter 25-pin M-25-pin M

Computer End Pin Number	Data Set End Pin Number
1	1
2	3
3	2
4	8
6	20
7	7
8	4
9	22
20	6
22	5

For UUCP direct connect applications between 98190A cards, the following cables could be used:

- 92219Q
- 40233A
- 30062B

The cables listed above are available from the HP Direct Marketing Division (DMK).

Recommended Modems

- HP 37212A Standalone Modem
- 92205A Hayes Smart Modem 1200
- Racal-Milgo MPS 1222 (Europe)
- US Robotics 2400 Baud
- Bell 212A

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HEWLETT® PACKARD

HP-PB Asynchronous 8-Channel Multiplexer

Technical Data

Product Number
HP 40299B

The HP 40299B Multiplexer provides eight asynchronous RS-232-C compatible ports with full duplex modem control capability, or an optional eight RS-422 direct connect asynchronous ports for longer distance and better noise immunity.

The HP 40299B provides a means to connect up to eight asynchronous serial devices to PA-RISC HP 9000 Series 800 Computers which use the HP-PB (Hewlett-Packard Precision Bus) as their primary system input/output bus (808, 815, 822, 832, 842, 852), and have HP-UX version 7.xx or later operating system installed.

A wide range of configurable transmission modes and formats permits hardwired and remote connection of various CRT terminals, printers, plotters, and other asynchronous devices.

In the RS-232-C mode, port 0 of the HP 40299B can support the local system console for 8x2 family of systems through the use of an HP700/92 or an HP2392 terminal. In addition, when HP-UX 8.0 release or later is installed, and a support cable is connected between the MUX and the system SPU, port 7 of the HP 40299B can support the remote Access Port (AP) functionality for system hardware and software support via a modem.

Features

In the RS-232-C mode:

- Eight full-duplex asynchronous serial I/O ports with 12-wire modem control capability
- EIA RS-232-C and V.24/V.28 compatibility
- Full duplex modem support (8 signals per channel)
- Three types of modem protocol:
  - Bell protocol, 2 signals: DTR and DCD
  - CCITT protocol, 6 signals: DTR, DCD, DSR, RTS, CTS, RI
  - No protocol, user can handle 8 signals (4 input/4 output)

In the optional RS-422 mode:

- Eight full-duplex asynchronous serial I/O ports for direct connect mode
- EIA RS-422 and V.11 compatibility
- Can support eight HP700/32 terminals in the RS-423 mode.

In either RS-232-C or RS-422 mode:

- Programmable data-rate for each channel
- Programmable character size: 7 or 8 data bits
- Programmable number of stop bits: 1 or 2
- Parity, overrun, framing error check detects transmission faults
- Firmware based self-test helps assure interface integrity, break detection, and generation
- Automatic and programmable device Xon/Xoff handshaking to pace MUX input and output data transmission
- Programmable parity: odd, even, or none
- On-board buffering to send/receive data to/from host for multiple ports

Support features:

- Self tests executed at "power-on"
- Support local and remote console with access port (AP) functionality (not applicable for HP 9000 808/815 systems which have their own SPU console port.)
- On-line diagnostics can be run without any additional hardware with the RS-232 interface, and with the use of a special loopback hood provided with the RS-422 interface.

Functional Description

The HP 40299B Asynchronous 8-Channel Multiplexer is used for interfacing up to eight EIA RS-232-C or up to eight RS-422 compatible devices to the HP-PB backplane. It comprises three major functional assemblies:

- The MUX card.
- The RS-232-C or RS-422 Active Distribution Panel (ADP).
- The Multiplexed Serial Link between the MUX card and the ADP.

At the heart of the HP 40299B is a circuit card which contains a 68000 microprocessor and associated EPROM and RAM memory. The 128-Kbyte EPROM contains the power-up self-test and system support code. The code download from the host is stored in the 128-Kbyte RAM. Download operation and card diagnostics are performed through a special supervisor on-card buffer.

The HP 40299B MUX also provides an interface to communicate with the console terminal and the support modem supporting the Access Port function. The Access Port function gives the operator the ability to check the operating status of the host, enable or disable remote operator accesses, lock the remote support modem for increased system security, force a system reset, and copy local console memory to remote console display.

RS-232-C and RS-422 Signals

RS-232-C	V.24	Common Abbrev	Description	Input/ Output	Connector Pin Nos.
			Protective Ground	N/A	1
AB	102	SG	Signal Ground	N/A	7
BA	103	SD	Transmit Data	O	3
BB	104	RD	Receive Data	I	2
CA	105	RS	Request to Send	O	8
CB	106	CS	Clear to Send	I	22
CC	107	DM	Data Set Ready	I	20
CD	108	TR	Data Terminal Ready	O	6
CF	109	RR	Data Carrier Detect	I	4
CH	111	SR	Signal Rate Selector	O	23
CE	125	IC	Ring Indicator	O	9
–	–	GPO	Gal. Purpose Output	O	5

RS-422	Description	Input/ Output	Connector Pin Nos.
	Protective Ground	I	1
	Transmit Data +	O	15
	Transmit Data –	O	17
	Receive Data +	I	19
	Receive Data –	I	25
	Signal ground	I	7

Warning: The potential between the signal ground pin on the ADP and the signal ground pin on the attached device must not exceed seven (7) Volts. Failure to observe this limit will damage the ADP.

Functional Specifications

Capacity

Channels: Eight channels—full-duplex, connected through a stand-alone Active Distribution Panel (ADP)

Buffering: On-card buffering to send/receive data for multiple ports to increase throughput and reduce host CPU load.

Transmit Buffer Size: 255 bytes per port

Receive Buffer Size: 511 bytes per port

Software: HP 9000 Series 800 HP-UX revision 7.0 or later.

Communications

- RS-232-C; CCITT V.24/V.28 for direct and modem connections
- EIA RS-422; CCITT V.11 for direct connections
- Data Rates: Baud rate defaults to 9600 and is software programmable to any of the following rates: 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200.
- Throughput: Although the HP 40299B 8-channel MUX hardware and firmware is able to support a data throughput of 19.2 K baud simultaneously on each channel without character loss when flow control is activated, the global performance of the MUX is dependent on the HP 9000 HP-PB Series 800 computer load and performance.
- Communication Mode: bit serial, asynchronous.
- Break Detection and Transmission: Break condition is recognized by the interface, and message is sent to the host. Break condition can also be generated by the MUX at the request of the host.
- Optional Device Handshakes: The MUX is capable of pacing both inbound and outbound data via an "Xon/Xoff" type of protocol. The "Xon/Xoff" characters are programmable. The host may program the MUX card to automatically manage "Xon/Xoff" flow control, thus avoiding any character loss. The "Xon/Xoff" may also be under application control, but no data loss is only guaranteed if the MUX is responsible for flow-control.

Installation and Support

Installation: The HP 40299B is usually bundled with the system; however, it can be purchased as an add-on product.

It is HP installable up to HP-UX 8.0 release and customer installable beyond. Installation services may be purchased from Hewlett-Packard if necessary.

Diagnostic: ADP LED indicators monitor the ADP status. A self-test is performed at power-on by the system. Additional on-line diagnostics and reset capabilities are provided through the system diagnostic environment for use by HP Customer Engineers.

Physical Specifications

	Height	Width	Depth	Weight
MUX card (P/N 40299-60021	29.5mm (1.15 in)	100mm (3.90 in)	220mm (8.58 in)	0.25kg
ADP box (P/N 5062-3070)	257mm	110mm	32mm	0.4kg
RS-232-C interface	(10.12 in)	(4.29 in)	(1.25 in)	
ADP box (P/N 5062-3085)	257mm	110mm	32mm	0.4kg
RS-422 interface	(10.12 in)	(4.29 in)	(1.25 in)	

Electrical Specifications

Direct Current Requirements: Voltage	MAX RS-232-C Current	MAX RS-422 Current
+5	1.80 A	1.80 A
+12	0.13 A	0.20 A
-12	0.13 A	0.00 A

Beyond HP-UX 8.0 release the customer will be able to use a loopback software utility with a hardware loopback hood for RS-422 interface that tests the data path between the host and the ADP ports.

Local and Remote Support: The HP 40299B RS-232-C multiplexer allows connections to a local console, and after HP-UX 8.0 release is installed, will also allow connectivity to a remote console for Access Port function. In this case, the following additional support features are provided:

- Console IODC
- Local console can be mirrored to a remote console
- Security password required for remote access to system
- Enhanced Access Port feature set
- User session port available to the remote support modem port
- Automatic speed sensing of local console terminal
- Remote support features available even when the host system is inoperable.

Recommended Peripheral Cables

13242M	5 meter 25-pin M to 25-pin M connector
13242N	5 meter 25-pin M to 25-pin M connector
13242Y	5 meter 25-pin M to 25-pin M connector
92219G	3.8 meter 25-pin M to 25-pin M connector
92219Q	5 meter 25-pin M to 25-pin M connector
40242Y	25-pin to 25-pin, male-male, RFI filtered, 5m (16 ft)
40242M	25-pin to 25-pin, male-male, RFI filtered, 5m (16 ft)
40234A	25-pin to 25-pin, male-male, RFI filtered, 5m (16 ft)
40233A	25-pin to 25-pin, male-male, RFI filtered, 5m (16 ft)
92219Q	25-pin to 25-pin, male-male, 1m (3.3 ft)

Remark: An ADP (RS-232-C) port will be considered as:

- an HP standard DTE at the termination of a 40233A cable.
- an HP standard DCE at the termination of a 40234A cable

Note: Cables like the 13242M/N, 40242M, and 92219Q have the line 23 connected which is used for internal loopback selftest. If the device attached to the cable monitors this line during the selftest, it could result in a selftest error message. Therefore these cables are not recommended.

Cable 40233A replaces the 30062B but without pin 23 connected.

Cable 40234A replaces the 40242M but without pin 23 connected.

Refer to the cabling manual (P/N 5957-9918) for a more detailed list of the available cables for your terminal.

Note that RS-232-C Standard is limited by cable capacitance. HP will support the use of RS-232-C provided that the cables used are compliant with RS-232-C recommendations.

Note that for the RS-422 cables, the connection from the ADP to peripheral device is by non-isolated RS-422. The maximum supported distance from the ADP to peripheral device is 1200 meters (4000 feet). An ADP (RS-422) port will be considered as an HP standard DCE at the 25-pin sub-D female connector.

RS-423 connection for use with an HP 700/32 terminal is described in the Installation and References manual shipped with the product. Other RS-423 connections are not supported.

Support Services:
Hardware/Software support services available for this product are included in the System Support services.

Ordering Information

The HP 40299B includes the following assemblies:

40299-60021 8-channel multiplexer printed circuit assembly
5062-3070 Active Distribution Panel
40299-60003 3m link cable
40299-60004 Installation kit
40299-90012 Installation & reference manual

HP 40299B options

1C8 Replaces the RS-232-C interface by the RS-422 interface.
Delete 5062-3070
Add 5062-3085 Active Distribution Panel.
Add 5181-2030 Loopback hood

Related products

The ADP is a stand-alone box but may be rack mounted in cabinets such as 92211R (mini rack for the 808/815 systems or the 46298B/C (EIA 19 inch x 1 m or x 1.6 m) especially when used in large configurations.

An ADP Rack Installation Kit has been designed specially to install the ADP into the above cabinets. Please refer to the D2350A, D2351A, D2352A product family.

Supported Devices

Devices	Direct Connect RS-232-C	Modem Connect RS-232-C
Terminals		
2392A/2393A/2394A/2397A	Yes	Yes
2394A Graphic Athena	Yes	Yes
3081A Data Capture	Yes	No
C1001A Settler I low cost 2392/94	Yes	No
C1003A Pioneer low cost ASCII term	Yes	No
Personal Computers		
HP 110+ with 2392A Reflector I*	Yes	Yes
HP 150 I/II with HP 2623 emulator	Yes	Yes
HP Vectra with HP 2392/93/94 emulator	Yes	Yes
Integral PC with 2622 emulator+	Yes	
9836A/9837A	Yes	
HP 9000 S200/300 2392A emulator*	Yes	
Printers		
2225D ThinkJet	Yes	No
2227A QuietJet	Yes	No
2563B	Yes	No
2565A	Yes	
2566A	Yes	
2932A/Bearfoot	Yes	Yes
2934A	Yes	Yes
2686A LaserJet	Yes	No
Plotters		
7440A/B Joey 8 pen B size	Yes	No
7470A opt. 001	Yes	No
7475A opt. 001	Yes	No
7550A	Yes	No
7580A/B	Yes	No
7585A/B	Yes	No
7586A/B	Yes	No

* Block mode support will be determined after testing
\+ No block mode support

Devices not appearing in the list above, whether they are Hewlett-Packard devices or not, may work when conforming to the specifications outlined above. However, HP NetAssure services are needed to obtain effective support from Hewlett-Packard.

HEWLETT® PACKARD

Fiber-Optic SCSI Extender

Technical Data

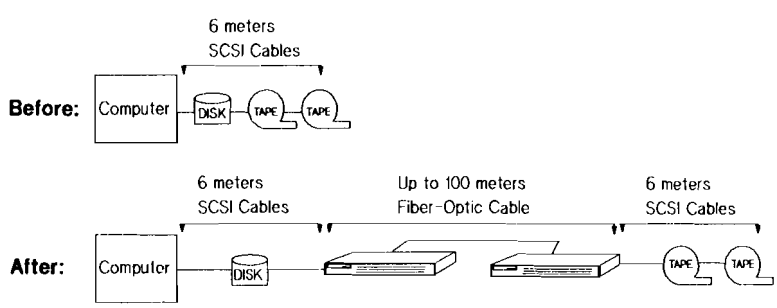
For HP 9000 Series 800 and HP 3000 Series 900 Computer Systems Product Number HP 28643A

The HP 28643A Fiber-Optic SCSI Extender overcomes the six-meter SCSI distance limitation by allowing you to add up to 100 meters to the SCSI bus. You can now locate peripherals based on user/operator convenience rather than on proximity to the host computer. This layout flexibility is provided in a highly transparent manner to system users as it maintains SCSI-based performance, functionality, and connectivity. By combining high-performance fiber optics and the industry-standard SCSI protocol, the HP 28643A adds distance to SCSI peripheral subsystems while it maintains data reliability and improves data security. In addition, this product maintains HP's long-standing tradition for the highest quality and reliability.

Fiber-Optic Extender Provides System Layout Flexibility

Customers need to connect peripherals at longer distances. Using HP's Fiber-Optic SCSI extender, peripherals can now be physically located in remote areas for improved access by system operators. Unattended devices (such as optical disk auto-changers) can be placed in separate rooms or on different floors and in secure environments. For improved user access, printers can be placed in user group areas for easy access to printer output.

The added flexibility in system layouts will help customers reduce system management costs through improved device access and more efficient floor space utilization.



Features

- Adds 100 meters to SCSI bus
- Complies with industry-standard SCSI*
- Transfers data synchronously or asynchronously
- Operates independently of computer backplane
- Uses industry-standard fiber-optic cables and connectors
- Provides up to 5 Mbyte/second burst transfer rate**
- Needs no additional software
- Supports powerfail recovery
- Contains built-in active terminator
- Provides auto resetting termpower protection
- Increases data security
- Is 19-inch rack mountable
- Provides fault and status LEDs
- Is easy to install
- Meets HP's standards for quality and reliability

Maximum Cable Length for High-Speed Operation: Interconnecting cable links should be as short as possible, with a maximum of 15 meters total length per system, and should have at least one equivalent resistive load per meter of cable (the high-speed resistor pack adds seven equivalent resistive loads).

Number of Devices	Maximum Total Cable Length (meters)
1	8
2	9
3	10
4	11
5	12
6	13
7	14
8 (maximum)	15

No more than eight devices are allowed in the system. A maximum system would be composed of a system controller, with its high-speed resistor pack, and eight peripherals. Load resistors may need to be repositioned on the interface card for high-speed operation. Refer to the installation guide.

Note: For high- and low-speed cabling guidelines, refer to the installation guide (P/N 28650-90101).

Error Detection

Data errors can be detected using Cyclic Redundancy Check-16 on all data messages sent or received. CRC-16 can be used if the other participating device supports CRC-16. See system documentation for details. Errors are also detected using odd byte parity.

Diagnostic Support

An online diagnostic executable at the system level is supported. Refer to the System Administration Guide for details.

Electrical Specifications

Voltage: +5 volts
Current: 0.45 amps
Power Dissipation: 2.25 watts

Physical Characteristics

Size: 24.4 cm long by 13 cm wide (9.6 in by 5.1 in)

Weight: 257 g (9 oz) without HP-IB cable

I/O Channel Interconnects: 96-pin connector, J1

Device Interconnects: 26-pin connector, P1

Environmental Characteristics

Operating Temperature: 0°C to 55°C (32°F to 131°F)

Operating Relative Humidity: 5% to 95% at 40°C (104°F)

Operating Altitude: 4600 m (15,000 ft) maximum

Ordering Information

The HP 28650B requires operating system HP-UX 8.02 or later.

The HP 28650B includes:

28650-60101 HP-IB Interface Card for HP Precision Bus
5181-6128 2-meter straight-exit HP-IB Cable
28650-90101 Installation and Service Guide

HP 28650B Options

0B0	Delete Installation and Service Guide
001	Delete Cable

HP-IB Capabilities

The HP 28650B HP-IB Interface connects to the signal lines shown in figure 1, acting as DEVICE A. Eight bidirectional data bus lines carry coded messages in bit-parallel, byte-serial form to/from other devices on the bus, with each byte transferred from one "talker" to one or more "listeners." Data is exchanged asynchronously using interface messages to set up, maintain, and terminate an orderly flow of device-dependent messages. Three handshake control lines control the transfer of each byte of coded data on the eight data lines. The five general interface management lines ensure an orderly flow of information within the HP-IB.

Functional Specifications

Capacity

High-Speed Devices per 28650B Interface: Up to eight with load resistors installed up to 14 without

Standard-Speed HP-IB Devices per Interface: Up to 14

Operating Modes

High-Speed Mode: Operation at data rates to 1 Mbyte/s

Standard-Speed Mode: Operation at data rates to 500 Kbytes/s

Note: Attainable speed for a particular system is dependent on such factors as cabling length, type of external device, system level software and number of devices. Higher transfer rates can be achieved when using less than maximum cable lengths and devices. Consult system documentation for further information or the HP-IB tutorial, P/N 5952-0156.

System Controller Mode: IO-CTL call enables HP 28650B operation as system controller or disables such operation.

Bus Characteristics

HP-IB Signal Lines:

DIO1	Data Input/Output 1
DIO2	Data Input/Output 2
DIO3	Data Input/Output 3
DIO4	Data Input/Output 4
DIO5	Data Input/Output 5
DIO6	Data Input/Output 6
DIO7	Data Input/Output 7
DIO8	Data Input/Output 8
DAV	Data Valid
NRFD	Not Ready for Data
NDAC	Not Data Accepted
IFC	Interface Clear
ATN	Attention
ASRQ	Service Request
REN	Remote Enable
EOI	End or Identify

Logic Levels: High >2.4 V; Low <0.5 V; all signals are low true

Supported HP-IB Functions: C1-C5, SR1, RL1, PP1, DC1, SH1, AH1, T1, TE4, L1, LE4, DT1, E2.

Logic Levels, Line Terminations, Line Drivers, and Line Receivers: All characteristics conform to IEEE Standard 488-1978.

Maximum Cable Length for Standard Operation: 2 meters (6.5 ft) per device connected, with a 20-meter (65 ft) total length. The maximum number of devices is accommodated by interconnections using shorter than maximum cable length.

HEWLETT® PACKARD

HP Precision Bus HP-IB Interface

Technical Data

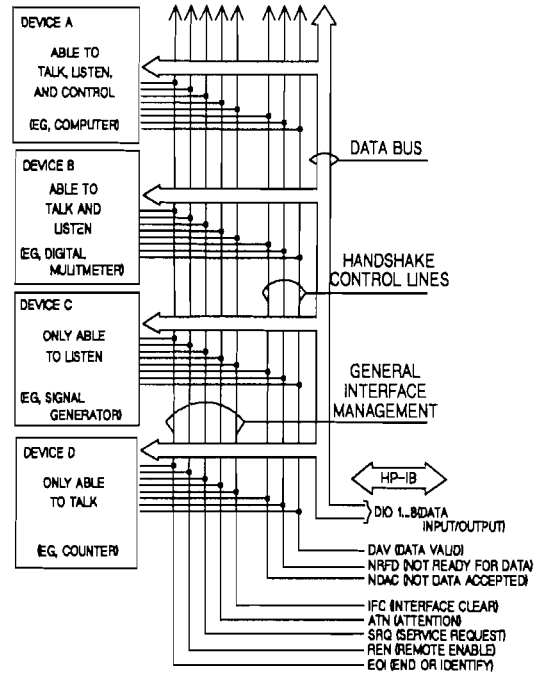
For HP-PB based HP 9000 Series 800 Computer Systems Product Number HP 28650B

The HP 28650B** HP-IB* Interface allows connection of up to 14 HP-IB compatible devices to HP 9000 Series 800 systems that use the HP Precision Bus backplane. HP-IB compatible devices include flexible and hard disks, printers, plotters, graphics digitizers, magnetic tape devices, and an extensive list of instruments.

Features

- 1 Mbyte/s high speed, 500 Kbytes/s standard speed
- Fully IEEE-488-1978 compatible
- Support of up to 14 standard-speed devices, 8 high-speed devices
- Simple implementation of computer-controlled instrumentation and peripheral systems
- Selectable HP-IB controller or slave capabilities
- Parallel poll mode can be programmatically enabled or disabled
- Self-test to help assure interface integrity

Figure 1



* The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable instrumentation" and identical ANSI Standard MS 1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

** The HP 28560B is a replacement for the HP 28650A on systems with HP-UX 8.02 or later.

Functional Specifications

Software

The SCSI drivers provided in the HP-UX kernel implement the Common Command Set and Message Set outlined in the SCSI-2-ANSI publication.

Message Set

The SCSI drivers implement a SCSI-2-compatible message set.

Command Set

In addition to all SCSI-2 mandatory commands, the 28655A driver includes many SCSI-2 optional commands.

Warranties and Disclaimers

Standard HP 90-day warranty with purchase of the product.

HP fully supports the 28655A for use with HP peripherals. Use of the product with non-HP peripherals is at the user's own risk and is not HP supportable. Hardware and/or software may require modification for system/peripheral compatibility. Upon modification of the software, HP waives all responsibility for proper operation including transaction accuracy and data integrity. Modification of software should only be taken on by users experienced with HP-UX drivers and SCSI implementations.

HP specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. In addition, HP specifically disclaims all responsibility for the operation of the SCSI interface software with non-HP products, and for results or data loss in connection with use of the software.

Power Requirements

Power Consumption: 3.75 watts (typical) at 5.0 volts

Input Voltage Operating Range: +4.75 to +5.25 volts

Termpower: The card supplies SCSI bus termination power and meets SCSI specifications (0.9 amps max at +5 volts)

Environmental Characteristics

Operating Temperature: 0°C to +55°C (+32°F to +131°F)
Storage Temperature: -40°C to +70°C (-40°F to +158°F)
Relative Humidity: 15% to 95% noncondensing

MTTR: Less than one hour for failure isolation and card replacement

Physical Characteristics

Dimensions:

Height: 24.13 cm (9.50 in)
Width: 12.95 cm (5.10 in)
Thickness: 3.16 cm (1.25 in)

Related Products

Sister Products from HP's Peripherals Group include: Winchester disks, Optical disks, DDS Cartridge Tape, 9-Track Tape, and CD-ROM.

Ordering Information

The HP 28655A includes:

28655-60001 SCSI/Parallel Host Adapter with active SCSI termination circuits
28655-90001 Installation Quick Start Guide
1252-3920 SCSI active peripheral terminator
5062-3383 SCSI 1-meter shielded twisted-pair cable with 50-pin, high density connector to 50-pin, low density connector
5180-0010 2-meter parallel cable with 36-pin connector on peripheral side

Note: SCSI cable length may not exceed 6 meters in a daisy-chain configuration. For cable extension, female to male cables are available through Direct Marketing Division.

HP 28655A Accessories:

5061-6565 Loopback Hood

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HEWLETT® PACKARD

HP Precision Bus SCSI/Parallel Host Adapter

Technical Data

For HP 9000 Series 800 HP-PB Computers
Product Number HP 28655A

The HP 28655A is an HP Precision Bus (HP-PB) system host adapter that delivers the Small Computer Systems Interface (SCSI) and Centronics (parallel) functionality in a single-board solution. These two industry-standard connections provide HP 9000 Series 800 HP-PB customers the capability to connect to a wide range of peripherals that implement these two widely accepted standards.

SCSI

The HP 28655A implements a SCSI solution which is fully compatible with the ANSI SCSI-2 specification. It provides a standard 8-bit SCSI bus and is capable of performing 32-bit DMA transfers to system backplanes. When connected with any of HP's SCSI peripheral devices, it provides a complete solution for direct access or backup storage. Each host adapter can support up to 7 SCSI peripheral devices, although performance and cable restrictions will apply.

SCSI Features

- Industry-standard interface
- Fully ANSI SCSI-2 Compliant
  - support of bus arbitration
  - parity across the interface
  - single-ended transceivers
  - disconnect/reconnect
- High-speed throughput:
  - asynchronous (3.0 Mbits/s) or synchronous (5.0 Mbits/s) mode
  - 32-bit DMA transfers

Note: System level performance is application dependent and may not reflect the higher I/O rate achievable with SCSI.

- Connects up to 7 devices per adapter
  - 1 meter cable ships with the adapter card
  - Cable uses 50-pin, high-density male connector on one end; 50-pin, low-density male on the other end.
- Up to 6 meters connectivity distance
- Compatible with HP SCSI peripheral devices. Refer to "HP 9000 Series 800 Configuration Guide".

Parallel

The parallel connection implements the widely accepted 8-bit Centronics specification intended primarily for printer connections. By achieving compatibility with a wide range of handshaking schemes, the HP 28655A is able to connect to a large selection of printers that implement the Centronics standard.

Parallel Features

- Industry-standard interface
- Asynchronous data transfer
- 64-byte FIFO
- 330 Kbyte/s burst transfer rate
- Compatible with HP's LaserJet printer family
- 36-pin parallel connector on peripheral side
- Up to 2 meters connectivity

* The HP 28643A extender is designed to operate with SCSI-2 compliant peripherals. However, due to variations in implementation, non-HP devices are not supported.

** Note that system-level performance depends on configuration, applications, and peripherals, and may not reflect this I/O rate.

Functional Specifications

Fiber-Optic Ports
Connectors: ST type
Wavelength: 820 nm

Fiber-Optic Cable
For non-HP cables, verify that the cable conforms to the following specifications:
Type: duplex
Material: glass
Core diameter:
62.5 ±3 μm or 50 ±3 μm
Cladding diameter:
125 ±2 μm
Buffer diameter:
900 ±50 μm
Numerical Aperture (NA):
0.275 for core diameter 62.5 μm
0.20 for core diameter 50 μm

Minimum Bandwidth-Length Product:
160 MHz-km at 820 nm for core diameter 62.5 μm
400 MHz-km at 820 nm for core diameter 50 μm

Maximum Attenuation (including connectors):
3.0 dB at 820 nm,
at FWHM = 75 μm,
with transmitter NA = 0.35
Connector: ST type
Interconnection loss (typical): 0.6 dB
Recommended ferrule construction: alumina, epoxied, and polished

SCSI Port
Applicable standard:
ANSI X3T9.2 compatible
Connectors: 50-pin shielded
Data transfer type:
asynchronous or synchronous
Transceivers: single-ended
Termpower: 900 mA

Environmental Conditions

Operating Temperature:
0°C to 55°C (32°F to 131°F)

Relative Humidity:
5% to 95% at 40 C (104°F)
noncondensing

Physical Dimensions:
Length: 42.5 cm (16.75 in)
Depth: 23.5 cm (9.25 in)
Height: 4.3 cm (1.71 in)

Electrical Characteristics:

Voltage:	100-120 V	200-240 V
Current:	0.5 A max	0.25 A max
Frequency:	50/60 Hz	50/60 Hz

Ordering Information

HP 28643A includes:
2 extender units
2 mounting bracket kits
1 installation/reference manual
1 loopback test coupler

Option AFB adds:
50 meters of 62.5/125 μm fiber-optic duplex cable

Option AFD adds:
100 meters of 62.5/125 μm fiber-optic duplex cable

SCSI Cables (not included)
SCSI peripheral cables:
(One additional standard SCSI peripheral cable is required to connect from the remote extender to the first remote peripheral.)

HP 92222A 0.5 m male-male
HP 92222B 1.0 m male-male
HP 92222C 2.0 m male-male

SCSI extension cable:
HP 92222D 1.0 m male-female

Comparative Distances:

	SCSI (Single-Ended) without HP 28643A	SCSI (Single-Ended) with HP 28643A
Distance	6 meters	112 meters

Typical Performance Rates:

	50 meters	100 meters
Asynchronous	250 Kbyte/s	200 Kbyte/s
Synchronous offset 8	4 Mbyte/s	3.3 Mbyte/s
Synchronous offset 16	5 Mbyte/s	5 Mbyte/s

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HEWLETT® PACKARD

SCSI Peripheral Host Adapter

Technical Data

For HP 9000 Series 800 CIO Computers
Product Number HP 27147A

The Small Computer System Interface (SCSI) is a widely accepted ANSI standard for connecting host computers to peripherals. SCSI peripherals available in the market today include floppy and Winchester disks, cartridge and reel-to-reel tape drives, CD-ROM, WORM drives, helical scanners, and a wide range of other peripherals. The HP 27147A can support seven devices on one interface although performance and cable restrictions will apply.

The HP 27147A host adapter provides a standard 8-bit SCSI bus for HP 9000 Series 800 CIO systems and is capable of performing 16-bit DMA transfers. When connected with any of HP's SCSI peripheral devices, it provides a complete solution for direct access or backup storage. By itself, the HP 27147A provides the flexibility of an industry-standard and allows connection to compatible peripherals.

Features

- Industry-standard interface
- Fully ANSI SCSI-2 compliant
  - support of bus arbitration
  - full parity across the interface
  - single-ended transceivers
  - disconnect/reconnect
  - command qeueing
- High-speed throughput:
  - asynchronous (1.5 Mbyte/s) or synchronous (5.0 Mbyte/s) mode
  - 16-bit DMA transfers

Note: System level performance is application dependent and may not reflect the higher I/O rate achievable with SCSI.

- Connects up to seven devices per adapter:
  - 2-meter adapter cable ships with the card
  - cable provides 50-pin, low-density male connector to first peripheral
- Up to 6 meters connectivity distance
- Compatible with HP's wide variety of SCSI devices. Refer to "HP 9000 Series 800 Configuration Guide"

Functional Specifications

Software
The SCSI drivers provided in the HP-UX kernel implement the Common Command Set and Message Set outlined in the SCSI-2 ANSI publication.

Message Set
The SCSI drivers implement a SCSI-2 compatible message set.

Warranties and Disclaimers

Standard HP 90-day warranty with purchase of the product.

HP fully supports SCSI for use with HP peripherals. Use of the SCSI adapter with non-HP peripherals is at the user's own risk and is not HP supportable. Hardware and/or software may require modification for system/peripheral compatibility. Upon modification of the software, HP waives all responsibility for proper operation including transaction accuracy and data integrity. Modification of software should only be taken on by users experienced with HP-UX drivers and SCSI implementations.

HP specifically disclaims the implied warranties of merchantability and fitness for a particular purpose. In addition, HP specifically disclaims all responsibility for the operation of the SCSI interface software with non-HP products and for results or data loss in connection with use of the software.

Power Requirements

Power Consumption:
13.1 watts (typical) at 5.0 volts
Input Voltages:
+4.75 to +5.25 volts
TermPower:
The cord supplies SCSI bus termination power and meets SCSI specifications (0.9 amps max at +5 volts).

Environmental Characteristics

Operating Temperature:
0°C to +55°C (+32°F to +131°F)
Storage Temperature:
-40°C to +70°C (-40°F to +158°F)
Relative Humidity:
15% to 95% at 40°C noncondensing

MTTR: Less than one hour for failure isolation and card replacement.

Physical Characteristics

Dimensions:
Height: 17.6 cm (6.9 in)
Width: 17.1 cm (6.7 in)
Thickness: 1.6 cm (0.6 in)

Supported Products include:

Winchester disks: C2212A and C2213A
Optical disks: C1700A
Sequential Access Tapes: C1512A, 7979S, 7980S

Ordering Information

The HP 27147A includes:

27147-60001 CIO SCSI Host Adapter with termination
27147-90006 CIO SCSI Adapter Installation
1252-3920 1 SCSI active peripheral terminator
27147-63001 2-meter shielded twisted-pair cable with 50-pin, low-density connector

Note: Cable length may not exceed 6 meters in a daisy chain configuration. For cable extension, female to male cables are available from Hewlett-Packard.

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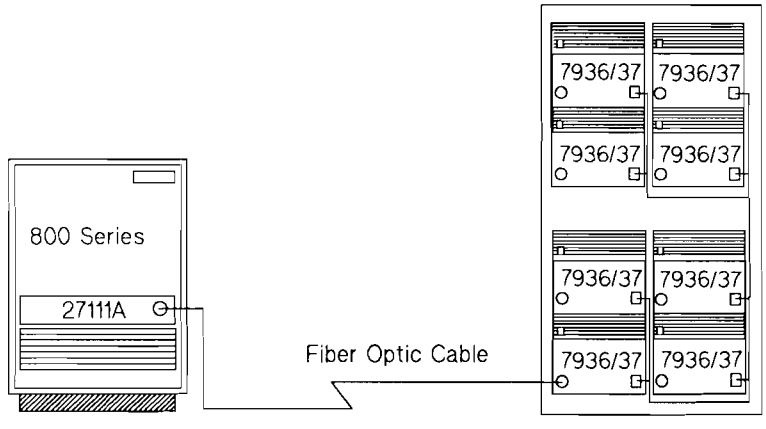
HEWLETT® PACKARD

Fiber-Optic Peripheral Interface

Technical Data

For HP 9000 Series 800 Computer Systems Product Number HP 27111A

The HP 27111A is a fiber-optic interface card (HP-FL) for connecting HP 9000 Series 800 systems to HP 7936FL and 7937FL disks that use the Channel I/O (CIO) backplane. The HP 7936FL and 7937FL use a fiber-optic disk controller and, when connected to the interface card over a fiber cable, provide transfer rates up to 5 Mbytes per second.
The HP 27111A comes standard with a 30-meter fiber-optic cable which may be replaced with a custom length cable of up to 500 meters. Each interface and cable can connect up to 8 disks in a daisy chain using a disk-to-disk bus. The fiber-optic disk controller and disk-to-disk bus are products from HP Disk Memory Division (DMD).



Features

- High-speed data throughput of 5 Mbytes/s
  - Command queuing and seek reordering for high performance in multiuser applications
  - 32-byte buffer for full-speed CIO transfers
  - Rapid logical channel switching
  - 64 virtual circuits (CIO logical channels)
- Onboard microprocessor to unload I/O processing from the SPU
- Remote capability of up to 500 meters with a custom length cable
- No EMI or RFI emissions
- Immunity from EMI and RFI
- Electromagnetic compatibility
- Reliable data transfer achieved through:
  - Cyclical redundancy checking
  - Redundant coding
  - Noise immunity
- Thin, lightweight, flexible cable
- Cable rate Class A environmental
- Electrical isolation

- Minimal performance degradation even when fully configured with 8 disk drives

Functional Description

The HP 27111A adapter consists of an improved HP-CIO backplane interface circuit, a Protocol Controller, a high-speed parallel/serial/parallel converter and coder/decoder, a high-performance microprocessor (80186) and fiber-optic links.

Compared to existing interfaces, the VLSI backplane circuitry improves CIO performance through increased data buffering and support for log-channels. The microprocessor handles the circuit-layer and device-layer protocols.

Onboard firmware and proprietary protocol perform command pipelining to enhance channel usage and card performance. Cyclical redundancy and parity checks ensure data integrity and high reliability across the link.

Functional Specifications

Data Rate: 5 Mbyte per second maximum burst rate. This may be compared to HP-IB, which is rated at 1 Mbyte per second. Actual performance, however, is extremely application dependent and will vary accordingly. Refer to the HP 27111A Performance Brief for more detail.

Overhead: Less than 1 millisecond per disk transaction. This includes HP 27111A overhead only. Additional overhead accrues from software, channel, and disk controller. In a multiprogramming/multiuser application, most overhead is masked by pipelining within the fiber-optic disk controller.

Devices per Adapter: The 27111A can connect up to 8 disks by daisy chaining them with a disk-to-disk bus. Length restrictions do apply when chaining more than 2 disks. Since each disk/disk controller has a fiber-optic port, 8 SPUs using 8 HP 27111As can connect to the 8 disks in the cabinet. Although the hardware allows an 8 SPU by 8 disk configuration, additional software is required to allow multiprocessor disk sharing. Consult HP for software availability.

Cable: The 30-meter fiber-optic cable (standard duplex cable of 100/140 mm glass fiber) uses four SMA style connectors. The 30-meter cable may be replaced with a custom length cable of up to 500 meters. These may be ordered from HP Optical Communications Division (OCD) using part numbers HFBR-AWQxxx, where xxx specifies the length desired. Lengths are available in increments of 5 meters from 5 to 50 meters, increments of 25 meters from 50 to 200 meters, and increments of 50 meters from 200 to 500 meters.

Supported Configurations: Configurations are system dependent; refer to the system specifications for more information.

MTBF: Estimated at 70,000 hours

MTTR: Estimated at 30 minutes for failure isolation and card replacement

Ordering Information

The HP 27111A includes

27111-60001 Interface card for Series 800
27111-96000 Installation manual for HP-UX Systems
1005-0078 30-meter fiber-optic cable
5061-3151 Disk-to-disk bus terminator (2)

HP 27111A Options

001 Delete 30-meter cable. HP recommends ordering alternate cable in advance.
002 Add 30.5 cm (12 in) loopback cable, P/N HFBR-3020.

Related Products

HP 27110BN Return credit for HP 27110B, Series 800 HP-IB from HP Disk Memory Division (DMD)
HP 7936FL 307 Mbyte disk with fiber-optic controller (comes with disk-to-disk bus cabling)
HP 7937FL 571 Mbyte disk with fiber-optic controller (comes with disk-to-disk bus cabling)
HP 97522FL HP-IB to fiber-optic controller field installable upgrade kit
HP 19514A Eight-pack disk cabinet

HEWLETT® PACKARD

EISA HP-IB Adapter

Technical Data

For HP Apollo 9000 Series 700 Computer Systems Product Number HP 25560A

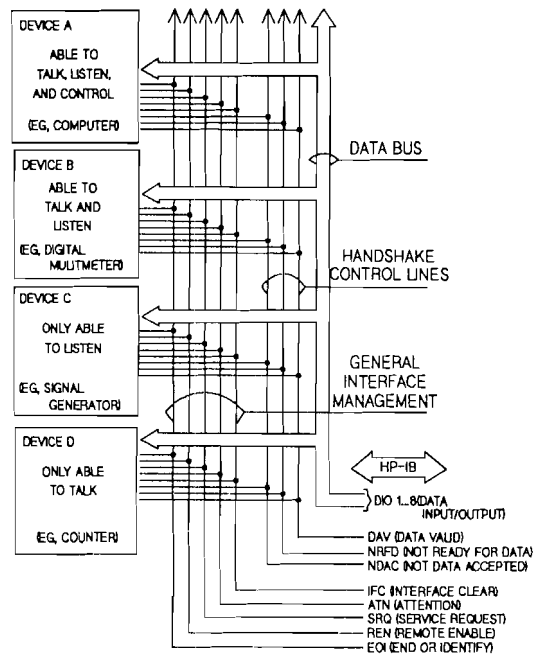
The HP 25560A EISA HP-IB* host adapter allows customers to connect supported HP-IB devices to HP Apollo 9000 Series 700 systems**.

Features

The HP 25560A

- Has a maximum burst transfer rate of 1 Mbyte/second in high-speed mode, and 500 Kbytes/second in standard-speed mode
- Complies with IEEE-488-1978 and IEEE-488A-1980 standards
- Supports cabling distances of up to 15 meters for high-speed operation and up to 20 meters for standard-speed operation
- Supports up to 14 standard-speed devices or 7 high-speed devices
- Has software-configurable HP-IP parameters, which include operating speed, HP-IB bus address, and HP-IB system controller capability
- Allows simple implementation of computer-controlled instrumentation and peripheral systems
- Has selectable HP-IB controller or slave capabilities
- Has parallel poll mode which can be programmatically enabled or disabled
- Uses self-test to help assure interface integrity

Figure 1



* The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable instrumentation" and identical ANSI Standard MS 1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

** Refer to the HP Apollo 9000 Series 700 Configuration Guide for a current list of supported peripherals and configuration limitations.

HP-IB Capabilities

The HP 25560A EISA HP-IB host adapter connects to the signal lines shown in Figure 1, acting as DEVICE A. Eight bidirectional data bus lines carry coded messages in bit-parallel, byte-serial form to/from other devices on the bus, with each byte transferred from one "talker" to one or more "listeners." Data is exchanged asynchronously using interface messages to set up, maintain, and terminate an orderly flow of device-dependent messages. Three handshake control lines control the transfer of each byte of coded data on the eight data lines. The five general interface management lines ensure an orderly flow of information within the HP-IB. (For more details on the HP-IB characteristics of the HP 25560A adapter, refer to the HP-IB tutorial, P/N 5952-0156.)

Functional Specifications

Capacity

Up to seven high-speed devices per HP 25560A adapter.
Up to 14 standard-speed devices per HP 25560A adapter.

Operating Modes

High-Speed Mode: The adapter operates at data rates to 1 Mbyte/s

Standard-Speed Mode: The adapter operates at data rates to 500 Kbytes/s

Note: Attainable speed for a particular system depends on such factors as cabling length, type of external device, system level software, and number of devices.

System Controller Mode: A software selection enables or disables the operation of the HP 25560A as system controller.

Bus Characteristics

HP-IB Signal Lines:
The HP 25560A conforms to IEEE 488-1978 and IEEE-488A-1980 standards. (For more details on the HP-IB characteristics of the HP 25560A adapter, refer to the HP-IB tutorial, P/N 5952-0156.)

Supported HP-IB Functions:
C1-C5, SR1, RL2, PP1, DC1, SH1, AH1, T1, TE1, L1, LE1, DT1, and E2. TE1 and LE1 require host system support.

Maximum Cable Length for Standard Operation: The maximum cable length in meters should be equal to two times the number of device loads on the HP-IB or 20 meters, whichever is less.

Note: Device loads consist of peripheral devices, the host adapter, and equivalent loads in resistor packs. Only the HP-IB system controller may contain additional device loads (resistor packs).

Maximum Cable Length for High-Speed Operation: The maximum cable length in meters should be equal to the number of device loads on the HP-IB or 15 meters, whichever is less. There must be at least one device load per meter of cable. (The resistor pack that comes installed on the HP 25560A adds seven equivalent device loads. The HP 25560A HP-IB adapter counts as one device load).

The number of HP-IB device loads must not exceed 15. A maximum system would be composed of a System Controller, with its resistor pack, and seven peripherals (CRC-16).

Error Detection

Data errors can be detected using Cyclic Redundancy Check-16 (CRC-16) on all data messages sent or received. CRC-16 can be used if the other participating device supports CRC-16. CRC-16 is invoked by the system for each transaction. See system documentation for details. Interface message errors are detected using odd byte parity.

Electrical Specifications

Voltage: +5 volts
Current: 3.06 amps
Power Dissipation: 15.3 watts

Physical Characteristics

Size: 21.3 cm long by 11.4 cm wide by 1.5 cm high (8.4 in by 4.5 in by 0.6 in)

Weight: 173 g (6.1 oz) without HP-IB cable

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Non-Operating Temperature:
-40°C to 70°C (-40°F to 158°F)

Relative Humidity:
15% to 95% at 40°C (104°F) noncondensing

Ordering Information

The HP 25560A EISA HP-IB adapter is supported on HP Apollo 9000 Series 700 systems using HP-UX 8.05 or later.

The HP 25560A includes:

25560-60001 EISA HP-IB adapter card assembly
5957-4369 antistatic precautions note
25560-90001 EISA HP-IB adapter installation manual

Note: The HP 25560A does not include an HP-IB cable. Cables must be ordered separately through HP Complementary Products Sunnyvale (CPS).

The HP 25560A EISA HP-IB adapter can be ordered:

- As an add-on product to HP Apollo 9000 Series 700 systems
- As an option to HP Apollo 9000 Series 700 computers

When ordered as an option with a Series 700 system, the HP 25560A is installed and configured into the Series 700 system. Refer to the HP Apollo 9000 Series 700 Price Guide or Configuration Guide for more detailed ordering information.

HEWLETT® PACKARD

EISA SCSI-2 Differential Host Bus Adapter

Technical Data

Product Number
HP 25525B

The HP 25525B EISA SCSI-2 Differential Host Bus Adapter (HBA) is the high-performance interface that allows customers to connect SCSI Differential devices to HP 9000 Series 700 computers.

The HP 25525B is now available for HP 9000 Series 700 customers who need:

- A higher performance disk connection solution than the built-in SCSI single-ended (SE) bus
- Longer cabling distances compared to the built-in SCSI SE bus
- Additional disk storage capacity

The HP 25525B EISA SCSI-2 Differential Host Adapter is supported on the HP 9000 Series 700 workstations running HP-UX 8.05 or later.

Features and Benefits

Benefits	Features
Higher performance	- 10 Mbyte/second burst performance (Note: System level performance is application-dependent and may not reflect the maximum I/O rate achievable with SCSI). - Access to high-performance disk arrays–the HP Series 6000 Model 420SA and Model 1350SA. - Access to high-performance disk systems–the HP Series 6000 Model 670SX and Model 1350SX. - Support of additional high-performance disk systems is planned. Dedicated disk connection solution to achieve the maximum disk I/O performance possible on Series 700s. - More than 8 Mbyte/second sustained throughput on Series 700 Model 750 with two HP 25525B HBAs.
Longer cabling distances	Support of up to 25 meters of total SCSI-2 cable length, providing customers more flexibility in locating their disk systems.
Added disk capacity	Support of up to seven differential SCSI-2 devices on each HBA. Presently, this provides a maximum disk capacity of 56 Gbytes per HBA (i.e., using the Series 600 Model 1350SA disk array) or 9.5 Gbytes per HBA (using the Series 6000 Model 1350SX disk systems).
Customer installable	Easy installation and configuration. There are no hardware jumpers or switches to set. All configuration is accomplished through EISA configuration software.

Features

The HP 25525B

- Connects to the industry-standard EISA backplane
- Provides 32-bit EISA bus master operation
- Supports synchronous SCSI protocol
- Provides boot support of Series 700 computers
- Supports SCSI differential devices. (Do not attach to single-ended devices.)
- Uses a high-density SCSI connector

Technical Specifications

Applicable Standards
Complies with SCSI-2

Power Consumption
15.3 watts (typical) at 5 volts

Power Consumption
USA: FCC Class A
Europe: CISPR-22 Class A
Germany: FTZ-1046 (VDE Level B)
Japan: VCCI Class 1

Physical
Length: 213 mm (8.4 in)
Width: 114 mm (4.5 in)
Height: 15 mm (0.6 in)
Weight: 184 g (6.5 oz)

Environmental
Temperature:
0°C-55°C operating;
40°C-70°C non-operating

Ordering Information

The HP 25525B product includes:

Hardware

- 12016-80003 Low Density Differential SCSI Terminator
- 25525-60001 EISA SCSI-2 Host Adapter Card

Documentation

- 5957-4369 Static Note
- 5960-3109 EISA SCSI-2 Host Adapter Installation Manual

The EISA SCSI-2 Differential Host Bus Adapter can be ordered in one of two ways:

- To add the SCSI-2 adapter to an existing HP 9000 Series 700 system, order product number HP 25525B. This product includes the host adapter card, external low-density differential terminator, and manuals for installation and service of the host bus adapter.

Note: The Model 720 computer, an EISA upgrade (P/N HP A1986A), must be ordered separately.

- For factory integration and configuration of the SCSI-2 adapter into a new HP 9000 Series 700 system, specify Option #ALE for the system being ordered.

Note: For the Model 720 computer, an EISA upgrade (Option #ALD), must also be ordered.

Refer to the HP Apollo 9000 Series 700 U.S. Price Guide for ordering information.

Notes

- HBA-to-peripheral cable is not included, order K2296 (0.9 meter) or K2297 (1.5 meter)
- HBA to disk array (HP 420SA or HP 1350SA) high-density, 50-pin to 68-pin cables:
  C2906A–2 meters
  C2907A–5 meters
  C2916A–20 meters
- Peripheral-to-peripheral SCSI Cables with 50-pin low-density, male connectors with bail-lock on both ends:
  92222A–0.5 meter
  92222B–1.0 meter
  92222C–2.0 meter
- SCSI extension cables with 50-pin, low-density, female-to-male, bail-lock connectors:
  92222D–1.0 meter
  C2900A–3.0 meter
  C2901A–5.0 meter
  C2902A–10.0 meter
  C2903A–20.0 meter

Technical information in this document is subject to change without notice.

Printed in the U.S.A.

HEWLETT® PACKARD

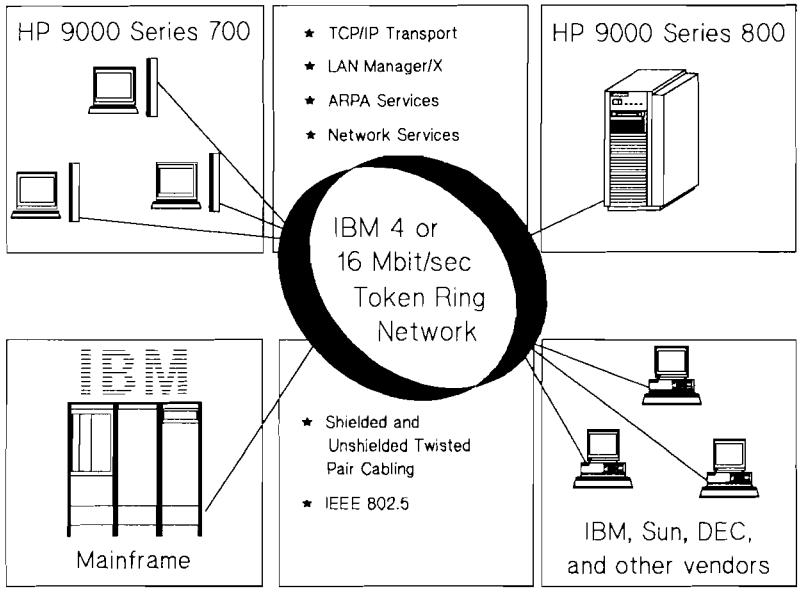
Token Ring 3000/iX for Series 900 Computers

Technical Data

For HP 3000 Series 900 Computer Systems
Product Number
HP J2167A

The Token Ring 3000/iX Link provides the hardware and software to connect an HP 3000 Series 900 system to a multivendor LAN. The Token Ring Link includes the hardware interface card and the device driver, network transport, and network management agent software.

The network transport software includes the industry standard TCP, UDP, and IP protocols, along with both the BSD sockets and HP NetIPC APIs. Users may write their own software to access the network via an API, or they may purchase one of the higher level networking services (ARPA, NS, LAN Manager, or Novell Netware) provided by HP.



Token Ring Features

- A complete link connection to the Token Ring network, which includes the Token Ring adapter and the transport software.
- Full interoperability with IBM Token-Ring.
- 4 Mbits/second or 16 Mbits/second burst transfer rate.
- Network transport software which provides the ARPA TCP, UDP, and IP protocols.
- BSD sockets API provides access to TCP and UDP.
- HP NetIPC API provides access to TCP.
- Integrated node management software provides online network configuration and logging.
- Supports Simple Network Management Protocol (SNMP).
- Supports Source Routing to remote connections through Source Routing Bridges.
- Supports Virtual Terminal (VT) access.

Hardware Components

The Token Ring adapter card manages packet buffering, processes Token Ring protocols, and uses an LED to display the Token Ring adapter status.

A 9-pin D-type connector on the Token Ring adapter card is used to connect the adapter to the Token Ring network through a cable that plugs into a Multistation Access Unit (MAU). On a 4 Mbit/second Token Ring network, the following IBM cable types are supported:

Data Grade	AWG	Type
Type 1	22	2-wire shielded twisted pair
Type 2	22	2-wire shielded or 4-wire unshielded twisted pair
Type 3	22,24	twisted-pair unshielded
Type 6	26	2-wire shielded twisted pair
Type 9	26	2-wire shielded twisted pair

For unshielded twisted pair (UTP), the customer will need to use a media filter which attaches to the DB9 connector. This is done for impedance matching from 150 Ohm (shielded twisted pair) to 100 Ohm UTP. Additionally, only shielded cables are supported at the 16 Mbit/second data link rate.

Note: Cables, media filter, and MAU are not provided in the product.

Features

- Uses TMS380C16/04 TI Token Ring communication processor
- Uses 512K bytes of DRAM space for MAC code and data storage
- Uses frame size up to 2048 bytes
- Supports early token release at 16 Mbits/second
- Supports up to 250 link stations
- Environmental: Class B2
- EMC: complies to FCC A and VDE Level B

Environmental Characteristics

Temperature

Nonoperating: -40°C to +75°C (-40°F to +167°F)
Operating 0°C to +70°C (0°F to 158°F)
Humidity 5% to 95% relative humidity

Electrical Specifications

Maximum power consumption is 10 watts at 5 volts.

Software Components

The Token Ring Link includes software corresponding to layers 2 through 4 of the Open Systems Interconnection (OSI) Reference Model. It also includes node management and network management agent software (SNMP).

The Data Link Layer, corresponding to OSI layer 2, consists of the link level Token Ring protocol. Transmission consists of sending addressed frames of data on the cable at a signaling rate of either 4 megabits per second or 16 megabits per second.

The Network Layer, corresponding to OSI layer 3, is based on the ARPA Internet Protocol (IP). IP provides packet fragmentation/ reassembly and internetting capability.

The Transport Layer, corresponding to OSI layer 4, is based on the ARPA Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).

TCP provides end-to-end reliable, connection-oriented services over IP with flow control and multiplexing. TCP also has mechanisms for detecting duplicate, lost, or out-of-sequence packets. UDP provides an unacknowledged connectionless delivery service over IP.

The Token Ring Link provides two application programmatic interfaces (APIs) to the network transport, Berkeley (BSD) sockets and HP's Network InterProccess Communication (NetIPC). Both APIs support the rapid exchange of data using peer-to-peer communications between processes. The processes may be on a single system or on different systems on the network.

BSD sockets provides a C language interface to TCP and UDP. BSD sockets is available on HP 1000s, 9000s, and PCs and on a wide range of computers from other vendors. BSD sockets is part of the MPE/iX FOS beginning with release 4.0 and is supported over the Token Ring Link. The following sockets calls are supported:

- accept()
- bind()
- close()
- connect()
- fcntl()
- gethostby xxxx
- getnetby xxxx
- getprotoby xxxx
- getservby xxxx
- listen()
- recv()
- recvfrom()
- select()
- send()
- sendto()
- shutdown()
- socket()
- socketpair()

Additional sockets calls are planned for later releases.

NetIPC is a set of 18 programmatic calls, appropriate for implementing efficient distributed applications over TCP only. NetIPC supports communications to various HP systems, including the HP 1000, 3000, and 9000 computer systems, as well as HP PC networking. Applications written to NetIPC can also interoperate with other applications written to BSD sockets.

Node management software is included in the Token Ring Link and provides a user interface for configuration, tracing, and logging. An online user configurator supports easy initial configuration and reconfiguration of the Token Ring Link software without bringing down the HP 3000. The node management software also delivers flexible event logging and the ability to selectively trace several levels of network software. Also included is NetTool, a set of tools to monitor, analyze, and diagnose the network transport software.

The Token Ring Link also includes a network management agent. The agent supports the Simple Network Management Protocol (SNMP) and collects information regarding the state of the link and transport. This information is used and displayed by remote management stations, such as the HP OpenView Network Node Manager (see related products).

Standards

The protocols utilized by the Token Ring Link software closely adhere to the following standards:

- RFC 768 UDP
- RFC 791 IP
- RFC 792 ICMP
- RFC 793 TCP
- RFC 826 ARP
- RFC 919 IP Broadcast Datagrams
- RFC 922 IP Broadcast Datagrams with Subnets
- RFC 950 IP SubnetExtension
- RFC 1155 Management Information (SNMP)
- RFC 1157 SNMP
- RFC 1213 MIB II (SNMP)

Support for Networking Services

The Token Ring Link supports the multivendor ARPA network services, Network File Services (NFS), HP's NS network services, Novell Netware, and LAN Manager. The products provide interactive and programmatic facilities, such as file transfer, remote database, file, and peripheral access.

Network Capacity and Performance

Although the signaling rate of the line may be 4 or 16 megabits/s, the throughput achieved at a node may be lower. This is primarily due to the overhead of the software providing network services and the user's application programs. Among the factors affecting user throughput are the type of software being used, the main

memory and speed of each processor (and its peripherals) involved in the transfer and the load on each system from non-network applications.

Because of the number and complexity of these factors, it is difficult to make useful generalizations about the performance or capacity of the network in a particular application. Hewlett-Packard network specialists are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

Installation and Configuration Policy

The customer is responsible for loading the Token Ring Link software onto the system. HP will install the Token Ring card and perform minimum configuration of the Token Ring Link to verify minimum product functionality. This activity is included in the product's purchase price.

Customer Responsibility

Prior to having HP personnel onsite to verify the installation and perform minimum configuration of the Token Ring Link, the customer is responsible for the following:

- Installing the appropriate wiring.
- Complying with all applicable building codes in the installation of the Token Ring cabling and components.
- Obtaining a valid IP address prior to the configuration of the Token Ring Link.
- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Updating the HP 3000 system to the proper release level and installing the Token Ring Link software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management experience and LAN management experience are available when HP is onsite to complete the installation and minimum configuration of the Token Ring Link.

After HP has completed the minimum configuration of the Token Ring Link, the customer is also responsible for completing the configuration in order to fully integrate the Token Ring Link into the existing customer network.

HP Responsibility

Following the installation of the Token Ring Link software, HP is responsible for the following:

- Verifying the operation of the Token Ring card.
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the Token Ring Link product to the minimum default configuration necessary to verify software and hardware functionality. This default configuration includes configuring the link and network interface in the network configuration file (NMCONFIG) using the NMMGR Utility.

These steps complete HP's portion of the installation and minimum configuration of the Token Ring/iX Network Link.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services form HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

The Token Ring/iX Network Link is supported on the following HP 3000 HP-Precision Bus Series 900 systems:

- 9X7LX, 9X7
- 922LX, 922RX, 922
- 932
- 948, 958
- CS 990/992

Only one Token Ring adapter is supported per system.

Ordering Information

This product consists of the Token Ring HP-PB adapter card, the Token Ring software driver, the TCP/IP transport, and hardware and software customer documentation. The Simple Network Management Protocol (SNMP) Agent and Basic Incoming Virtual Terminal (VT) services are also included with this product.

To receive the Token Ring/iX Network Link, order the base product (P/N J2167A), and specify the hardware option (AL4) and an appropriate User License option. MPE/iX release 4.0 or later is required for the product to be operational.

HP J2167A Token Ring 3000/iX Network Link

AL4 Hardware Option

Documentation Option (optional)

0B0 Delete documentation

Token Ring HP-PB Adapter Card User License Options

The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
0CD Credit for Processor Option 310
0GJ Credit for Processor Option 315
0CE Credit for Processor Option 320
0CF Credit for Processor Option 330
0GL Credit for Processor Option 335
0GM Credit for Processor Option 340
UEK Credit for Processor Option 350

HEWLETT® PACKARD

HP Token Ring/9000 for Series 800 Computers

Technical Data

Product Number
HP J2166A

HP Token Ring/9000 provides the Token Ring network adapter to interface between an HP 9000 Series 800 computer and a Token Ring Local Area Network. Also included in this link product is driver and node management software.

Users can choose to write their own user software to access Berkeley Sockets software provided, or choose one of the higher-level networking software products provided by Hewlett-Packard.

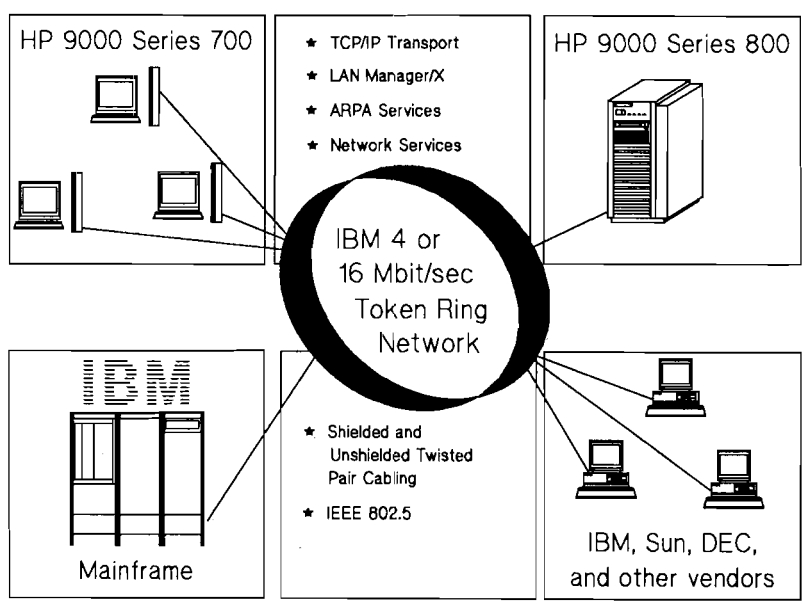
HP Token Ring/9000 Connectivity

For those users needing multivendor communications, HP Token Ring/9000 can be used with ARPA Services, NFS Services, and LAN Manager/X. ARPA Services provide de facto networking software as defined by the Department of Defense Advanced Research Project Agency and the Berkeley Software Distribution (BSD) UNIX® 4.3 system. NFS/9000 allows HP 9000 computers to share file systems in a multivendor network of machines and operating systems. LAN Manager/X is an advanced full-featured network operating environment that enables UNIX-based machines to operate as file and resource servers to MS-DOS® and OS/2 PC workstations.

Network transport software based on de facto industry-standard Defense Advanced Research Projects Agency (DARPA) protocols, corresponding to the transport and network layer functions is included with the HP-UX kernal with Release 9.0 or later.

HP Token Ring/9000 Features

- A complete link connection to the Token Ring network, which includes hardware and driver software
- Full interoperability with IBM Token-Ring



- 4 Mbits/second or 16 Mbits/second burst transfer rate
- Integrated node management software provides online network configuration and logging
- Supports Source Routing to remote connections through Source Routing Bridges configured to use a maximum packet size of 4472 bytes
- Supports HP 9000 Series 800 as LAN-to-LAN router

Hardware Components

The HP Token Ring/9000 adapter card manages packet buffering, processes Token Ring protocols, and uses an LED to display the Token Ring adapter status.

A 9-pin D-type connector on the Token Ring adapter card is used to connect the adapter to the Token Ring network through a cable that plugs into a Multistation Access Unit (MAU). On a 4 Mbit/second Token Ring network, the following IBM cable types are supported:
For Type 3 unshielded twisted pair (UTP), the customer will need to use a media filter, which attaches to the DB9 connector. This is done for impedance matching from 150 Ohm (shielded twisted pair) to 100 Ohm UTP. Additionally, only shielded cables are supported at the 16 Mbit/second data link rate.

Note: Cables, media filter, and MAU are not included in the product.

Features

- Uses TMS380C16/04 TI Token Ring communication processor
- Uses 512K bytes of DRAM space for MAC code and data storage
- Uses frame size up to 4096 bytes
- Supports early token release at 16 Mbits/second
- Supports up to 255 link stations
- Environmental: Class B2
- EMC: complies to FCC A and VDE Level B

Environmental Characteristics

Temperature
Nonoperating: -40°C to +75°C (-40°F to +167°F)
Operating: 0°C to +70°C (0°F to 158°F)

Humidity
5% to 95% relative humidity

Electrical Specifications
Maximum power consumption is 10 watts at 5 volts.

Data Grade	AWG	Type
Type 1	22	2-wire shielded twisted pair
Type 2	22	2-wire shielded or 4-wire unshielded twisted pair
Type 3	22, 24	twisted-pair unshielded
Type 6	26	2-wire shielded twisted pair
Type 9	26	2-wire shielded twisted pair

Software Components

HP Token Ring/9000 includes driver software that implements the Token Ring protocol. Token Ring/9000 runs under the TCP/IP, SNAplus, and NetWare IPX transports.

The node manager software uses the commands of the nodal management module to establish computer-to-network connections and to maintain the network. Network maintenance operations include initialization and configuration of the networking products, establishing network security, and using various diagnostic tools to ensure proper network operation. The diagnostics include loopback verification, nodal statistics, tracing, and logging.

Installation Policy

Please contact your HP Sales Representative or local HP sales office for more information on the installation policy of this software product in your system environment.

Customer Responsibility

HP Token Ring/9000 for the Series 800 is customer installable and configurable. Installation of HP Token Ring/9000 is the responsibility of the customer. Prior to installing HP Token Ring/9000, the customer should complete the following tasks:

- Install HP-UX 8.02 or 9.0 on the HP 9000 Series 800
- Install the Token Ring wiring
- Attach and configure all necessary networking devices, including any Token Ring accessories such as MAUs and cables

The basic steps required to install HP Token Ring/9000 include loading the software, setting the adapter link speed, installing the Token Ring adapter card, attaching the system to the network, configuring the adapter card, and verifying the installation. Recommended reading prior to implementing a Token Ring network includes the manual "Installing and Administering HP Token Ring/9000 Software," (P/N J2165-61001 for HP-UX 8.02 or J2165-61004 for HP-UX 9.0) and the "Quick Installation Guide," (P/N J2166-61002 for HP-UX 8.02 or J2166-61003 for HP-UX 9.0).

For quick implementation of your network, a simplified service interface, verified network operation, and assured ongoing supportability, please refer to the "HP Network Startup" in this guide.

System Environment

HP Token Ring/9000 is supported on the HP 9000 Series 800 HP-PB computer systems, with the exception of Series 8X2, 808, and 815 computer systems. The product supports up to two Token Ring adapter cards per system on the Series 800 with HP-UX 8.02 and up to five adapter cards per system with HP-UX 9.0.

Ordering Information

HP Token Ring/9000 for the Series 800 includes the Token Ring adapter card, the Token Ring software driver, the Series 800 HP-PB Token Ring Quick Installation Card, the HP-PB Token Ring Network Adapter Installation and Service manual, and the Installing and Administering HP Token Ring/9000 Software manual.

Series 800 Hardware and Software

HP J2166A HP Token Ring/9000

The HP Token Ring/9000 product (HP J2166A) must be ordered with a hardware option, a processor software option, a media option, and an HP-UX version option. The hardware option (without a processor software option, a media option, or an HP-UX version option) may be ordered to obtain a second Token Ring adapter for use in the same system.

Processor Hardware Option
(must order)

20N Token Ring Hardware

Processor Software Options
(may choose one)

Processor

AH0 License to use on Tier 1
AE5 License to use on Tier 2
AEP License to use on Tier 3

Media Options
(may choose one)

AA0 ¼-inch cartridge tape (valid with HP-UX 8.02 only)
AA1 ½-inch magnetic tape (1600 bpi)
AAH DDS cartridge tape
AA4 QIC media
AAU CD-ROM certificate only

HP-UX Version Options
(may choose one)

APC HP-UX Revision 8.02
APH HP-UX Revision 9.0

Software Upgrade Options
(may choose one)

Upgrade options are also provided for scalability. Previous purchase of HP Token Ring/9000 is required.

Processor Upgrades

0GR for return credit for AH0, Tier 1
0C8 for return credit for AE5, Tier 2

HEWLETT® PACKARD

HP Token Ring/9000 for Series 700 (EISA) Computers

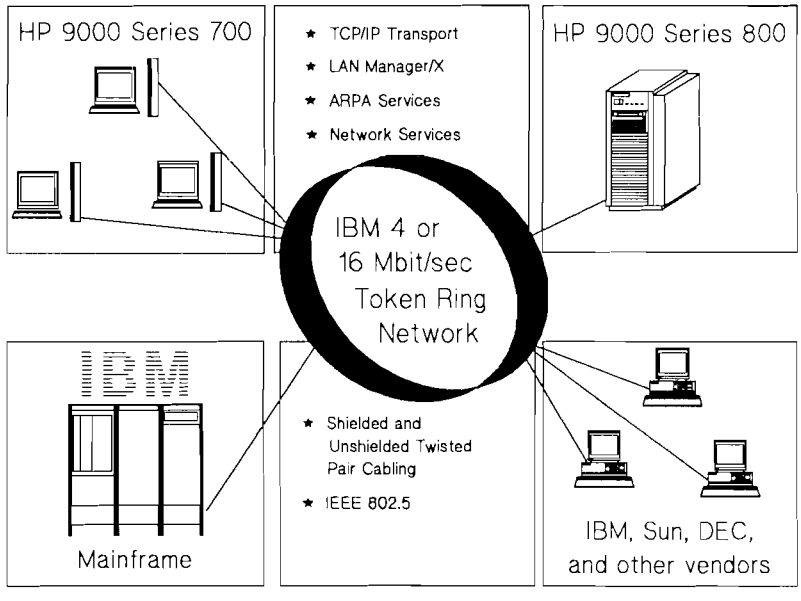
Technical Data

Product Number
HP J2165A

HP Token Ring/9000 provides the Token Ring network adapter to interface between an HP 9000 Series 700 computer and Token Ring Local Area Networks. Also included in this link product is driver and node management software. Users can choose to write their own user software to access Berkeley Sockets software provided, or choose one of the higher-level networking software products provided by Hewlett-Packard.

HP Token Ring/9000 Connectivity

For those users needing multivendor communications, HP Token Ring/9000 can be used with ARPA Services, NFS Services, and HP LAN Manager/X. ARPA Services provide de facto networking software as defined by the Department of Defense Advanced Research Project Agency (DARPA) and the Berkeley Software Distribution (BSD) UNIX® 4.3 system. NFS/9000 allows HP 9000 computers to share file systems in a multivendor network of machines and operating systems. HP LAN Manager/X is an advanced full-featured network operating environment that enables UNIX-based machines to operate as file and resource servers to MS-DOS® and OS/2 PC workstations.



Network transport software based on de facto industry-standard Defense Advanced Research Projects Agency (DARPA) protocols, corresponding to the transport and network layer functions is included with the HP-UX kernal with Release 9.0 or later.

HP Token Ring/9000 Features

- A complete link connection to the Token Ring network, which includes hardware and driver software
- Full interoperability with IBM Token-Ring

- 4 Mbits/second or 16 Mbits/second burst transfer rate
- Supports Source Routing to remote connections through Source Routing Bridges configured to use a maximum packet size of 4472 bytes
- Supports HP 9000 Series 700 as LAN-to-LAN router

Hardware Components

The HP Token Ring/9000 adapter manages packet buffering and processes Token Ring protocols. A 9-pin D-type connector on the HP Token Ring adapter is used to connect the adapter to the Token Ring network through a Shielded Twisted Pair (STP) cable that plugs into a Multistation Access Unit (MsAU). The HP Token Ring adapter also comes with an RJ45 connector for Unshielded Twisted Pair (UTP) wiring. On 4 and 16 Mbit/second Token Ring network, the following IBM cable types are supported:

Data Grade	AWG	Type
Type 1	22	2wire shielded twisted pair
Type 2	22	2wire shielded or 4wire unshielded twisted pair
Type 3	22, 24	twisted pair unshielded
Type 6	26	2wire shielded twisted pair
Type 9	26	2wire shielded twisted pair

Both shielded and unshielded cables are supported at the 4 or 16 Mbit/second data link rate.

Note: Cables and MAU are not included in the product.

Features

- Uses TMS380C16 TI Token Ring communication processor
- Uses 256 KB of DRAM space for MAC code and data storage
- Operates as bus master, transferring 32 bits of data every cycle at a maximum EISA burst speed of 33 megabytes per second
- Uses frame size up to 4096 bytes
- Supports early token release at 16 Mbits/second
- Supports up to 256 link stations on STP, and up to 72 on UTP
- Environmental: Class B2
- EMC: complies to FCC A and VDE Level B

Environmental Characteristics

Operation Temperature: 0°C to +55°C
Storage Temperature: -40°C to 70°C
Relative Humidity: 15% to 95%
Electrical Specifications: Maximum power consumption is 11.5 watts maximum.

Software Components

HP Token Ring/9000 includes driver software that implements the Token Ring protocol. Token Ring/9000 runs under the TCP/IP, SNAplus, and NetWare IPX transports.

The node manager software uses the commands of the nodal management module to establish computer-to-network connections and to maintain the network. Network maintenance operations include initialization and configuration of the networking products, establishing network security, and using various diagnostic tools to ensure proper network operation. The diagnostics include loopback verification, nodal statistics, tracing, and logging.

Installation Policy

Please contact your HP sales representative or local HP sales office for more information on the installation policy of this software product in your system environment.

Customer Responsibility
HP Token Ring/9000 for the Series 700 is customer installable and configurable. Installation of HP Token Ring/9000 is the responsibility of the customer. Prior to installing HP Token Ring/9000, the customer should complete the following tasks:

- Install HP-UX 8.07 or 9.0 on the HP 9000 Series 700.
- Install the Token Ring wiring.
- Attach and configure all necessary networking devices, including any Token Ring accessories such as MAUs and cables.

The basic steps required to install HP Token Ring/9000 include loading the software, setting the adapter link speed, installing the Token Ring adapter, attaching the system to the network, configuring the adapter, and verifying the installation. Recommended reading prior to implementing a Token Ring network includes the manual, "Installing and Administering HP Token Ring/9000 Software", (P/N J2165-61001 for HP-UX 8.07 or J2165-61004 for HP-UX 9.0) and the "Quick Installation Guide", (P/N J2165-61002 for HP-UX 8.07 or J2165-61006 for HP-UX 9.0).

For quick implementation of your network, a simplified service interface, verified network operation, and assured ongoing supportability, please refer to the HP Network Startup data sheet.

System Environment

HP Token Ring/9000 is supported on the HP 9000 Series 700 with available EISA bus expander. The product supports up to two Token Ring adapters per system on the Series 700 with HP-UX 8.07 and up to five adapters per system with HP-UX 9.0.

Ordering Information

HP Token Ring/9000 for the Series 700 includes the Token Ring adapter, the Token Ring software driver, the Series 700 EISA Quick Installation manual, the EISA Token Ring Adapter Installation manual, and the Installing and Administering HP Token Ring/9000 Software manual.

Series 700 Hardware and Software

HP J2165A HP Token Ring/9000 (must order)

Media Option (must order)
AAH DDS cartridge tape
AAH CD-ROM certificate only

HP-UX Version Option
(must order)
APF HP-UX Revision 8.07
APH HP-UX Revision 9.0

Documentation Option
(optional)
0B0 Delete documentation

HEWLETT® PACKARD

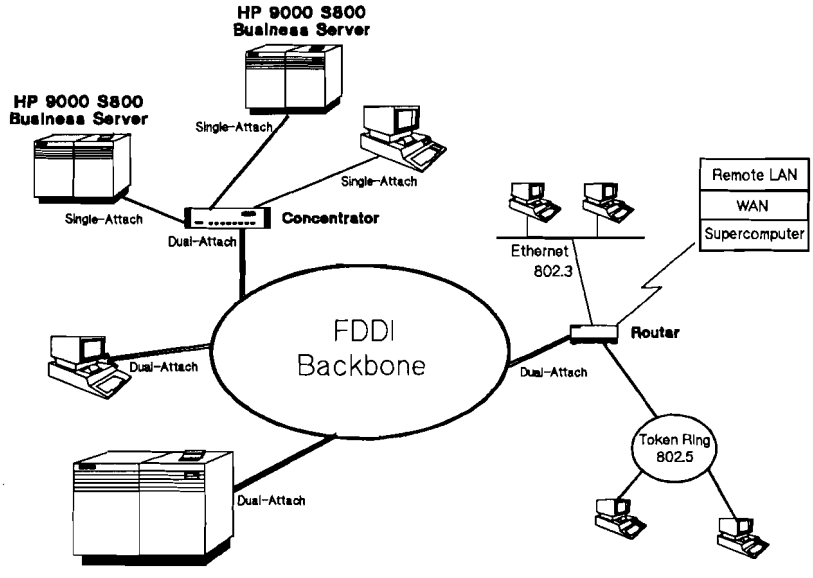
HP FDDI/9000 for Series 800 Business Servers

Technical Data

Part Number
HP J2157A

HP FDDI/9000 for Series 800 Business Servers provides HP-Precision Bus (HP-PB) Series 800 computers with a Single Attach Station (SAS) connection to the ISO standard 9314 Fiber Distributed Data Interface (FDDI) network. HP FDDI/9000 for Series 800s is fully compliant with the ISO 9314 standard, providing an optical interface to the 100 Mbps FDDI network. HP FDDI/9000 for Series 800s consists of a single double-high HP-PB adapter and driver software. HP FDDI/9000 for Series 800s is supported on the HP 9000 Model 890 as well as all of the HP 9000 Series 8x7 Business Servers.

FDDI is the high-speed local area network standard defined by the ISO standard 9314. An FDDI network is a 100 Mbps fiber optic token ring LAN arranged in a dual counter-rotating ring, fault tolerant topology. FDDI offers greater capacity and distance than any existing LAN. The FDDI token ring topology offers 100 Mbps, with a maximum length of 2 km between stations, up to 500 stations per ring and a 100 km maximum ring circumference.



Features

HP FDDI/9000 for Series 800 Business Servers provides:

- An FDDI Single Attach Station.
- An HP Precision Bus FDDI connection.
- An adapter requiring a single, double height HP-PB slot in an HP 9000 Series 8x7 Business Server.
- An implementation fully compliant with ISO standard 9314.
- Full compatibility with SMT version 6.2.
- A Media Interface Connector (MIC) receptacle.
- Customer installable and configurable hardware and software.
- SNMP management (RFC 1157) with MIB II (RFC 1158).

HP FDDI/9000 for Series 800s supports standard and de facto standard services including BSD/ARPA, OSI services and NFS. Support of standard and de facto standard APIs include BSD Sockets, XTI, ROSE, and ACSE/presentation. The internet protocols TCP, UDP, IP, ICMP, the OSI protocols and ISO standard 8802/2 are supported. Network management includes SNMP (RFC 1157) and MIB II (RFC 1158).

The FDDI network consists of two independent 100 Mbps rings, the primary and the secondary. The dual ring approach provides redundancy and the ability to reconfigure the network under fault conditions. An FDDI ring has two station types, dual attach (Class A) that connects to both primary and secondary rings, and single attach (Class B), that connects to either primary or secondary rings, but not to both. Class A and Class B stations continue to operate in a reconfigured ring under fault conditions. In addition, Class B stations can be easily isolated in the case of station failure.

An FDDI network can include Dual Attach Stations (DAS), Single Attach Stations (SAS), and concentrators. Concentrators connect multiple single attach stations to the FDDI network in a star-like fashion. HP FDDI/9000 for the Series 800 requires a concentrator to connect the Series 800 Business Server to the FDDI network. HP does not manufacture its own FDDI concentrator.

Concentrators are used with Single Attach Stations and provide the interface to a dual ring architecture. Dual attach architecture allows connections to both of the rings and provide fault tolerance by allowing the rings to "wrap" in the event of a ring failure. The concentrator maintains the fault tolerant capability. HP FDDI/9000 for the Series 800 is compliant with any vendor's concentrator product meeting the ISO standard 9314.

HP FDDI/9000 for Series 800s includes the software license to use, the HP-PB FDDI Single Attach Station adapter, the HP-PB FDDI Adapter Installation Guide, the Installing and Administering FDDI/9000 Software manual, and the Series 800 HP-PB FDDI/9000 Quick Installation Card.

Three components of the HP FDDI/9000 Series 800 adapter conform to the OSI Model as shown below: the physical layer, the data link layer, and station management. The physical layer includes two pieces, the Physical Medium Dependent (PMD) layer that provides the point-to-point communications between stations in the network, and the PHYsical (PHY) layer protocol layer that provides a connection between the physical medium dependent layer and the data link layer.

The data link layer includes the Media Access Control (MAC) standard. For reference, the Logical Link Control (LLC) standard is directly above the MAC. The MAC's primary function is the delivery of frames. The LLC provides a common protocol between the MAC and network layer.

<table>
<tr><td>Application
Presentation
Session
Transport
Network</td><td colspan="2"></td></tr>
<tr><td rowspan="3">Data Link</td><td colspan="2">802.2 Logical Link Control (LLC)
ISO 8802/2</td></tr>
<tr><td>Media Access Control (MAC)
ISO 9314-2:1989
ANSI X3.139-1987</td><td rowspan="3">Station Management

ISO to be determined

ANSI
X3T9.5/84-49
Revision 6.2</td></tr>
<tr><td rowspan="2">Physical</td><td>Physical Layer Protocol (PHY)
ISO 9314-1:1989
ANSI X3.148-1988</td></tr>
<tr><td>Physical Medulm Dependent (PMD)
ISO 9314-3:1990
ANSI X3.166-1990</td></tr>
</table>

The FDDI standard is final with the exception of the Station Management (SMT) portion. SMT is the software portion of the FDDI standard that defines how FDDI nodes are monitored and configured by a network management service. HP FDDI/9000 for the Series 800 supports SMT version 6.2. As the SMT portion of the standard evolves to newer versions of SMT, the SMT software of HP FDDI/9000 for the Series 800 will be enhanced to support these later versions of SMT.

Product Specifications

- 100 Mbps burst link rate
- Compliant with the ISO standard 9314's multimode optical interface (PHY, PMD)
- Compatibility with SMT version 6.2
- HP-PB master DMA controller
- HP-PB master/slave interface
- 16 MBps HP-PB burst DMA rate
- FDDI MIC (keyed) connector
- Multimode fiber optic cable required
- 25 MHz on-board 68C020 processor
- 64K by 16 read-only memory
- 32K by 32 zero-wait-state SRAM
- Second generation FDDI chip set

Environmental Characteristics

Electromagnetic:
- FCC Class A (U.S.A.)
- CISPR-22 Class A (Europe)
- FTZ-1046 (VDE Level B) (Germany)
- VCCI Class 1 (Japan)

Temperature:
- 0° to 70° Celsius, operating
- -40° to 70° Celsius, nonoperating

Relative Humidity: 5% to 90% @ 40° Celsius, noncondensing

Altitude: 4.6km

Electrical

18 watts typical 21 watts maximum

Installation Policy

Prior to installing HP FDDI/9000 for the Series 800, the customer is responsible for completing the following:

- Properly installing either HP-UX 8.02 or 9.0 on the HP 9000 Series 800.
- Properly installing FDDI wiring.
- Properly attaching and configuring all necessary networking devices, including concentrators and cables.

HP FDDI/9000 for the Series 800 is customer installable and configurable. The basic installation steps include loading the software, powering down the system, installing the HP-PB FDDI/9000 adapter, attaching the HP-PB FDDI/9000 adapter to the network, and configuring the driver software. Installation can be verified by the successful completion of the power on self-test.

Recommended reading prior to implementing an FDDI network includes the manual "Planning FDDI Networks," part number J2156-90002.

Ordering Information

HP-UX operating system version 8.02 or 9.0 is required.

Please order HP FDDI/9000 for Series 800 Business Servers as follows:

HP J2157A HP FDDI/9000 for Series 800 Business Servers

FDDI/9000 for Series 800 Business Servers (HP J2157A) must be ordered with the hardware option (UG2), a processor software option, a media option, and an HP-UX version option to acquire the first FDDI/9000 adapter for the Business Server. The standard product (HP J2157A) with only the hardware option (UG2), may be ordered to obtain a second FDDI/9000 adapter for use in the same Business Server. Previous purchase of HP J2157A with the software license-to-use is required to order HP J2157A standalone with only the hardware option (UG2).

Hardware Option
(must order)

UG2 HP-PB FDDI Single Attach Adapter

Processor Software Options
(may choose one)

AH0 Software Right-to-Use for Tier 1 SPUs
AE5 Software Right-to-Use for Tier 2 SPUs
AEP Software Right-to-Use for Tier 3 SPUs

Media Options
(may choose one)

AA0 ¼-inch cartridge tape (Release 8.02 only)
AA1 ½-inch magnetic tape (1600 bpi)
AAH DDS cartridge tape
AA4 QIC media
AAU CD-ROM certificate only

HP-UX Version Options
(may choose one)

APC HP-UX Revision 8.02
APH HP-UX Revision 9.0

Documentation Option
(optional)

0B0 Delete documentation

Software Upgrade Options
(may choose one)

0GR Return credit for AH0, Tier 1
0C8 Return credit for AE5, Tier 2

Software upgrade options are provided for scalability. Previous purchase of FDDI/9000 for Series 800 Business Servers is required.

The HP J2157A with option product UG2 includes:

28670-60001 HP-PB FDDI Single Attach adapter
5957-4629 License to Use
28670-90001 HP-PB FDDI Adapter Installation Guide
J2156-61001 Installing and Administering FDDI/9000 Software (Release 8.02)
J2157-61002 Series 800 HP-PB FDDI Quick Installation Card

One HP FDDI/9000 Series 800 adapter is supported in the Model 807, Model 817 and Model 837. All other Series 800 systems support two HP FDDI/9000 Series 800 adapters.

An FDDI network concentrator is required to connect single attach stations to the FDDI ring. HP does not manufacture its own FDDI concentrator.

An FDDI cable is required to connect the HP FDDI/9000 Series 800 adapter to the concentrator. A standard FDDI MIC connector cable can be purchased from any distributor.

FDDI Accessory Components

Two interconnecting FDDI cables and an attenuating loopback connector are available from Hewlett-Packard.

The interconnecting cables are used when FDDI cabling from a central wiring closet and/or FDDI concentrator to an office or work area is provided, but the interconnection from a wall jack to the network adapter card is not provided.

The FDDI MIC loopback attenuator is used to isolate the network adapter from the rest of the network and to verify the operational status of the network adapter's optical components. The 11dB attenuation simulates the maximum cabling loss allowed by the ISO standard 9314.

Description	HP P/N
ST-MIC 10 m cable	1005-0180
MIC-MIC 10 m cable	1005-0179
MIC Loopback (11dB loss)	1005-0305

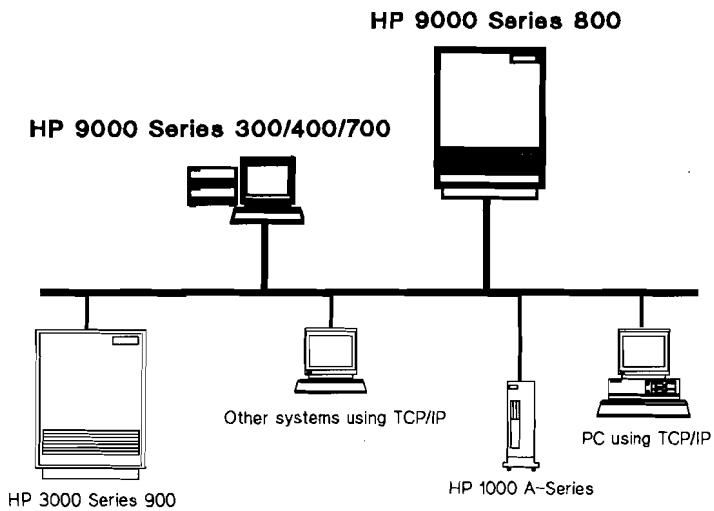
HEWLETT® PACKARD

LAN/9000 Link

Technical Data

For HP 9000 Series 700 and 800 Computers
Product Numbers
HP 25567B, 36967A, J2146A

The LAN/9000 Link provides the hardware and software to connect an HP 9000 computer to a multivendor LAN. The link includes the hardware interface card and the device driver, network transport, network management, and C2 level security software. The link connects to either Ethernet LANs, IEEE 802.3 LANs, or both. The network software includes the industry transport standard TCP, UDP, IP, and SLIP protocols, along with the BSD sockets API. Users may write their own software to access the network via an API, or they may purchase one of the higher level networking services (ARPA, NFS, NCS, LM/X, NS) provided by Hewlett Packard and supported over the LAN/9000 Link.



Features

- Network transport software provides the ARPA TCP, UDP, IP, and SLIP protocols.
- BSD sockets API provides access to TCP and UDP.
- Supports any HP 9000 as a LAN-to-LAN router.
- Supports Ethernet Rev. 1 and 2 and IEEE 802.3 protocols.
- Supports C2 level security.
- Supports 10 Mb/s burst transfer rate.
- Uses a microprocessor-driven interface controller to minimize Series 800 overhead associated with data communications processing; not available for workstations.
- Supports connections to thin coaxial cable, thick coaxial cable, and unshielded twisted-pair wiring.
- Any node may be attached or removed while the network is active.
- Integrated node management software provides online configuration and logging.
- Integrated network management software supports SNMP.

Functional Specifications

Cable Type	ThinLAN (Thin coaxial)	ThickLAN (Thick coaxial)	EtherTwist (Unshielded twisted-pair)
IEEE cable specification	Type 10Base2	Type 10Base5	Type 10BaseT
Maximum segment length	185 meters	500 meters	100 meters hub to node
Maximum number of nodes per segment	30	100	N/A
Minimum distance between nodes	0.5 meter	2.5 meters	N/A
Maximum AUI cable length	50 meters	50 meters	50 meters

Functional Description

The LAN/9000 Link provides the hardware and software to connect an HP 9000 computer to a multivendor Local Area Network (LAN). The LAN/9000 Link supports system-to-system communications to other HP 9000s; HP 1000s, HP 3000s, and PCs; as well as other systems supporting TCP/UDP/IP over Ethernet/802.3 wiring. The hardware components of the link include the Local Area Network Interface Controller card (LANIC), the Medium Attachment Unit (MAU), and in some cases, an Attachment Unit Interface (AUI) cable. The software components of the link include the LANIC device driver, the TCP/UDP/IP network transport, and the BSD sockets API.

Some or all of the components of the LAN/9000 Link are bundled with most HP 9000 systems. The components may also differ, depending on the specific system. Please see the ordering instructions below for more details.

Hardware Components

Local Area Network Interface Controller (LANIC)

The LANIC is a microprocessor-based communications controller that plugs into the HP 9000 backplane. It handles buffering, the IEEE 802.2 and 802.3 protocols, error checking, and keeping track of network statistics. When addressed by another node on the network, the LANIC receives frames of information and checks the accuracy of the data before passing the frames to the host. To transmit data, an addressed frame is sent from the host to the LANIC, which adds error checking information. The LANIC then tests to see if the cable is busy and, if not, transmits the frame.

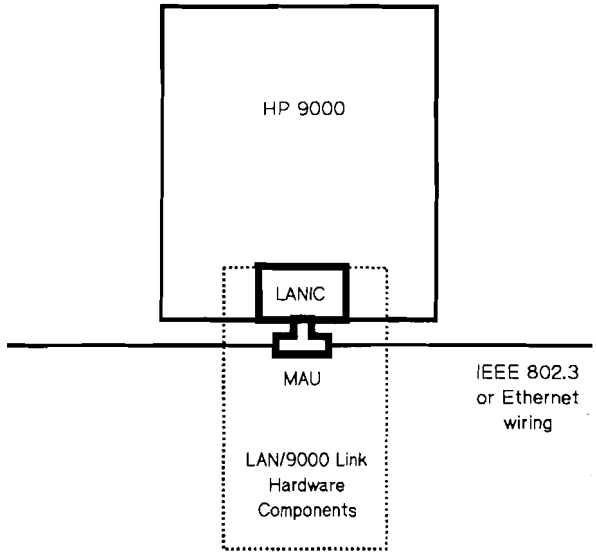
Features

- Includes onboard microprocessor capable of receiving multiple back-to-back packets on Series 800; not available for workstations.
- Supports IEEE 802.2 link-level protocol.
- Supports IEEE 802.3 Carrier-Sense Multiple Access with Collision Detection (CMSA/CD) access method protocol.
- Supports multicast, broadcast, and individual addressing.
- Frame length up to 1500 bytes.
- Collects LAN statistics (collided packets, bad packets, etc).
- Environmental: Class B.
- EMC: will pass FCC, VDE Level A.
- HP Precision Board (HP-PB) card includes integrated ThinLAN Transceiver and AUI port.

IEEE 802.3 and Ethernet Coexistence

There are some similarities and some differences between IEEE 802.3 and Ethernet LANs. Since both types utilize the same coaxial cable media, Ethernet nodes may coexist on the same LAN segment with IEEE 802.3 nodes. The most significant differences are in the data packet format and the electrical grounding of the hardware. All HP 9000 LANICs can transmit either IEEE 802.3 or Ethernet-type packets.

Figure 2.



Medium Attachment Unit (MAU)

The Medium Attachment Unit (MAU) provides the physical and electrical connection to the LAN wiring. It receives signals from and sends signals to the cable, and also detects collisions resulting from two nodes starting to transmit simultaneously. The MAU also provides electrical isolation from the cable and performs several other functions to ensure network reliability. For example, if a MAU fails by continuously transmitting, a circuit will detect the failure and shut down the MAU.

The LAN/9000 Link can be connected to thin coaxial cable (a ThinLAN transceiver with a BNC "T" connector), thick coaxial cable (a ThickMAU with a 6 meter AUI cable and tap), or unshielded twisted-pair wiring (an EtherTwist transceiver with a 1 meter AUI cable).

Note: The specific MAU and cabling supplied with the LAN/9000 Link differs, depending on the specific HP 9000 system. Please see the ordering instructions for more details.

- **Transmission Characteristics**
  - Transmission Mode: Baseband Digital
  - Access Method: Carrier-Sense Multiple Access with Collision Detection (CSMA/CD)
  - Impedance: 50 Ohms
  - Maximum Burst Transfer Rate: 10 Mb/s

- **Environmental Characteristics**
  - Temperature (Nonoperating): -40°C to +75°C (-40°F to +167°F)
  - Temperature (Operating): 0°C to +70°C (+32°F to +158°F)
  - Humidity: 5% to 95% relative humidity

- **Electrical Specification**
  - Maximum power consumption for the interface is: 5 Volt; 15 Watts (Series 800), 4.89 Watts (Series 300)
  - The interface also powers the various MAUs, which require 12 Volts: 4.3 Watts typical

Software Components

The LAN/9000 Link includes software corresponding to layers 2 through 4 of the Open Systems Interconnection (OSI) Reference Model (see figure 3). It also includes node management and network management agent software (SNMP).

The Data Link Layer, corresponding to OSI layer 2, consists of the Ethernet or IEEE 802.2 and 802.3 protocols. The 802.3 implementation supports Carrier Sense Multiple Access/Collision Detection (CMSA/CD), which gives every node on the coaxial cable equal access to the network. A

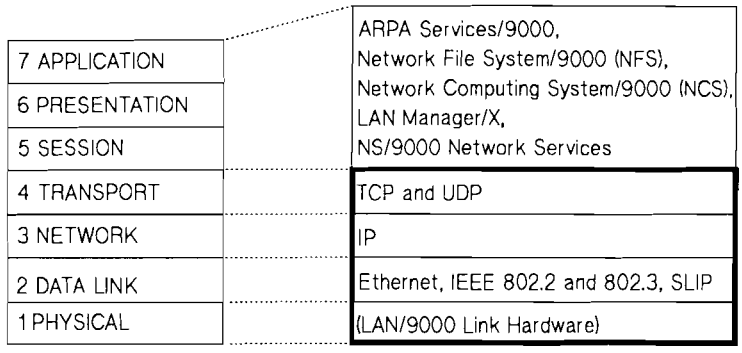


Figure 3.

sending node monitors the network to ensure that no other node is transmitting before it attempts transmission. If, while transmitting, the sending node detects a collision, the sending node initiates a jam signal and waits for a random period of time before retransmitting. Transmission consists of sending addressed frames of data to the wiring at a signalling rate of 10 megabits/second. The 802.2 implementation supports Logical Link Control (LLC). Both the IEEE 802.2 and the Ethernet service are Type 1 (unacknowledged datagrams).

The default layer 2 encapsulation is Ethernet only. Link dependent features are incorporated in the lanconfig command. 802.3 encapsulation can be added using the lanconfig command.

Link Level Access (LLA) is a programmatic interface to the driver of the LAN interface card. LLA provides access to the Data Link Layer (layer 2). IEEE 802.3 or Ethernet data packets can be exchanged between systems on a LAN using LLA. LLA is for the technically sophisticated user who has experience in writing data communication protocols. LLA can be useful when high performance is required.

LLA does not guarantee delivery of Ethernet or IEEE 802.3 data packets. The LLA user must incorporate the desired degree of reliability using higher level protocols.

The Networking Layer, corresponding to OSI layer 3, is based on the ARPA Internet Protocol (IP). IP provides packet fragmentation/ reassembly and internetting capability.

Terrain, distance, and property rights often limit LAN cabling. Where LAN wiring is restricted, network connections can often be made using asynchronous serial lines. The LAN/9000 Link includes the Point-to-Point Link (PPL). PPL is HP's implementation of the Serial Line Internet Protocol (SLIP) and abbreviated SLIP (ASLIP). The PPL can be used over a serial line to:

- Dial-in to the HP 9000
- Dial-out from the HP 9000
- Direct connect to the HP 9000

The Transport Layer, corresponding to OSI layer 4, is based on the ARPA Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).

TCP provides end-to-end reliable, connection-oriented services over IP, with flow control and multiplexing. TCP also has mechanisms for detecting duplicate, lost, or out-of-sequence packets.

UDP provides an unacknowledged connectionless delivery service over IP.

The LAN/9000 Link provides an application programmatic interface (API) to the network transport, Berkeley (BSD) sockets. Berkeley sockets supports the rapid exchange of data using peer-to-peer communications between processes. The processes may be on a single system or on different systems on the network.

BSD sockets provides an interface to TCP and UDP. BSD sockets is available on HP 9000s; HP 1000s, HP 3000s, and PCs; and on a wide range of computers from other vendors that support the UNIX® operating system.

The node manager software uses the commands of the nodal management module to establish computer-to-network connections and to maintain the network. Network maintenance includes initializing and configuring the LAN, establishing network security, and using various diagnostic tools to ensure proper network operation. Some of the diagnostics provide loopback verification at levels 2, 3, and 4, nodal statistics, tracing, logging, and security files.

The LAN/9000 Link also includes a network management agent. The agent supports the Simple Network Management Protocol (SNMP) and collects information regarding the state of the link and transport. This information is used and displayed by a remote management station, such as the HP OpenView Network Node Manager (see related products below).

The LAN/9000 Link also offers C2 level security. C2 systems have a discretionary access control policy that is capable of granting or denying access to individual users. C2 security provides for auditing of security relevant events and associates the audit records with individual users. The C2 implementation on this product has not been evaluated by the National Computer Security Center (NCSC).

Standards

The protocols underlying the LAN/9000 Link software closely adhere to the following standards:

RFC 768	UDP
RFC 791	IP
RFC 792	ICMP
RFC 793	TCP
RFC 826	ARP
RFC 891	IGP (RIP and HELLO)
RFC 904	EGP
RFC 919	IP Broadcast Datagrams
RFC 922	IP Broadcast Datagrams with Subnets
RFC 950	IP Subnet Extension
RFC 1055	IP on Serial Line (SLIP)
RFC 1058	IGP (RIP and HELLO)
RFC 1155	Management Information (SNMP)
RFC 1157	SNMP
RFC 1213	MIB II (SNMP)

Support for Networking Services

The LAN/9000 Link supports the ARPA Services, the Network File System (NFS), the Network Computing System (NCS), and LAN Manager/X (LM/X). The ARPA Services provides interactive and programmatic facilities, including virtual terminal access, file transfer, and electronic mail. NFS allows computers to share file systems across multiple systems. NCS supports distributed computing in a heterogeneous computer environment. LAN Manager/X is a network operating system that enables computers running UNIX to act as file and resource servers for MS-DOS® and OS/2 PC clients. (See related products below.)

The LAN/9000 Link also supports HP's proprietary NS network services. The NS services provide virtual terminal access and file transfer to other HP systems. (See related products below.)

Network Capacity and Performance

Although the signaling rate of the line may be 10 megabits/second, the throughput achieved at a node may be lower. This is primarily due to the overhead of the software providing networking services and the user's application programs. Among the factors affecting user throughput are the type of software being used, the main memory and speed of each processor (and its peripherals) involved in the transfer, and the load on each system from non-network applications.

Because of the number and complexity of these factors, it is difficult to make useful generalizations about the performance or capacity of the network in a particular application. HP network specialists are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

Installation Policy

Please contact your HP sales representative or local HP sales office for more information on the installation policy for this software product in your system environment.

Customer Responsibility

Installation of the LAN/9000 is the responsibility of the customer. Prior to installation of the LAN/9000, the customer should perform a full system backup. At that point, the customer should install and verify the operation of the LAN interface controller, perform a system update to add the product software modules to the system, and then verify that the number and version of the software modules that have been installed are correct.

The customer is responsible for the installation of the coaxial cable, including terminators, T-connectors, taps, and (where necessary) the MAUs, and the routing of the AUI cable from the MAU to the LANIC. The customer should then connect the wiring to the LANIC, using either the integrated MAU or the AUI cable. The customer should then verify that the product properly accesses the network and ensure that all safety grounds in the systems served by the cabling are connected. At this point, installation of the LAN/9000 Link product is complete.

For quick implementation of your network, a single service interface, verified network operation, and assured ongoing supportability, consider the HP Network Startup network support service. (See related products below)

Ordering Information

The LAN/9000 Link is supported on the HP 9000 Series 700 and Series 800 computer systems. Multiple LANIC cards per system are supported. Please see the configuration guide for each system for more specific information on the supported configurations, including the maximum number of cards per system.

Note: SLIP is included with the LAN/9000 Link on HP-UX 8.0 and later releases.

Series 700 Hardware

HP 25567B LAN/9000 Link for HP 9000 Series 700

The LAN/9000 Series 700 Link includes:

- LANIC card.
- Built in ThinLAN Transceiver.
- BNC "T" connector.

The LAN/9000 Link for the Series 700 only provides an additional LAN card (hardware). The first LAN card comes with the system; the media and documentation are included with the HP-UX Run-Time product.

The LAN/9000 Link for the Series 700 comes standard with a ThinLAN Transceiver and cabling. By ordering the appropriate option, the customer can delete the ThinLAN Transceiver and replace it with a ThickMAU or EtherTwist Transceiver.

Cabling Options

(may select one option)

740	Add ThickMAU, tap, and 6 meter AUI cable
840	Add EtherTwist Transceiver and 1 meter AUI cable

Series 800 Hardware and Software

The LAN/9000 Link is bundled (or can be ordered with an option) with all HP 9000 Series 8x7 and 890 computers. The system includes an HP-Precision Bus (HP-PB) 802.3/Ethernet LANIC with an integrated ThinLAN MAU. For HP-UX 8.02 and later releases, the software right-to-use is included with the system; the media is part of the HP-UX Run-Time product. Configuration instructions are part of the Owner's Guide and General Usage documentation set. To receive the detailed documentation for the LAN/9000 Link, order the HP-UX documentation for the Series 800 (HP B2437A), option 014.

HP J2146A LAN/9000 Link for HP 9000 Series 8x7, 890

(For additional LANIC cards or system software upgrades)

Documentation Options
(optional)

0B0 Delete documentation

Processor Hardware Options
(may select one option)

20N HP-PB LANIC for Tiers AH0 (single-high)
20C HP-PB LANIC for Tiers AE5 and AEP (single-high)

Alternate MAUs

HP 28685B EtherTwist MAU
HP 30241A ThickMAU

HP 36967A LAN/9000 Link for HP 9000 Series 800

(For additional LANIC cards or system software upgrades. For Series 8x7 and 890 systems, see HP J2146A above.)

The LAN/9000 Link for HP 9000 Series 800 systems must be ordered with a Processor Software option and a Processor Hardware option.

The LAN/9000 Series 800 Link, when ordered only with Processor Software and Hardware options, includes:

- Printed Circuit Assembly
- Software Right-to-Use

Most customers will also require software media, documentation, and a ThinLAN Transceiver. These options are listed following the Processor Hardware and Software Options. The media and documentation options are specific to a version of HP-UX operating system.

Beginning with HP-UX 9.0, the media is included with the HP-UX Run-Time product. To receive the detailed documentation for the LAN/9000 Link on this release, order the HP-UX documentation for the Series 800 (HP B2437A), option 014.

Processor Hardware Options
(must select one option)

20N HP-PB LANIC for the 808, 815, 822, 832, 842, or 852 (single-high)
20C CIO LANIC for the 825, 835, 840, 845, 850, 855, 860, 865, or 870
001 Delete hardware *[for software version upgrade or processor upgrade (within the same processor hardware option number)]*

Cabling Options
(may select one option only)

Cabling and a MAU are usually required, but will not be provided unless a "Cabling Option" is chosen. There is no charge for the ThinLAN or EtherTwist connection.

640 Add ThinLAN connection *(includes ThinLAN Transceiver and BNC "T" connector)* on 808, 815, 822, 832, 842, or 852

641 Add ThinLAN connection *(includes ThinLAN Transceiver, stub cable, and BNC "T" connector)* on 825, 835, 840, 845, 850, 855, 860, 865, or 870

740 Add ThickLAN connection *(includes ThickMAU, tap, and 6 meter AUI cable)*

840 Add EtherTwist connection *(includes EtherTwist Transceiver and AUI cable)*

Processor Software Options
(must select one option)

AH0 System License for HP 9000 Tier 1 SPUs

AE5 System License for HP 9000 Tier 2 SPUs

AEP System License for HP 9000 Tier 3 SPUs

1AW Delete System License (for an additional card in same SPU). Requires prior purchase of HP 36967A.

Media and Documentation Options
(may select one option)

Media and documentation are usually required. To receive media and documentation, however, the appropriate "Media and Documentation Option" must be explicitly ordered.

030 Add ¼-inch cartridge tape and software documentation for HP-UX 8.0

031 Add ½-inch magnetic tape (1600 bpi) and software documentation for HP-UX 8.0

032 Add Digital Audio Tape (DAT) and software documentation for HP-UX 8.0

033 Add software documentation only for HP-UX 8.0

Software Upgrade Options
(may select one option)

Previous purchase of the LAN/9000 Link is required. In order to receive the upgrade credit, customers must order both the upgrade credit option which pertains to their current processor and the new processor software option on the same order. An upgrade from an SPU within one processor hardware option number to another requires the purchase of the appropriate processor hardware option (LANIC card) for the new system. (For example, from the 825 to the 852 = 20C to 20N.)

0GR Upgrade credit for option AH0, Tier 1

0C8 Upgrade credit for option AE5, Tier 2

Documentation

Documentation for the LAN/9000 Link for the Series 700 and Series 800 is the same. Beginning with HP-UX 8.0, the documentation for the LAN/9000 Link for the Series 700 will be included with the HP-UX Run-Time product.

The following manuals comprise the LAN/9000 Link documentation set. The first number indicates the part number for HP-UX 9.0. The numbers in parentheses show HP-UX 8.0 part numbers.

B1012-90013 *(B1012-90012)*
HP 9000 Networking Overview
98194-60532 *(98194-60527)*
NetIPC Programmer's Guide
98194-60531 *(98194-60525)*
Berkeley IPC Programmer's Guide
98194-60534 *(98194-80524)*
LLA Programmer's Guide

Included with B2437A option 014:

98194-60530 *(98184-90526)*
Installing and Administering LAN/9000 Software
98194-60533 *(98194-60522)*
Using Serial Line IP Protocols

Included with HP 36967A option 20C:

5959-2259 CIO LAN Interface Controller (LANIC) Installation and Reference Manual

Included with HP 36967A option 20N:

5959-2263 HP-IB LAN Interface Controller (LANIC) Installation Manual

Related Documents

5959-2208 HP Site Wire Twisted-pair Cabling Installation Guide
5957-4624 Making the LAN Connection
5955-7680 LAN Cable and Accessories Installation Manual

Related Products

B1030B
ARPA Services/9000
N/A
HP Network Startup
B1009A, B1024A
HP OpenView Network Node Manager
B1003A, B1011A
LAN Manager/X
B1019A, B1020A, B1021A, B1022A
Network Computing System (NCS)
B1031B
Network File System Services/9000 (NFS)
B1012B, B1029B, J2140A
NS/9000 services

Support Products

Software and manual updates are available by ordering the appropriate Software Material Subscription (SMS) for the LAN/9000 Link product.

Response Center Support and Account Management Support customers must also order the Data Communications Category Support C, if it has not already been purchased.

Customers with hardware support agreements must add the appropriate level of coverage (SMMC or BMMC) for this link product to their support agreement.

Support services are strongly recommended for all users of the LAN/9000 Link product.

Cable and LAN Accessories

The LAN/9000 Link provides all the components of a connection to an IEEE 802.3 or Ethernet media. The ThinLAN Transceivers provided with the link can be used with any coaxial cable that fully complies with IEEE 802.3 specification for 0.4-inch diameter baseband coaxial cable. Use of HP coaxial cable is recommended, since it contains relative distance markings to allow easy installation, maintenance, and troubleshooting of the product.

A complete line of local area network products, including cable, installation tools, and connector products is available from HP; refer to the current Computer Users Catalog. For cable planning information, refer to the LAN Cable and Accessories Installation Manual (P/N 5955-7680), available from your HP sales representative.

HEWLETT® PACKARD

X.25/9000 Link

Technical Data

For the HP 9000 Series 300/400, 700, 800 Product Numbers HP 36941A, J2159A, 36960A

Introduction

The X.25/9000 Link product for the HP 9000 Series 300/400, 700, and 800 provides a network connection on the HP 9000 Series 300/400, 700, or 800 systems to private and public X.25 networks. This product conforms to the 1984 CCITT recommendations.

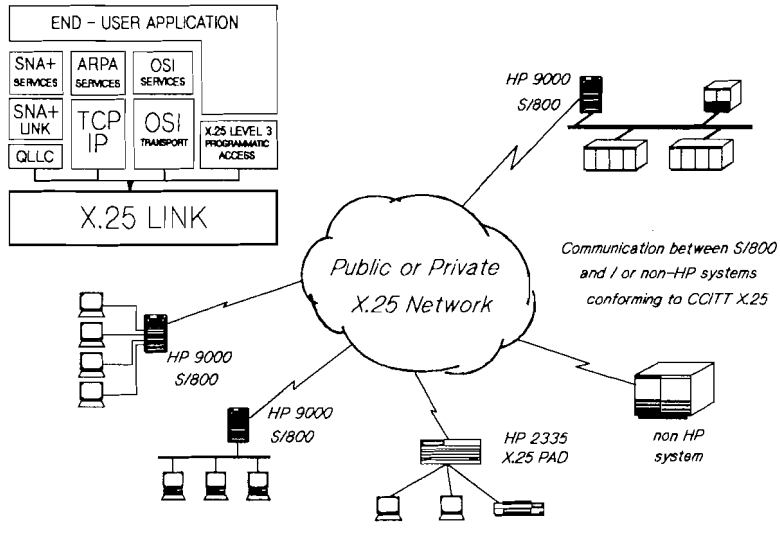
This product allows HP 9000-to-HP 9000 communications as well as HP 9000 to other systems (HP or non-HP) over X.25 networks, through the use of ARPA services and UNIX®-to-UNIX Copy (UUCP), OSI, and SNA over QLLC.

(SNAplusLink is only available on HP 9000 Series 700 and 800).

Remote display terminals are supported by implementation of host PAD capability (CCITT recommendation X.3 and X.29) on the X.25/9000 Link product. Host PAD emulation and remote PAD printer is also supported by the X.25/9000 Link product.

NFT, HP's Networking Services product, is supported for communications between HP 9000 or between HP 9000 and HP 3000 computers. In addition, the X.25/9000 Link product provides programmatic access (through Berkeley sockets) to X.25 packet layer 3 and via TCP provides access to HP's NetIPC. This allows customers to develop their own protocol and services for communication with remote HP or non-HP systems over an X.25 network.

The X.25/9000 Link product supports the OSI services environment when implemented with the OTS/9000 product. The X.400/800 product allows customers to exchange electronic mail using the X.400 protocols over the X.25/9000 Link (Series 800 only).



Features and Benefits

- Compliance with industry and international standards
  - Supports ARPA/Berkeley Services (except ruptime and rwho) for HP 9000-to-HP 9000 or HP 9000-to-non HP computers communication
  - Supports NFT for HP 9000-to-HP 3000/V and HP 9000-to-HP 3000/XL communication
  - Supports layer 3 interoperability for HP 9000-to-HP 1000 and HP 9000-to-HP 3000 communication
  - Provides ability to write customized programs to layer 4 over TCP/IP via BSD and NetIPC. (ARPA Services/9000 are required for application development using Berkeley services.)
  - Complies with the 1980 and 1984 CCITT recommendation for X.25
  - Complies with the U.S. Defense Data Network (DDN) TCP/IP-X.25 standard protocols (RFC 877)
  - Certified on major public and private networks
- Customized application support
  - Provides programmatic user access to X.25 packet layer 3 for multivendor and customer-designed communications via Berkeley Sockets
- Ease-of-Use
  - Extensive diagnostic tools
  - Menu-driven configuration product
- Cost-effective remote terminal connections
  - Implementation of host PAD capability (complies with the 1984 CCITT recommendation X.3 and X.29)
  - Provides PAD emulation for incoming and outgoing access
  - Provides remote PAD printing capabilities
- Transparent access over multiple nodes and networks
  - Dynamic packet routing and gateway capabilities through the use of ARPA/Berkeley services over Internet Protocol (IP)
  - Dynamic packet routing and gateway capabilities through the use of Open Systems Interconnection (OSI) when used with X.400
  - Provides interface with UNIX-to-UNIX copy (UUCP)

Functional Description

An HP 9000 computer with the X.25/9000 link product is capable of simultaneously originating calls to and receiving calls from other computers over an X.25 network.

When operating over public or private X.25 network, it can be configured as DTE with line speeds up to 19.2 kb/s (for Series 300 and 400) or up to 64 kb/s (for Series 700 and 800).

When operating over point-to-point lines the product can also be configured as DCE. Point-to-point communication requires usage of modems or modem eliminators.

Remote Terminal Connection

Remote asynchronous character-mode HP terminals connected to public or private PADs such as the HP 2335A can transparently access any HP 9000 Series 300, 400, 700, or 800 computer over the same X.25 line, for increased connectivity and lower communications cost. This feature is provided through the implementation of the 1984 CCITT recommendation for X.3 and X.29 protocols.

Remote Printer Connection

The X.25/9000 link product allows an HP 9000 computer to print data at a remote printer connected to a PAD.
The product handles all of the CCITT (1984) protocol considerations to allow the LP spooling system to treat the remote PAD printers as if they are connected to the local computer.

Any printer supported by the LP spooling system and the remote PAD may be used.

Programmatic Access

The X.25/9000 Link product also provides a message-based programmatic interface to the X.25 level 3 layer to establish connections with remote HP or non-HP computers.

The programmatic access (through Berkeley Sockets) consists of routines that are accessible from C programs. This interface is fully compatible (except for D-bit parameter handling) across the HP 9000 family and allows easy migration of the software developed on this interface.

Supported X.25 Network Parameters

Layer 1

- X.21 bis (RS-232-C, CCITT V24/V28) for line speeds from 1200 bps to 19.2 Kbps
- V.35 (Series 700 and 800 only) for line speeds from 1200 bps to 64 Kbps
- Operates as a DTE

Layer 2

- LAP-B protocol
- Frame sizes: as required for layer 3 packet sizes
- Window sizes: 1-7
- Modulo 8 frame sequence numbering
- Configurable maximum number of retransmissions (0 to 255)
- Configurable retransmission timer (1 sec to 12 sec)
- Operates as a DTE or DCE

Layer 3

- One-way/two-way (incoming and outgoing) Switched Virtual Circuits (SVC)
- Permanent Virtual Circuits (PVC) (not supported in a host PAD support configuration
- Delivery confirmation bit (D-bit) for X.25 packet level 3 applications only (Series 700/800 only)
- Qualifier bit (Q-bit) for X.25 packet level 3 applications
- More-data bit (M-bit)
- Packet sizes:
  - 128 or 256 bytes for Series 300/400
  - 16 to 4096 bytes for Series 700/800
- Window sizes: 1-7
- Maximum number of Virtual Circuits:
  - 32 (128 byte packets) for Series 300/400
  - 64 (128 byte packets) for Series 800 (Mid-Bus)
  - 256 (128 byte packets) for Series 800 (NIO-bus)
- Modulo 8 and 128 packet sequence numbering
- Throughput class:
  - 3 to 11 for Series 300/400
  - 3 to 12 for Series 700/800
- Operates as a DTE or DCE

Supported number of X.25/9000 links

The maximum number of X.25/9000 links which can be installed on a system depends on the HP 9000 computer type. This information is available in the HP 9000 Systems Configuration Guide.

Whatever the number of X.25 links installed on an HP 9000, the maximum number of X.25 Virtuals Circuits supported per system is 1024.

Supported and Recommended Products

Certified X.25 Packet Switched Networks

Operation of the X.25/9000 product connected to a public X.25 Network requires certification on this Network. The X.25/9000 product is certified on many X.25 Public Networks. In order to get the most up to date certified X.25 Networks list (based on HP 9000 platforms and HP-UX versions) please contact your HP sales representative.

Supported X.25 Switching Equipment

- HP Model 45
- HP Model 45 Plus

Supported Pad Devices

- HP 2334A Plus
- HP 2335

Note: HP 2334A Plus and HP 2335A HP-defined local PAD parameters are not supported.

Supported Terminals And PCs (for use in host PAD configuration)

- HP 700/41
- HP 700/92
- HP 700/94
- HP 700/22
- HP 2392A
- HP 2393A
- HP Vectra (used with AdvanceLink and Reflection terminal emulation)

Verified Modems

Modem	Verified Speed(s), BPS
Black Box SME V.35	1200,7200,64000
CIT Alcatel V35 ER BdB 144/20	48000,64000
CODEX 2345	4800, 7200, 9600
HP 37230A	4800, 7200, 9600, 19200
Racal Milgo MPS 1222	9600

Supported Applications
(for use in host PAD configuration)

- All HP-UX applications, with the exception of block-mode applications, and mail exchange.

Configuration Requirements

Series 300/400

- HP-UX Operating System Version 8.0 or later (X.25 and HP-UX versions must be the same)
- Minimum Central Memory: 4 Mbytes
- Minimum free disk space: 2.4 Mbytes
- Supported Processors: 320, 330, 332, 340, 350, 360, 370

Series 700

- HP-UX Operating System Version 8.07 or later (X.25 and HP-UX versions must be the same)
- Minimum Central Memory: 4 Mbytes
- Minimum free disk space: 3.4 Mbytes
- Supported Processors: 715, 720, 725, 730, 750

Series 800

- HP-UX Operating System Version 8.0 or later (X.25 and HP-UX versions must be the same)
- Minimum central memory: 8 Mbytes
- Minimum free disk space: 3.4 Mbytes

* Supported processors: 807, 808S, 815S, 817, 822, 825S, 825SRX, 825CHX, 827, 832, 837, 835S, 835SE, 835SRX, 835CHX, 840S, 842, 845, 847, 850S, 852, 855, 857, 860, 865, 867, 870, 877, 887, 890, 897.

Installation Policy

Customer Responsibility
Before installing X.25/9000, the customer should obtain, install, and verify the correct operation of any communication line, X.25 network access, or any other equipment and facilities necessary to interface to the X.25/9000 Link product.

HP Responsibility
Hewlett-Packard is only liable for the correct execution of the product self-tests. All other hardware and software connections to the communication line, the X.25 network and non-HP computers are the customer's responsibility.

Product Structure

The X.25/9000 Link product includes an X.25 networking card, software, customer documentation, and the necessary cables for connection to the customer's modem.

Ordering Information

Series 300/400

HP 36941A X.25/300 and X.25/400 Link for the HP 9000 Series 300 and Series 400; includes an RS-232-C (DTE) cable (5m) and software

1AW Credit for software; used if an additional X.25 card is needed in the SAME HP 9000
0CC Revision upgrade for users not on support services

Series 700

HP J2159A X.25/9000 Link for the HP 9000 Series 700

Media Options
UJ9 DDS tape for HP UX 8.07
UJC DDS tape for HP UX 9.0
UJB CD-ROM certificate for HP UX 9.0

Connection Options
1AT RS232-C cable
1AU V.35 cable

Documentation Options
0B0 Delete all manuals

Hardware Only Option
1AW Delete software. For additional X.25 cards in the same HP 9000 only.

Series 800

HP 36960A X.25/9000 Link for the Series 800

On the Series 800, the X.25 link can be ordered in two different ways: factory installed or add-on.

X.25 link "factory installed" ordering

The X.25 link Hardware is installed in the SPU and X.25 Software preloaded on the system disk.

Only one option is required in this case.

- **0DN** Factory installed X.25 link (RS-232) for F or G server
- **0DP** Factory installed X.25 link (V.35) for F or G server
- **0DQ** Factory installed X.25 link (RS-232) for H or I server
- **0DR** Factory installed X.25 link (V.35) for H or I server
- **AU5** Factory installed X.25 link (RS-232) for Tier 3 server
- **AU6** Factory installed X.25 link (V.35) for Tier 3 server

Note: back-up software on media and documentation are not provided by default with factory installed options. If these components are required, include HP A2321A product in the SAME order.

"Add-on" X.25 link ordering

Must order **one** feature in the following options.

Processor License Options

- **AH0** RTU License on Tier 1 SPUs
- **AE5** RTU License on Tier 2 SPUs
- **AEP** RTU License on Tier 3 SPUs

Processor Hardware Options

- **20N** For 807, 808, 815, 817, 822, 827, 832, 837, 842, 847, 852, 857, 867, 877, 887, 890, 897,
- **20C** For 635, 645, 825, 835, 840, 845, 850, 855, 860, 865, 870

Interface Cable Options

- **1AT** RS-232-C (DTE) cable (5m)
- **1AU** V.35 cable (5m, Series 800 only)

Note: This cable complies with the U.S. standard which does not comply to European standards. A universal adapter is required for complying to European standards.

May order **one** feature in the following options:

Documentation Options

Documentation is included when a media option is selected.

Interface Cable Options

- **1AT** RS-232C (DTE) cable (5m)
- **1AU** V.35 cable (5m)

Note: This cable complies with the U.S. standard which does not comply to European standards. A universal adapter is required for complying to European standards.

May order **one** feature in the following options

Documentation Options

- **0B0** Deletes all the manuals

X.25 Hardware Only Options

Used if additional X.25 cards are needed in the same SPU.

- **1AW** Delete software for Tier 1 SPUs
- **2A2** Delete software for Tier 2 SPUs
- **2A5** Delete software for Tier 3 SPUs

Media Options

Use the following matrix for ordering the media option.

HP-UX version	8.0	8.02	8.06	9.0
¼-inch cartridge	AA0	040	050	–
½-inch tape (1600 bpi)	AA1	041	051	UJA
CD-ROM	–	–	–	UJB
DDS tape	AAH	042	052	UJC
QIC cartridge		043	UJD	

Software Upgrade, Credit Options

Requires previous purchase of X.25 Link for the Series 800. Upgrades are allowed only for SPUs within the same Processor Hardware Option (see 20N and 20C above).

0GR Return Credit from option AH0 (Tier 1)
0G8 Return Credit from option AE5 (Tier 2)

Additional cables may be ordered

28606-63006 RS-232-C
28606-63003 V.35 (for Series 700 and 800 only)

Note: This cable complies with the U.S. standard, which does not comply with European standards. A universal adapter is required to comply with European standards.

Support Products

H2012A+L00 BaseLine Software Support
H2011A+H00 ResponseLine Software Support
H2010A+T00 Teamline Software Support
H2014A+S00 Software Update Materials

Customers with ResponseLine and Teamline support for the HP-UX Operating System will automatically receive this same level of support (ResponseLine and Teamline) for the X.25/9000 Link product. Customers with hardware support agreements must add the appropriate level of coverage (Priority, Priority Plus, or Next Day Service) for this link product to their support agreement.

Documentation

The following Hardware installation manuals are included with each product:

Series 300/400

36941-90002 X.25/300 Link Hardware Installation Manual

Series 700

J2159A-90001 Series 700 Hardware Installation Manual

Series 800

30263-90001 Series 800 (825/835/840/845/850/855/860/865/870) Central Bus PSI Card Installation Manual
28606-90001 Series 800 Models 808/815/822/832/842/852 HP-PB Programmable Serial Interface Hardware Installation Guide

The following manuals are included with all X.25/9000 Links. Additional copies may be ordered from HP:

36940-90001 X.25/9000 Programmer's Guide
36940-90004 Installing and Administering X.25/9000
36940-90005 Troubleshooting X.25/9000
B1012-91012 HP 9000 Networking Overview
5958-3402 X.25: The PSN Connection

Related Documentation

The following manuals may be ordered separately:

98194-60527 NetIPC Programmer's Guide
98194-60525 Berkeley IPC Programmer's Guide

HP DCE/9000

Technical Data

HP 9000 Series 800 Business Servers
HP 9000 Series 700 Workstations

Designed for the HP 9000 family of HP-UX systems, HP's Distributed Computing Environment (DCE) products provide a high-quality, comprehensive, standards-based framework to develop, administer, and use distributed applications. HP DCE/9000 provides a fully-functional, robust implementation of the Open Software Foundation (OSF) DCE services, with additional tools to facilitate the development, debugging, and management of DCE-based applications.

The Distributed Computing Environment

As information systems change from applications running on just one machine towards client/server applications running across several machines, businesses need a standards-based foundation for multivendor operation.

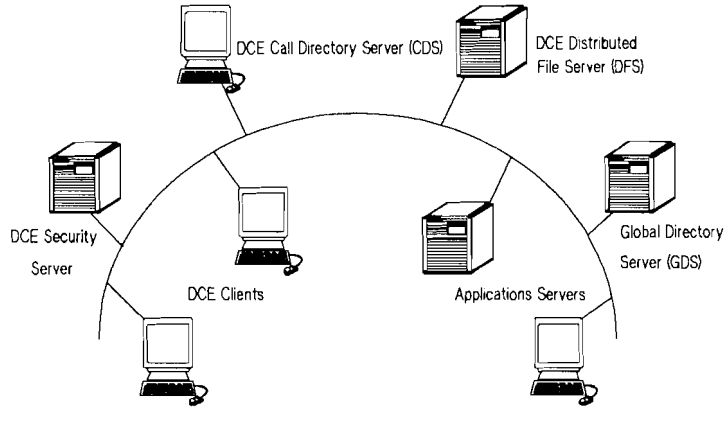
DCE is designed to provide a comprehensive framework for data and applications to be distributed transparently across networks, machines, and people. Virtually every computer vendor (from PCs to mainframes) has endorsed DCE, making DCE a true open foundation for heterogeneous distributed computing.

The DCE framework offers several advantages for distributed computing.

Transparent Communication
Client/server applications no longer require server locations written into the application. DCE directory services provide dynamic server identification and location within the network.

Global Operation
DCE was designed with WAN operation in mind, providing reliable communication across the entire enterprise. Capabilities include a global and consistent directory and name service, and the automatic routing of client requests to specialized servers in remote locations.

Figure 1. DCE: An Intelligent Foundation for Open Distributed Computing



Inherent Security
Security is integrated throughout, providing protection of critical data, applications, and communication links, even within a distributed environment.

Resource Replication
Key servers can be replicated for increased availability with automatic routing of client requests by the directory services.

Scalable Framework
Using server replication for increased application throughput and the global directory services for accessing all available server resources, DCE allows for incremental growth as business needs dictate.

Hewlett-Packard has a long established history of leadership and excellence in distributed computing. The Network Computing System (NCS) was introduced by HP/Apollo in 1987, and was chosen by the OSF to be the Remote Procedure Call (RPC) mechanism used in DCE. In addition to pioneering with NCS, Hewlett-Packard has an entire family of NCS-based distributed applications, such as OmniBack (a network-wide central backup management system), NetLS (for central software licensing), and Passwd Etc (for central control of users passwords). Now, HP's distributed computing expertise is reflected in its HP DCE/9000 products.

HP DCE/9000 consists of two software products: the DCE Core Services and the DCE Application Development Tools.

DCE Core Services

The DCE Core Services contain the following DCE technologies:

- Remote Procedure Call (RPC): TCP and UDP versions
- CMA Threads: POSIX 1003.4a, a user-space implementation
- Naming: Cell Directory Services (CDS) with Global Directory Agent (GDA) to Domain Naming Service (DNS)
- Security: USA version includes Data Encryption Services (DES) library
- Distributed Time Service (DTS)

DCE Management Tools
In addition to providing a robust implementation, Hewlett-Packard provides for efficient and cost-effective DCE use and administration with industry-leading tools. HP has made it easier to install, configure, and validate a DCE environment by integrating the DCE installation/configuration process into HP-UX's Motif®-based, menu-driven System Administration Manager (SAM), including software installation over the network from one central server. A validation tool ensures that DCE installation and configuration has been completed successfully and that a DCE environment is ready to run. Ongoing DCE management is facilitated with a graphical browser for the CDS namespace to both view and edit entries in an efficient manner. Increased availability of critical DCE resources is ensured with full replication of the CDS and Security servers. Also included with the DCE Core Services is HP Camera, a tool that records and reports the status of a DCE cell before and during a failure to facilitate troubleshooting. HP's DCE Core Services are fully-interoperable with OSF's DCE reference platforms.

DCE Application Development Tools

The HP DCE Application Development Tools are unique in the industry and are provided to increase the productivity of the DCE application developer. A DCE RPC tracing and logging facility, as well as an error reporting facility, are available to help debug DCE applications and keep track of RPC communication between clients and servers. Also included is an Instrumented Interface Definition Language (IDL) compiler which can trace individual thread and RPC activity in a distributed application, providing in-depth insight with key timing information needed for debugging and tuning of DCE applications. The DCE compiler can also be integrated within HP's SoftBench development framework for increased programmer efficiency. Several online DCE application examples are included to help both the novice and expert DCE programmer get started and shows how DCE

interfaces are integrated into client/server programs.

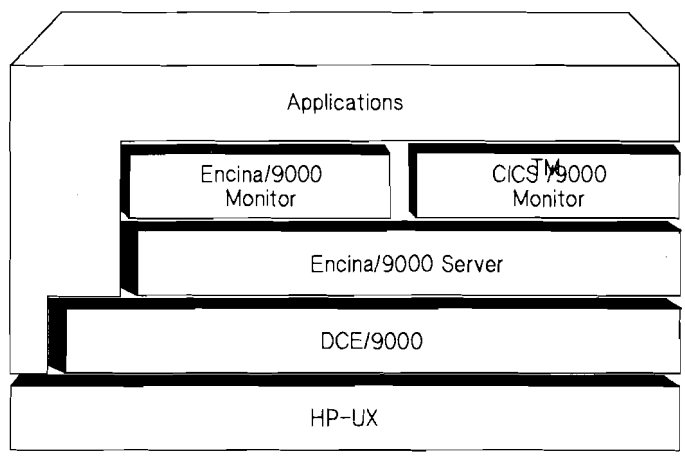
HP OpenRoad to Distributed Computing

HP DCE/9000 supports the HP 9000 Series 800 Business Servers and Series 700 workstations running HP-UX 9.0. HP DCE/9000 is the foundation for a full range of distributed computing solutions from HP. As well as providing a solid platform for DCE-based applications, HP is adding special enhancements needed for specific environments. For example, HP is providing the HP Encina/9000 and CICS™/9000 transaction management products for ensuring data integrity in distributed OLTP applications. Both Encina/9000 and CICS™/9000 are built upon the HP DCE/9000 foundation. HP is also pursuing an aggressive program to provide Distributed Management Environment (DME) compliant tools for managing DCE-based applications and systems.

Hewlett-Packard is sharing its distributed computing expertise in a series of detailed, technical DCE training programs, such as the five-day HP DCE Application Programming class, as well as the one-day introductory HP DCE Seminar. These classes are available at your local HP education centers and are also offered on-site at your work location.

For more information about HP DCE/9000 or HP's DCE training, please contact your local HP sales representative.

Figure 2. HP's Distributed Computing Framework



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HEWLETT® PACKARD

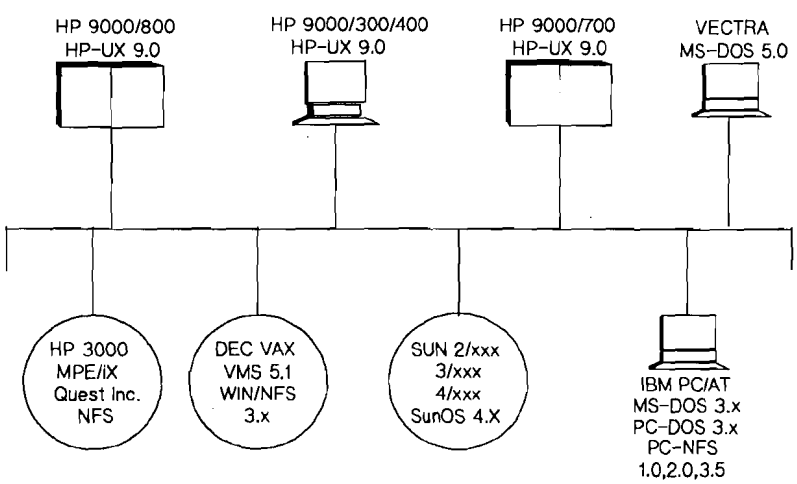
HP Network File System Services/9000

Technical Data

For HP Series 800/700/ 400/300 Systems

HP's Network File System NFS product allows HP 9000 systems to access and share files in a multivendor network of machines and operating systems. Machines running NFS and sharing files can range from minicomputers and superminicomputers to high performance workstations and personal computers. After mounting a file system using NFS, most user commands (list, remove, copy, etc) performed on a local file system will operate on the remote file system, making the remote file system look local to the user.

NFS, a de facto industry standard, permits workgroups to integrate remote data or files into local applications. Those applications can run on a variety of machines while accessing information on remote disks because of XDR, External Data Representation, a feature in NFS. The XDR creates a machine-independent data format facilitating multivendor file sharing. In addition, users may access printers, plotters, and other resources on servers through the use of spooling routines. Computers running NFS may access remote databases containing drawings, schematics, netlists, models, or source code. This eliminates the need to maintain consistency between multiple copies of files and to store that information locally, thereby reducing disk storage requirements on individual systems. NFS facilitates the transition from timesharing to distributed environments by migrating those general purpose minicomputers into NFS servers. A server running the NIS Network Information Service, formerly Yellow Pages, a component of the NFS product, provides the convenience of centrally administering files. NIS with NFS helps your systems administrator manage a distributed network of NFS clients and NFS file servers. NFS provides high performance because of its stateless nature, such that the system avoids the overhead associated with the tracking of transactions. In addition, application programs using NFS will take less time to port. File paths in applications do not need



adjusting as NFS allows the path to remain unchanged from machine to machine. NFS gives programmers the ability to create distributed routines that execute on remote machines with the ONC RPC, Remote Procedure Call mechanism. NFS also provides transparent access to compute servers using the REX Remote Execution facility.

Features and Benefits

- De facto Industry-Standard Networking
  - Integrates multivendor systems, applications, and peripherals
  - Lasting value in hardware and software; connects old with new systems
  - Facilitates evolution from timesharing to a distributed environment; transforms general-purpose minicomputers to servers
- Network File Sharing
  - Maintains consistent files among a work group, no longer need multiple copies
  - Reduces storage among multivendor and homogeneous systems, creating cost reductions
  - Easier system administration by sharing OS-dependent files; updates and backups only done once
- Stateless Server
  - Automatic crash recovery
  - Greater performance by reducing overhead of transaction tracking
- Network Information Service (NIS)
  - Simplifies network administration
  - Automounter
  - Improves transparency by allowing automatic client file system and directory access/mounting
- File Location Transparency
  - Eases application portability, allowing paths (file location) to remain consistent from machine to machine
  - ONC Remote Procedure Call (RPC)
  - Simplifies writing distributed application programs
- External Data Representation (XDR)
  - Facilitates multivendor data sharing through a machine-independent format

HP's versions of NFS/300/400, NFS/700, and NFS/800 contain all the components of NFS Revision 3.2 and with HP/UX 9.0, the major features of 4.1:

- Capabilities to mount remote file systems and directories, to transparently access files on remote machines and gracefully recover from file server crashes.
- Capabilities for servers to export both file systems and directories and export read-only files and root capability to specific clients (NFS 4.1 feature as of HP/UX 9.0)
- Automounter allows the systems administrator to establish maps specifying which directories can be mounted by clients. These directories are then mounted automatically upon client access and unmounted after a timeout.
- External Data Representation (XDR) specifies alignment and size of data types in a machine-independent manner.
- Remote Procedure Call (RPC) allows programmers to execute routines on remote machines and, upon completion, receive the results. RPC allows network programmers to write customized networking applications.
- Lock Manager provides advisory file locking between systems over an NFS network. With file locking implemented in an application, if two different clients are accessing the same file on an NFS server, the second user will be prevented from inadvertently overwriting the first user's data. File locking using the Lock Manager is implemented using the same system calls as local file locking in HP-UX.
- Network Information Service (NIS) gives the user a centrally administered data look-up service (/etc/passwd, host), including utilities for global system administration and the associated user-level commands. NIS combined with Automounter allows the system administrator to configure a dynamic and location transparent file system for a group of workstations. All automounted file systems and directories can be dynamically and transparently accessed by clients and file system locations can be updated via NIS transparently to the client user. In addition, HP provides the following features:

  - The Virtual Home Environment (VHE) provides a means of configuring a set of NFS nodes such that a user could log in to any node in a grouping and be put into the work environment that is associated with the login on his home node
  - A high performance asynchronous write option provides increased throughputs
- Remote Procedure Call Generator (RPCGEN) allows application developers to write C-language descriptions of networked applications and then automatically produce the C-code for the server and client sides of the applications. (See the Programming and Protocols for NFS Services for more detailed information on RPCGEN.)
- Remote Execution Facility (REX) allows a user to execute a command on another system and have it look as though it is executing in his home environment. REX uses the on command to do this. When a user issues the command on remote-host command, his working directory is mounted to the remote system and all environmental variables are copied from the client to the server. REX can execute both interactive and non-interactive commands across the network.

The following ISO model template shows what levels the components of the NFS product occupy.

NFS Commands

General User-Level Commands

domainname(1)—displays the current NIS domain name

ypcat(1)—prints the values in a specified NIS map

ypmatch(1)—prints the values associated with the key(s) in a NIS map

yppasswd(1)—allows users to change or install a password in a NIS password map

ypwhich(1)—prints the host name of the NIS server on the host administrative commands

rup(1)—lists host information, users logged in, and load average

rusers(1)—lists the host names and users for all remote nodes

on(1)—copies environmental variables from client to specified host, mounts client's working directory on host, and executes the specified command on the host Administrative Commands

mount(1M)—allows the superuser to attach a remote file system

umount(1M)—allows the superuser to detach a remote file system

rpcinfo(1M)—tells which remote programs are registered

showmount(1M)—lists all the clients that have remotely mounted a file system

HP NFS Services/9000

ISO 7 Application:	NFS, NIS, Automounter
ISO 6 Presentation:	XDR (External Data Representation)
ISO 5 Session:	RPC (Remote Procedure Call)
ISO 4 Transport:	UDP (User Datagram Protocol)
ISO 3 Network:	IP (Internet Protocol)
ISO 2 Data Link:	Ethernet
ISO 1 Physical:	Ethernet/IEEE 802.3

Product Requirements

HP NFS/300/400/700/800 requires the HP/UX 9.0 Runtime product.
HP LAN/LINK, with the appropriate LAN hardware, is also required. NFS is not supported over a wide area network. We recommend reserving 400 to 500 Kbytes of RAM for NFS on the HP Series 300. In addition, we recommend 4 MB of internal system memory for acceptable performance, and allocating 3 MB of external disk space for NFS/300. We recommend reserving 500 Kbytes of RAM for NFS on the HP Series 800. In addition, at least 8 MB of internal memory is recommended for acceptable performance. 4.5 MB of disk space should be allocated for the NFS files. See the HP LAN/9000 Link data sheet for the necessary HP LAN/Link hardware and software for the HP Series 800.

NFS is bundled with HP/UX 9.0 for all 300/400/700/800 systems. The appropriate HP/UX Product numbers for systems follow:

B2438A: HP/UX 9.0 for 300/400/800
B2459A: HP/UX 9.02 for 8x7 systems
B2461A: HP/UX 8.06 for 8x7 MP systems
B2352A: HP/UX 9.07 2-user license for series 700
B2353A: HP/UX 9.07 8-user license for series 700

NFS is not ordered separately. It is bundled with the above HP-UX operating systems.

Connectivity

HP certifies that its version of NFS will communicate with the following systems and that we have tested these systems to ensure interoperability. Communication between HP 9000 computers and DN Series is also certified.

Product	Computer	OS	Company
Sun NFS	Sun 4/xxx	Sun OS Rel. 4.x	Sun Microsystems Inc.
IBM NFS	RS 6000	AIX Rel. 3.2	IBM
PC NFS 4.0 1.0, 2.0, 3.5	HP Vectra IBM PC	MS DOS® 5.0	Sun Microsystems Inc.

Ordering Information

There are no independent product numbers for NFS on the HP Series 300/400, 600/700, or 800. For these systems, NFS is included with the HP-UX Run Time product.

The following manuals comprise the NFS Services documentation set. The first number is the HP-UX 9.0 part number, and the number in the parentheses is the HP-UX 8.0 part number.

B1012-90013 *(B1012-90012)*
HP 9000 Computer Networking Overview
B1013-90008 (8.0 only) Using NFS Services
01915-A00 (9.0 only) Power Programming with RPC by John Bloomer published by O'Reilly and Associates, Inc.
B1013-90010 (8.0 only) Programming and Protocols for NFS Services
B1013-90009 *(B1013-90009)* Installing and Administering NFS Services

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HEWLETT® PACKARD

HP LAN Manager version 2.2 for HP 9000 Series 700/800

Technical Data

Product Number
HP J2256A

HP LAN Manager version 2.2 for HP 9000 Series 700/800, abbreviated as LM/U 2.2, provides the latest version of Microsoft's powerful networking product, LAN Manager for UNIX® Systems, for use on a Hewlett-Packard HP-UX platform. This version of LAN Manager incorporates the most highly-requested features for integration of PCs, whether using OS/2, Windows on MS-DOS®, or a Macintosh environment, into an HP-UX environment.

Now, an HP-UX-based machine can not only operate as a file and print server but run HP-UX-based applications, and download PC applications as well. LM/U 2.2 runs on and takes advantage of Hewlett-Packard's range of powerful HP-UX Series 700 and 800 servers and workstations.

A major step forward in network productivity can be realized through the use of client/server architecture for such solutions as database servers and applications, electronic mail, and user-friendly interfaces. The server can function both as a powerful file and print sharing server, and as an application engine server, gaining considerable ease of administration and, potentially, productivity by combining functions onto one server, or by consolidating users onto fewer servers.

With LM/U 2.2, users have a number of features unavailable before this completely revamped version of the LAN Manager for UNIX systems became available from Microsoft®. The main features greatly improve the ease of system administration and flexibility of network organization; add expanded security control; provide file replication service to other servers on the network; and permit administration to be done from a Windows-based environment. Users of this new implementation of the networking software get the best of both worlds: access to a wealth of PC applications, especially Windows-based, **plus** access to the power, resources, and powerful applications available on HP-UX. Users can continue to use PC applications from the familiar PC environment. In addition, users can also access resources of HP-UX, which includes a wide range of CPUs, a variety of large disks, and high-quality printers and plotters, and a variety of database products. LM/U 2.2 complements other Hewlett-Packard networking products, such as the ARPA/Berkeley Services, HP Network Services (NS), and Network File System(NFS) Services.

LM/U 2.2 increases workgroup productivity in both technical and commercial markets. The emergence of the powerful Intel-based PC has increased the number of PCs found in engineering environments. LM/U 2.2 solves the engineer's and system administrator's problem of integrating these PCs with their existing HP-UX equipment and resources.

Functionality

The major new features provided by LM/U 2.2 are the following:

Domain Administration
A group of users accessing a server can be connected to other servers on the network under a common environment called a domain. The domain can then be administered from a common source, called the Domain Controller, by one system administrator.

File Replication Service
Any file on the domain can be updated automatically on all network servers by use of the File Replication Service. This capability can be used to easily update applications resident across a series of servers.

New Security Features

- User Account Subsystem—flexible system administration capability for managing user and group administration, for example:
  - Logon based on Time or Workstation ID
  - Password Aging
- Access Control Lists—controls how users can access the network resources, for example:
  - Read/Write privileges
  - Set time slots for use
  - Set account expiration dates

Windows-based Administration
System Administration can be performed from a Windows-based networked client.

Benefits of LM/U 2.2

The major benefits of LM/U 2.2 are the ease of system administration and the flexibility of domain administration.

The ability to perform system administration duties from a Windows-based system lets an administrator already familiar with Windows on a PC quickly adapt to the LM/U 2.2 administration screens and setup procedures. Initial setup time, or learning curve for migrating from a previous version of LAN Manager, is minimized.

Setting up domains to cluster servers frequently accessed by a group of users on a common subnet lets a workgroup be more productive by having one logon for the domain instead of each server, and permits the system administrator to easily provide access to members of the workgroup needing access to the range of servers. The security features built into LM/U 2.2 also keep control of User Account Subsystems and Access Control Lists.

- User Account Subsystems define access logons, which can be based on time-of-day; specific workstation; password aging; etc. User account information can also be downloaded to another server brought onto the subnet.
- Access Control Lists define privileges given to a specific user, such as read/write privileges; allocated time slots; account expiration dates; etc.
- Using the File Replication Service, new file versions can be downloaded from the central domain controller server to all servers set up on the subnet to accept updates.

With the above capabilities, system administration can be automated to a degree not available before on an HP-UX system with commensurate savings in administration time and effort and expense.

Other Features

Additional features of the HP LAN Manager version 2.2 for HP 9000 include most capabilities previously available on the 1.4 version, such as the following:

- Comprehensive Printer Management and Print Spooling
- Multiple LAN Card Support (with limitations)
- Application Program Interfaces (APIs)—(not yet available)
- Station-to-Station Messaging
- Scalability across HP's full line of HP-UX servers and workstations
- Network File and Peripheral Sharing
- Comprehensive Spooler
- Internetting
- Latest standard Microsoft client
- Industry-Standard Network Transport (TCP/IP)
- Wide Range of Industry Standard Links
- Open Architecture

Product Requirements

Required Hardware

Server Hardware

- HP 9000 Series 700/800 Computer

Recommended minimum memory requirements:

- 32 Mbytes

You may need to add additional memory depending on the number of users and applications on your system.

Client Hardware
For an MS-DOS or OS/2 PC Client, a list of currently supported PC hardware should be obtained from Microsoft.

Required Software

Server Software:

- HP-UX 9.0
- STREAMS for Series 700: P/N J2232A
- STREAMS for Series 800: P/N J2237A

MS-DOS Client Software:

- MS-DOS version 5.0

OS/2 Client Software:

- OS/2 version 1.3

Installation and Support

Installation

LM/U 2.2 is a customer installable product. However, the customer can purchase installation services from HP if desired.

Hardware Support Services

Provides customers with standard hardware support for their HP 9000 and HP PC hardware.

Software Support Services

HP Software Materials Update Service—Entitles customers to receive updated software and documentation for any revisions to the product up to but not including the next major upgrade.

A series of additional software support services are available through Hewlett-Packard. The HP sales representative can provide details about these services.

HP LAN Manager version 2.2 for HP 9000 Series 700/800

Ordering Information

Ordering Instructions

A media type **must** be specified for the server software (Options AA1-AA4) as well as HP-UX Revision 9.0 (Option APH)

Please note that the following software is required and does need to be ordered as a separate product:

- STREAMS for Series 700: P/N J2232A
- STREAMS for Series 800: P/N: J2237A

Next, a user license for each server running LM/U 2.2 is required, based on the number of users that will be connected to a server (this number also represents the number of copies of client software allowed by the license)

Each media option includes a complete set (one copy each) of LM/U 2.2 server documentation, server software on the selected media, client software for MS-DOS and OS/2 on 3.5" and 5.25" floppy disks, and client documentation

HP J2256A HP LAN Manager version 2.2 for HP 9000 Series 700/800

APH	HP-UX Revision 9.0
AA1	1/2" Mag Tape—1600 BPI (for Series 800 only)
AAH	DDS Cartridge
AAU	CD ROM Certificate
AA4	QIC Cartridge (for Series 800 only)
UA3	8-User License
UA5	16-User License
UA7	32-User License
UA9	64-User License
UAB	128-User License
UAD	256-User License
UCR	1024-User License
UB3	Credit for 8-User License
UB5	Credit for 16-User License
UB7	Credit for 32-User License
UB9	Credit for 64-User License
UBA	Credit for 128-User License
UBV	Credit for 256-User License
021	Credit for B1011C*, 8-User version
022	Credit for B1011C, 16-User version
023	Credit for B1011C, 32-User version
024	Credit for B1011C, 64-User version
025	Credit for B1011C, 128-User version
026	Credit for B1011C, 256-User version
027	Credit for B1011C, 512-User version
028	Credit for B1011C, 1024-User version

* B1011C is LAN Manager version 1.4 for HP 9000 which is the predecessor to version 2.2

Documentation

The following manuals are supplied with the product. Additional manuals can be ordered separately by individual part number.

Server Software Manuals

J2256-90010 Installing and Administering LAN Manager 2.2
J2256-90020 LAN Manager 2.2 Troubleshooting and Commands Reference
J2256-90030 Using the LAN Manager 2.2 Server

Microsoft LAN Manager 2.2 Client Software Manuals

J2256-90100 Installation and Configuration Guide
J2256-90200 Administrator's Guide
J2256-90300 Administrator's Reference
J2256-90400 User's Guide for MS-DOS
J2256-90500 User's Guide for MS OS/2
J2256-90600 Using LAN Manager with Microsoft Windows
J2256-90700 Integrating Microsoft Windows for Workgroups with Microsoft LAN Manager 2.2
J2256-90800 NetWare Connectivity Administrator's Guide
J2256-90900 Comprehensive Index

Related Products

HP 32015A HP LAN Manager/XL (Named Pipes)

HP J2246A PC ARPA/NS Services

1 Product based on Microsoft(R) LAN Manager for UNIX Systems

HEWLETT® PACKARD

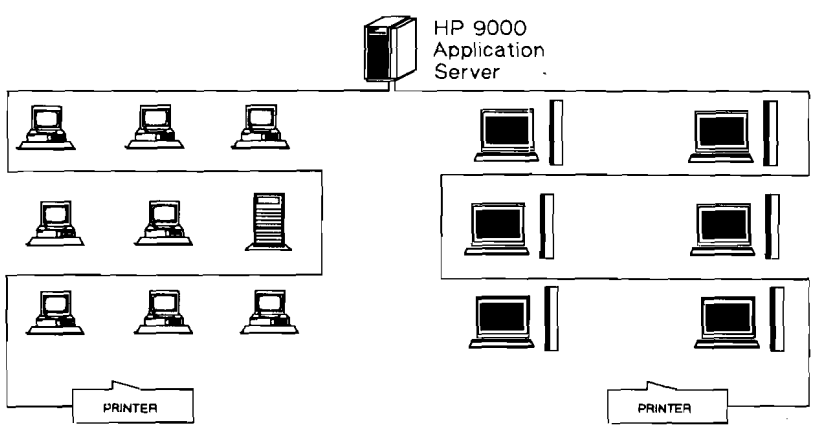
NetWare for the HP 9000 Series 800

Technical Data

Product Number
HP J2240A

NetWare 3.11a for the HP 9000 Series 800 is a fully compatible NetWare server product that provides transparent integration of DOS, OS/2, Windows, and UNIX® (NFS) desktop systems. The HP 9000 with NetWare services will connect into existing Novell networks or can be used to build new NetWare networks and provide the same services as PC-based NetWare servers. NetWare for the HP 9000 is a robust, network operating system that enables HP 9000 systems to operate as a file and resource server to desktop clients. It runs on, and takes advantage of, HP's full range of powerful HP-UX servers.

NetWare for the HP 9000 provides the functionality of Novell Inc.'s PC services, including file and printer sharing and server administration functions (such as password security, connection maintenance, bindery facility, print queue management, and accounting services).



In addition to file and print sharing capabilities, NetWare on the HP 9000 will provide support for NetWare Application Programming Interfaces (APIs) such as Sequence Packet Exchange (SPX). These APIs are the foundation for client/server applications on NetWare networks.

NetWare offers the client access to a wealth of PC applications plus access to mission-critical UNIX based applications. Users can continue to use PC applications from the familiar PC environment. In addition, users can also access UNIX resources including a wide range of CPUs, disks, printers, and plotters. NetWare complements other HP networking products such as the ARPA/Berkeley Services, HP Network Services (NS), and Network File System (NFS) Services.

Through the combination of NFS and NetWare, users on both PCs and UNIX platforms can share files and resources. With PCs in finance and marketing and UNIX workstations in engineering, users can continue to use their familiar interfaces while sharing files and printers. NetWare can be easily added to the UNIX network server, providing a bridge between departments and increasing productivity across corporate organizations.

Features

- Support for NetWare's application programming interfaces (APIs).
- Uses NetWare's SPX/IPX network transport, certified by Novell.
- Support for Novell Virtual Terminal (NVT), providing NetWare clients easy access to HP-UX terminal based applications.
- NetWare for the HP 9000 provides all of the basic resource sharing functionality a user has come to expect from a NetWare server. Added are the resources that only the power of the HP 9000 can provide, including peripherals, security and reliability, and access to sophisticated, complex, mission-critical applications.
- NetWare Loadable Modules (NLM) are not supported. However, most NLM applications, such as databases, are currently available on HP-UX.

File Sharing

To the end user, the file sharing capability includes familiar NetWare file access, file allocation, and administration features. Also, NetWare features such as resource accounting, password protection, and file backup are included. Backward compatibility for NetWare clients to version 2.1 ensures installation of NetWare for the HP 9000 will not cause interruption of Novell networks already installed.

Access to MS-DOS® or OS/2 files from HP-UX applications is provided by a set of function calls when the server is in operation.

Print Sharing

Printer sharing and print queue management is provided through the same commands familiar to all NetWare users. This insures transparent print services with no special commands or procedures to be learned. Up to 16 supported HP 9000 spooled printers can be serviced by the NetWare print server. HP 9000 environment files can be associated with a print queue as well.

Application Programming Interface (API)

Of particular importance to developers and end users alike is support of the interprocess communication capability that NetWare for the HP 9000 provides. APIs are the foundation upon which client/server platforms are based. The HP 9000 is a powerful server platform for mission-critical OLTP database client/server applications being developed for corporations of all sizes today.

NetWare for the HP 9000 supports Novell's popular Sequenced Packet Exchange (SPX) protocol. The SPX interface for both client and server are provided as part of NetWare for the HP 9000.

UNIX Workstation Connectivity

In addition to DOS, OS/2, and MS-Windows clients, NetWare for the HP 9000, in combination with NFS, provides the ability to connect UNIX clients. UNIX clients have all the benefits of NetWare without forfeiting their familiar native UNIX interface. UNIX workstations can share files with other NetWare clients and print to NetWare server attached printers. In the reverse, NetWare clients can print to UNIX printers.

HP PC ARPA and Network Services Connectivity

Access to existing HP 9000 applications from a NetWare client is very important. HP PC ARPA and Network Services for NetWare provides this capability and is ordered separately, Product Number HP J2246A. HP PC ARPA and Network Services provides NetWare client PCs running MS-DOS with ARPA, FTP, Virtual Terminal (TELNET), and Network Interprocess Communication (NetIPC) connectivity to the HP 9000.

For detailed information on this option see HP PC ARPA and Network Services data sheet.

Terminal Emulation Support

NetWare for the HP 9000 through NVT supports any third-party terminal emulation program that adheres to the interrupt 14 interface standard, such as HP AdvanceLink or WRQ Reflection®. NVT allows NetWare clients to access host applications and services.

Network Capacity

NetWare for the HP 9000 will support up to 250 clients per server. Of course the actual number of clients supported on an individual server will depend on what applications and network functions are running on that server.

A maximum of one NetWare server can be supported per HP 9000 system.

System Requirements

NetWare for the HP 9000 is available on all HP 9000 Series 800 Business Servers, except Series 807 and F10.

NetWare for the HP 9000 requires the installation and operation of Lan Link, HP-UX version 8.02 or 9.0, and at least 16 MB of RAM and 25 MB of free disk space.

Installation Policy

NetWare for the HP 9000 is a customer installable product. Full installation and operation documentation is included with the product. NetWare for the HP 9000 also comes with DOS and Windows PC client software kits. The customer is responsible for performing the following tasks in order to successfully install and configure NetWare for the HP 9000:

- Verify the proper installation, configuration, and functioning of the LAN link.
- Update the HP 9000 system to proper release level and install the product.
- Verify the successful installation of the product by accessing the HP NetWare server from a NetWare PC client.
- It is highly recommended that customer personnel be trained on Novell's NetWare in order to take advantage of the full range of NetWare capabilities. Contact Novell's education department or HP Customer Education for information on Novell NetWare education courses.

Support Products

Contact your local HP sales representative for further information on software and network support options for NetWare for the HP 9000 and for NetAssure for PC LAN products. HP support products do not include NetWare upgrades to future versions of NetWare for the HP 9000.

Ordering Information

001	Try and Buy Demo (30 Day Trial Package)
AA4	QIC
AA0	¼-inch cartridge tape (Release 8.02 only)
AA1	½-inch magnetic tape (1600 bpi)
AAH	DDS cartridge tape
AAU	CD-ROM certificate only
UA2	4 clients supported
UA3	8 clients supported
UA5	16 clients supported
UA7	32 clients supported
UA9	64 clients supported
UAB	128 clients supported
UAD	250 clients supported
UB2	Credit for 4 User License
UB3	Credit for 8 User License
UB5	Credit for 16 User License
UB7	Credit for 32 User License
UB9	Credit for 64 User License
UBA	Credit for 128 User License

In order to receive the upgrade credit, customers must select the upgrade credit option which pertains to their current User License option on the same order.

NetWare Version 4.0 will be a new and separate product. Upgrade credit will be offered for NetWare V.3.11.

Documentation

The following documentation is provided with NetWare for the HP 9000:

J2240-61001 NetWare Installation Manual
J2240-61002 NetWare for the HP 9000 System Administration
J2240-61003 NetWare User Basics for DOS Workstations
J2240-61004 NetWare Utilities Reference
J2240-61005 NetWare Concepts.
J2240-61006 NetWare Troubleshooting and System Error Messages
J2240-61007 NetWare for the HP 9000 Installing and Administering Guide

Novell's NetWare DOS and Windows Client Software and manuals are also provided.

Printed in the U.S.A.

5091-4641E

HEWLETT® PACKARD

NetWare for the HP 9000 Series 700

Technical Data

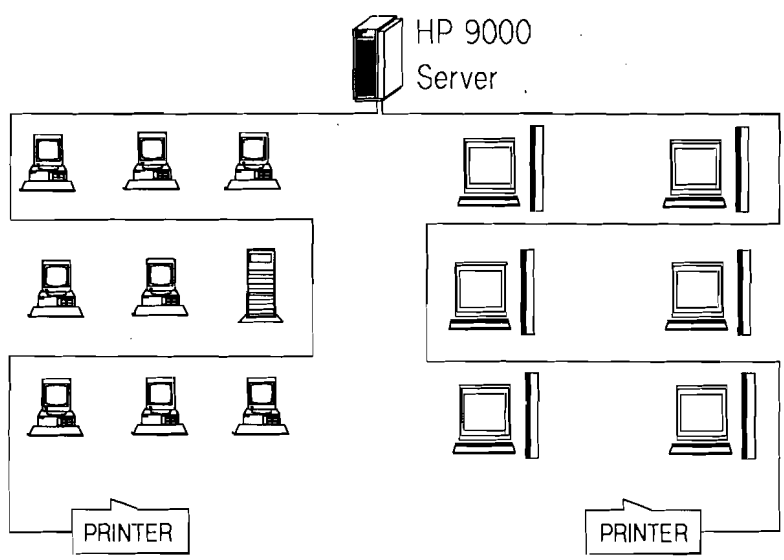
Product Number
HP J2239A

NetWare 3.11a for the HP 9000 Series 700 is a fully compatible NetWare server product that provides transparent integration of DOS, OS/2, Windows, and UNIX® (NFS) desktop systems. The HP 9000 with NetWare services will connect into existing Novell networks or can be used to build new NetWare networks and provide the same services as PC-based NetWare servers. NetWare for the HP 9000 is a robust, high-speed network operating system that enables HP 9000 systems to operate as a file and resource server to desktop clients. It runs on and takes advantage of HP's full range of powerful HP-UX servers.

NetWare for the HP 9000 provides the functionality of Novell Inc.'s PC services, including file and printer sharing, and server administration functions (such as password security, connection maintenance, bindery facility, print queue management, and accounting services).

In addition to file and print sharing capabilities, NetWare on the HP 9000 will provide support for NetWare Application Programming Interfaces (APIs) such as Sequence Packet Exchange (SPX). These APIs are the foundation for client/server applications on NetWare networks.

NetWare offers the client access to a wealth of PC applications plus access to mission-critical UNIX-based applications. Users can continue to use PC applications from the familiar PC environment. In addition, users can also access UNIX resources including a wide range of CPUs, disks, printers, and plotters. NetWare complements other HP networking products such as the ARPA/Berkeley Services, HP Network Services (NS), and Network File System (NFS) Services.



Through the combination of NFS and NetWare, users on both PCs and UNIX platforms can share files and resources. With PCs in finance and marketing, and UNIX workstations in engineering, users can continue to use their familiar interfaces while sharing files and printers. NetWare can be easily added to the UNIX network server, providing a bridge between departments and increasing productivity across corporate organizations.

Features

- Support for NetWare's application programming interfaces (APIs).
- Uses NetWare's SPX/IPX network transport, certified by Novell.
- Support for Novell Virtual Terminal (NVT), providing NetWare clients easy access to HP-UX terminal based applications.
- NetWare for the HP 9000 provides all of the basic resource sharing functionality a user has come to expect from a NetWare server. Added are the resources that only the power of the HP 9000 can provide, including larger systems and peripherals, security and reliability, and access to sophisticated, complex, mission-critical applications.
- NetWare Loadable Modules (NLM) are not supported. However, most NLM applications, such as databases, are currently available on HP-UX.

File Sharing

For the end user, the file sharing capability includes familiar NetWare file access, file allocation, and administration features. Also, NetWare features such as resource accounting, password protection, and file backup are included. Backward compatibility for NetWare clients to version 2.1 ensures installation of NetWare for the HP 9000 will not cause interruption of Novell networks already installed.

Access to MS-DOS®, or OS/2 files from HP-UX applications is provided by a set of function calls when the server is in operation.

Print Sharing

Printer sharing and print queue management is provided through the same commands familiar to all NetWare users. This ensures transparent print services with no special commands or procedures to be learned. Up to 16 supported HP 9000 spooled printers can be serviced by the NetWare server print server. HP 9000 environment files can be associated with a print queue as well.

Application Programming Interface (API)

Of particular importance to developers and end users alike is support of the interprocess communication capability that NetWare for the HP 9000 provides. APIs are the foundation upon which client/server platforms are based. The HP 9000 is a powerful server platform for mission-critical OLTP database client/server applications being developed for corporations of all sizes today.

NetWare for the HP 9000 supports Novell's popular Sequenced Packet Exchange (SPX) protocol. The SPX interface for both client and server are provided as part of NetWare for the HP 9000.

UNIX Workstation Connectivity

In addition to DOS, OS/2, and MS-Windows clients, NetWare for the HP 9000 in combination with NFS provides the ability to connect UNIX clients. UNIX clients have all the benefits of NetWare without forfeiting their familiar native UNIX interface. UNIX workstations can share files with other NetWare clients and print to NetWare server attached printers. In the reverse, NetWare clients can print to UNIX printers.

HP PC ARPA and Network Services Connectivity

Access to existing HP 9000 applications from a NetWare client is very important. HP PC ARPA and Network Services for NetWare provides this capability and is ordered separately, Product Number HP J2246A. HP PC ARPA and Network Services provides NetWare client PCs running MS-DOS with ARPA, FTP, Virtual Terminal (TELNET), and Network Interprocess Communication (NetIPC) connectivity to the HP 9000.

For detailed information on this option see HP PC ARPA and Network Services data sheet.

Terminal Emulation Support

NetWare for the HP 9000 through NVT supports any third-party terminal emulation program that adheres to the interrupt 14 interface standard, such as HP AdvanceLink or WRQ Reflection®. NVT allows NetWare clients to access host applications and services.

Network Capacity

NetWare for the HP 9000 will support up to 250 clients per server. Of course the actual number of clients supported on an individual server will depend on what applications and network functions are running on that server.

A maximum of one NetWare server can be supported per HP 9000 system.

System Requirements

NetWare for the HP 9000 is available on all HP 9000 Series 700 Servers.

NetWare for the HP 9000 requires the installation and operation of Lan Link, HP-UX version 8.07 or 9.0, at least 16 MB of RAM, and 25 MB of free disk space.

Installation Policy

NetWare for the HP 9000 is a customer installable product. Full installation and operation documentation is included with the product. NetWare for the HP 9000 also comes with DOS and Windows PC client software kits. The customer is responsible for performing the following tasks in order to successfully install and configure NetWare for the HP 9000:

- Verify the proper installation, configuration, and functioning of the LAN link.
- Update the HP 9000 system to proper release level and install the product.
- Verify the successful installation of the product by accessing the HP NetWare server from a NetWare PC client.
- It is highly recommended that customer personnel be trained on Novell's NetWare in order to take advantage of the full range of NetWare capabilities. Contact Novell's education department for information on Novell NetWare education courses.

Support Products

Contact your local HP sales representative for further information on software and network support options for NetWare for the HP 9000 and for NetAssure for PC LAN products. HP support products do not include NetWare upgrades to future versions of NetWare for the HP 9000.

Ordering Information

HP J2239A NetWare 3.11a for HP 9000 700S

001	Demo copy (30 day license)
AAH	DDS cartridge tape
AAU	CD-ROM certificate only
UA2	4 clients supported
UA3	8 clients supported
UA5	16 clients supported
UA7	32 clients supported
UA9	64 clients supported
UAB	128 clients supported
UAD	250 clients supported
UB2	Credit for 4 User License
UB3	Credit for 8 User License
UB5	Credit for 16 User License
UB7	Credit for 32 User License
UB9	Credit for 64 User License
UBA	Credit for 128 User License

In order to receive the upgrade credit, customers must select the upgrade credit option which pertains to their current user license option on the same order.

NetWare Version 4.0 will be a new and separate product. Upgrade credit will be offered for NetWare V.3.11.

Documentation

The following documentation is provided with NetWare for the HP 9000:

J2240-61001 NetWare Installation Manual
J2240-61002 NetWare for the HP 9000 System Administration
J2240-61003 NetWare User Basics for DOS Workstations
J2240-61004 NetWare Utilities Reference
J2240-61005 NetWare Concepts.
J2240-61006 NetWare Troubleshooting and System Error Messages
J2240-61007 NetWare for the HP 9000 Installing and Administering Guide

Novell's NetWare DOS and Windows Client Software and manuals are also provided.

HEWLETT® PACKARD

STREAMS/UX

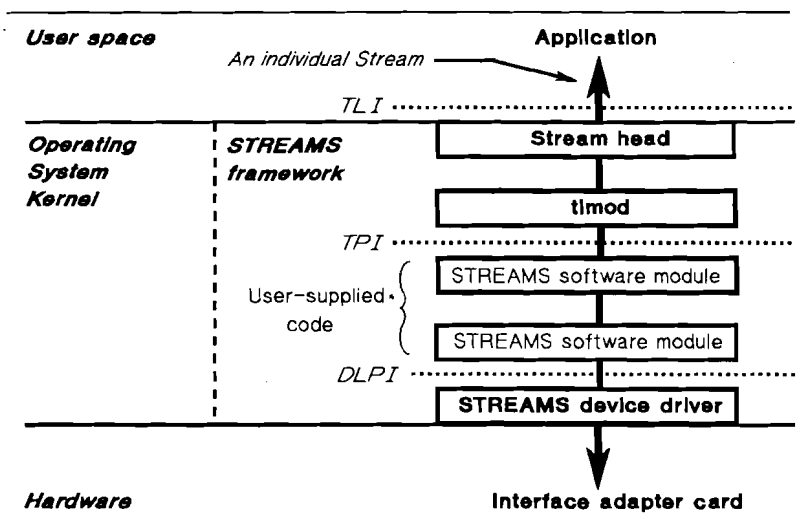
Technical Data

For HP 9000 Series 300/400, 700, and 800 Computers
Product Numbers
HP J2231A, J2232A, J2237A

STREAMS/UX provides the basic STREAMS environment for HP 9000 computers running HP-UX release 9.x.

STREAMS is an industry-standard framework for implementing modular software within the operating system kernel. The STREAMS framework is an extension of the operating system kernel, enabling STREAMS-based code to become part of the kernel.

An individual Stream is a two-way path for transferring data from an application in user space through the STREAMS framework to the device driver for a hardware interface. Individual Streams (coming from different applications and going to different hardware interfaces) all pass through the STREAMS framework. The Stream head provides a general interface between user space applications and STREAMS modules and drivers.



Within the STREAMS framework information is passed from software module to software module as messages. Modular units of code can be inserted or removed on any Stream. The modular code modifies or processes the data passing between the application and the hardware interface (or in the other direction).

Features

- A UNIX® System-V-Release-4-compatible version of the basic STREAMS framework.
- A generic TLI interface.
- A DLPI interface to the device drivers for HP's Ethernet/802.3, FDDI, and Token Ring LAN adapter cards.

STREAMS Functional Description

The STREAMS Framework

The STREAMS framework itself provides a set of system calls, kernel resources, kernel routines, and programming tools.

The STREAMS framework supports:

- Memory buffer management.
- Message queues with priority levels.
- STREAMS multiplexors, which allow multiple drivers to link under a common software module.
- Standard interfaces (APIs) from user-space into the STREAMS framework.
- Standard networking-related interfaces within STREAMS.

Networking Interfaces Related to STREAMS

Several networking-related interfaces are defined in conjunction with STREAMS. These interfaces fall into two categories: Layer Interfaces (LIs), which are application programmatic interfaces (APIs) from applications in user space to code running within the STREAMS framework; and Provider Interfaces (PIs), which are internal STREAMS message interfaces between STREAMS modules and drivers. The most common STREAMS-related interfaces are TLI, TPI, and DLPI.

TLI is the Transport Layer Interface. It provides an API to the transport layer of a network protocol stack (for example, TCP or OSI TP 0-4). Thus TLI is conceptually equivalent to various other transport interfaces: Berkeley (BSD) sockets, Novell's SPX, IBM's LU 6.2, and HP's NetIPC. TLI is actually implemented as a library of system calls (that an application can utilize) and a STREAMS module (timod) that "converts" those calls into TPI messages. TLI is just an interface; it does not specify the underlying transport (TCP/IP, OSI, SNA, etc.).

TPI is the Transport Provider Interface. It provides a generic message interface within STREAMS to a STREAMS-based network transport (for example, TCP/IP or OSI TP 0-4). Any user-supplied STREAMS-based network transport code that "speaks" TPI at its upper end can be installed under the timod module, which "speaks" TPI at its lower end.

DLPI is the Data Link Provider Interface. It provides a generic layer 2 interface within STREAMS to a hardware device driver.

Benefits

The STREAMS framework supports the development of modular, reusable, portable code. For networking protocol implementations, STREAMS can help provide protocol and media independence. The standard networking-related interfaces within STREAMS allow module layering; complex services can be built up from simpler "building-blocks".

The STREAMS framework itself provides generic resources which can be used for a variety of purposes. While any networking protocol can be implemented in STREAMS, STREAMS itself does not provide any specific networking functionality.

In addition to the HP products listed later in this data sheet, a wide range of STREAMS-based code is available from various third parties.

STREAMS/UX Functionality

The STREAMS/UX product includes the following:

- A UNIX System-V-Release-4-compatible version of the basic STREAMS framework.
- A generic TLI interface. *Support for the TLI system calls and the timod module. A user must supply their own STREAMS-based networking code which can process TPI messages.)*

- A DLPI interface to the device drivers for HP's Ethernet/802.3, FDDI, and Token Ring LAN adapter cards.

The HP STREAMS/UX product **does not** currently include the following:

- A TLI or XTI interface to the TCP/IP network protocol stack.
- A STREAMS-based implementation of TCP/IP (including the ability to push or pop STREAMS modules between the network protocol modules.)
- A STREAMS-based implementation of UNIX pipes and fifos.
- Terminal I/O-specific functionality in the STREAMS framework.
- A STREAMS-based implementation of terminal I/O.
- A STREAMS-based interface to the device drivers for HP's mux and serial ports.
- A STREAMS-based interface to the device drivers for HP's SCSI peripherals.

Supported Commands, Calls, Functions, and Utilities

STREAMS/UX supports all of the STREAMS commands, system calls, drivers, modules, Driver Kernel Interface (DKI) functions, and utilities, *except as noted in the following two lists.*

STREAMS/UX **does** support the following features, but the implementation differs in some form from UNIX System V:

autopush	select
bufcall	signal
clone	strace
dlpi	strclean
echo	strerr
esballoc	strlog
ioctl	timod
poll	tirdwr
putmsg	write
sad	writev
sc	

In most cases the differences are minor and stem from underlying variations in the System V and HP-UX operating systems. For more information, consult the STREAMS/UX Reference Manual.

STREAMS/UX **does not** support the following:

cmpdev	pckt
connld	pipe
console	ports
drv_setparm	ptem
expdev	ptsname
fattach	rmalloc
fdetach	rmfree
getemajor	rminit
geteminor	strchg
grantpt	strconf
isastream	sxt
ldterm	unlockpt
makedevice	xt

In general, these features all relate to STREAMS-based functionality that is not supplied with STREAMS/UX (see the product summary above). For more information, consult the STREAMS/UX Reference Manual.

HP Products Using (Dependent on) STREAMS/UX

The following HP products use STREAMS/UX-based code:

- HP-UX SNAplusLink
- HP-UX SNAplus3179G
- HP-UX SNAplus3270
- HP-UX SNAplusAPI
- HP-UX SNAplusRJE
- NetWare for the HP 9000 (Portable NetWare, NetWare for UNIX)
- OSI Transport Services/9000 (OTS)
- LAN Manager for UNIX for the HP 9000 Series 700/800 Version 2.2

Beginning with HP-UX 9.0, each of these products requires the purchase and installation of the STREAMS/UX code.

(Only one copy of STREAMS/UX is required per system.)

Installation Policy

STREAMS/UX is customer installable and configurable. Installation and configuration may also be performed by HP through the purchase of consulting services.

Software Support

For support purposes, STREAMS/UX is part of the operating system. Software and manual updates are available by ordering the appropriate operating system support product.

Ordering Information

Hardware and Software Requirements

5 MB of disk space is required to install the core STREAMS/UX product; 3 MB of this space is used for the TOOL fileset.

8 MB of total RAM memory is required for HP-UX; STREAMS/UX's memory requirements over and above the operating system are minimal. *(User-supplied software running in STREAMS/UX may require additional memory)*

STREAMS/UX requires HP-UX release 9.0 or higher. The operating system kernel must be rebuilt as part of the STREAMS/UX installation.

Product Structure

The STREAMS/UX products all share a common product structure. The base product number MUST be ordered; it provides a license to use the STREAMS/UX code on a single system. (This includes the implicit right to copy the STREAMS/UX code to that single system.) The STREAMS/UX options each provide both the STREAMS/UX code on a specific media type and the STREAMS/UX documentation.

Thus to initially install STREAMS/UX, a customer must order the base product number AND one option (for media and documentation). To replicate the STREAMS/UX installation on additional systems (without additional copies of the media or documentation), a customer should order the base product number only.

HP J2231A STREAMS/UX for the HP 9000 Series 300/400

Media and documentation will not be included unless a "Media/Documentation Option" is selected.

Options
(may select one option)

AA0 ¼-inch cartridge tape and documentation
AAH DDS cartridge tape and documentation
AAU CD-ROM certificate and documentation

HP J2232A STREAMS/UX for the HP 9000 Series 700

Media and documentation will not be included unless a "Media/Documentation Option" is selected.

Options
(may select one option)

AAH DDS cartridge tape and documentation
AAU CD-ROM certificate and documentation

HP J2237A STREAMS/UX for the HP 9000 Series 800

Media and documentation will not be included unless a "Media/Documentation Option" is selected.

Options
(may select one option)

AA0 ¼-inch cartridge tape and documentation
AA1 ½-inch mag tape - 1600 BPI and documentation
AA4 QIC cartridge tape and documentation
AAH DDS cartridge tape and documentation
AAU CD-ROM certificate and documentation

Documentation

The STREAMS/UX products all share a single common reference manual. The manual is included in the media/documentation product options.

The STREAMS/UX reference manual should be sufficient for users who are merely installing STREAMS/UX as a dependency for other HP or third-party software running in the STREAMS environment.

Users planning to do STREAMS-based programming will also need the AT&T UNIX System V Release 4 documentation, specifically the *UNIX System V Release 4 Programmer's Guide: STREAMS* and *UNIX System V Release 4 Programmer's Guide: Networking Interfaces.*

These manuals must be purchased separately, but are commercially available through any bookstore.

J2237-60001 STREAMS/UX for the HP 9000 Reference Manual

Topics covered in the STREAMS/UX manual include:

- Chapter 1: Installation and Verification of HP-UX STREAMS.
- Chapter 2: Detailed Product Installation and Configuration.
- Chapter 3: Differences Between HP-UX STREAMS and System V Release 4 STREAMS.
- Chapter 4: Differences Between HP-UX TLI and System V Release 4 TLI.
- Chapter 5: How to Compile and Link STREAMS Drivers, Modules, and Applications.
- Chapter 6: Debugging STREAMS Modules and Drivers.
- Chapter 7: HP-DLPI.
- Appendix A: STREAMS Entry Points.
- Appendix B: STREAMS/UX man pages.

HEWLETT® PACKARD

HP X.500 Distributed Directory

Technical Data

Product Numbers
HP J2152A, J2153A

HP X.500 Distributed Directory is an Open System Interconnection (OSI) product based on the 1988 CCITT X.500 standard. This directory product is a full X.500 directory. HP X.500 can be used for accessing names and electronic mail addresses for multivendor messaging backbone networks. HP X.500 can also be used for the development of networked applications requiring distributed directory functionality.

Features

Integrated with HP OpenMail:
HP OpenMail terminal interface users will be able to access the enterprise-wide HP X.500 distributed directory directly from the user interface. X.400 or UNIX® addresses can be selected and automatically returned to OpenMail, simplifying the process of mailing multivendor electronic mail.

Integrated with HP-UX Mailers:
HP-UX Sendmail users can access electronic mail addresses from an X.500 server over a TCP/IP network.

End-User Address Look-up:
Easy-to-use X.500 interface allows users of non-HP e-mail systems to access data stored in the X.500 Directory. Phonetic searches allow users to find names when they are uncertain of the spelling.

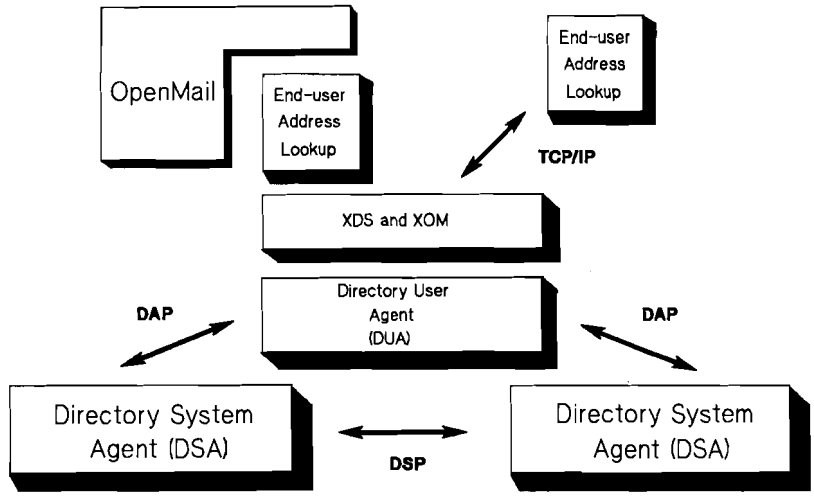
X.500 APIs:
X/Open X.500 APIs (XDS and XOM) are included with the product and allow developers to write their own X.500-based applications. HP X.500 also supports high-level APIs on top of XDS and XOM, which simplifies and speeds application development.

Messaging Backbone Foundation:
HP X.500 works together with HP X.400 to form the foundation for a multivendor messaging backbone. Common user interfaces and troubleshooting tools simplify the integration of multivendor environments.

Menu Driven Administration:
Full screen, menu driven administration tools simplify configuration and data retrieval.

Replication:
Data Shadowing, the ability to automatically replicate data among groups of Directory System Agents (DSAs), allows higher performance and easier management of the database in a global environment.

Security:
Access control prevents unauthorized users from obtaining and manipulating secured directory data.



Interoperability and Troubleshooting Tools:
HP provides a full set of tools to help simplify the interoperability and troubleshooting process. HP's OSI tools allow the network administrator to check the interoperability of the network at various layers of the OSI stack, isolating problems quickly and easily.

Complete DUA and DSA:
HP X.500 includes a complete multithreaded Directory User Agent (DUA) and Directory Server Agent (DSA). The X.500 Directory Information Base (DIB) is built on a database that has been optimized for X.500 performance. HP X.500 contains full support for Directory Access Protocol (DAP) and Directory Server Protocol (DSP).

Object Classes:
All X.500 and 1988-X.400 object classes and attributes are supported. User defined object classes and attributes are fully supported.

Configurable Schema:
HP X.500 supports the creation and modification of subclasses and DIT hierarchy.

Functional Description

HP X.500 is a distributed database that is based on the client/server model. The Directory User Agent (DUA) acts as the client while the Directory Server Agent (DSA) is the server. The DUA can reside on the same computer as the DSA or can access a DSA remotely.

The DSA is the place where data is held. Because X.500 is a distributed directory, data can be partitioned and shared between multiple DSAs. Each DSA can contain a portion of the directory or the entire directory.

HP X.500 supports distributed directory operations, which include chaining, multicasting, and referral.

Applications can be developed on top of the DUA using industry-standard (X/Open) XOM and XDS APIs. Administration screens allow configuration and data manipulation through the DUA.

The end-user address look-up facility allows X.500 data to be accessed from a TCP/IP network. This facility is also integrated with the HP OpenMail Electronic Mail software.

Conformance

HP X.500 complies with the following standards: CCITT Directory Recommendation X.500 to X.521; ISO/IEC 9504-1, 9594-2, 9594-3, 9594-4, 9594-5, 9594-6, 9594-7, 9594-8; HP will be conformant to NIST and EWOS directory functional profiles.

Hardware and Software Requirements

	HP X.500 Distributed Directory/9000 Series 800 (Client and Server) HP J2152A	HP X.500 DUA/9000 Series 800 (Client Only) HP J2153A
Hardware	Any HP 9000 Series 800 (Series 890 requires HP-UX 9.0)	
Operating	HP-UX 8.0, 8.02, or 9.0*	
Software	HP OTS/9000 for Series 800 32070A *If HP-UX 9.0, STREAMS/UX **Must be ordered separately**	
Memory	16 MBytes memory 20 MBytes free disk space plus disk space for DIB	
Links	X.25/9000 LAN/9000 Link	

Documentation

The following manuals are included with both HP X.500 Distributed Directory Products:

J2152-61001 Installing and Configuring HP X.500 Distributed Directory
J2152-61002 Managing HP X.500 Distributed Directory
J2152-61003 Using HP X.500 Distributed Directory
J2152-61004 HP X.500 Distributed Directory Command Reference Guide
J2152-61005 HP X.500 Address Lookup
J2152-61006 HP X.500 Distributed Directory API Programmer's Guide
J2152-61007 API to Directory Services (X/Open Manual)
J2152-61008 OSI Abstract Data Manipulation API (X/Open Manual)
J2152-61009 HP X.500 Read-Me-First (HP-UX 9.0 version only)

Installation and Support Policy

HP X.500 Distributed Directory Software is customer installable and configurable. Installation and configuration can also be performed by HP through the purchase of consulting services. Interoperability testing can also be purchased from Hewlett-Packard on a time and material basis.

Ordering Information

The HP X.500 Distributed Directory Product offering is made up of two products: a client/server product and a client only product. These products can be ordered separately. These products can not be run simultaneously on a single machine.

HP X.500 Client/Server Product

HP X.500 Distributed Directory/9000 for the HP Series 800 is ordered with the product number HP J2152A. In addition, an operating system option, a media option, and a processor option must be specified. The processor upgrade and other options are not required. Since the options are the same for both products, the options are listed below.

HP X.500 Client Only Product

HP X.500 DUA/9000 for the HP Series 800 is ordered with the product number J2153A. In addition, an operating system option, a media option, and a processor option must be specified. The processor upgrade and other options are not required. Since the options are the same for both products, the options are listed below.

Ordering Options

The following options apply to both X.500 products.

Operating System Options

APB HP-UX version 8.0
APH HP-UX version 9.0

Media Options

AA0 ¼-inch cartridge tape (Release 8.0 only)
AA1 ½-inch magnetic tape (1600 bpi)
AAH Digital Audio Tape (DAT)
AAU CD-ROM certificate only
AA4 QIC

Processor Options

AH0 License to use on Models 807, 808, 817, 834
AEL License to use on Models 815, 822, 827, 837
AE5 License to use on Models 825, 832, 847, 857, 635
AE6 License to use on Models 835, 842, 867, 877, 645
AEN License to use on Models 845, 852, 887, 897
AEP License to use on Models 850, 855, 860, 865, 890, 1, 2 CPU
AH1 License to use on Models 870, 890, 3, 4 CPU

Other Options

0B0 Delete documentation

Processor Upgrades

Return credit is given to customers upgrading within the Series 800 family. To order an upgrade, order product number HP J2152A or HP J2153A, select a software option, an operating system option , a processor option, and one of the following upgrade options.

Upgrade Options

0GR For Models 807, 808, 817, 834
0GE For Models 815, 822, 827, 837
0C8 For Models 825, 832, 847, 857, 635
0GS For Models 835, 842, 867, 877, 645
0GT For Models 845, 852, 887, 897
0GU For Models 850, 855, 860, 865, 890, 1, 2 CPU

Related Products

In addition to HP X.500/9000 and HP OTS/9000 products, the following HP OSI products are offered:

- HP FTAM/9000
- HP MMS/9000
- HP X.400/9000

Printed in the U.S.A. 2/93

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HEWLETT® PACKARD

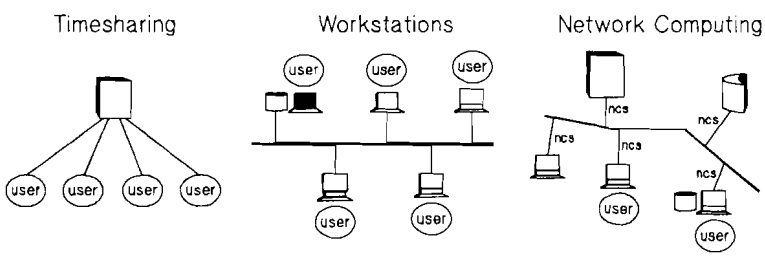
Network Computing System 1.5.1 (NCS)

Technical Data

Product Number
HP B2674A

The Network Computing System (NCS) is a set of distributed computing products that provides true intervendor computing in heterogeneous environments. NCS makes it easy to develop and run applications that use computing resources throughout a network. Individual program modules within an application can be distributed to computers best suited for the task. Modules that can run in parallel are easily distributed to multiple computers at once, creating, in effect, a network supercomputer. The result is higher performance for workstation users and better utilization of computing resources throughout the network.

Network Computing System



The Network Computing system establishes a new generation of computing by letting single users, even single applications run multiple computers at once.

NCS was accepted by the Open Software Foundation (OSF) as their remote procedure call (RPC) mechanism. NCS has been incorporated into the Distributed Computing Environment (DCE) and is shipped as the DCE/RPC.

The NCS product comprises two major pieces: the Network Computing Kernel (NCK), which provides run-time support, and the Network Interface Definition Language (NIDL) compiler, which is a tool for application developers.

NCS is a truly open system written in portable C code, fully documented, and based on industry-standard protocols. To ensure network independence, NCS uses the low-level datagram services available on most networking protocols, including UDP/IP and the Apollo DDS (Domain Distributed Services).

With NCS, corporations will be able to use their many different CPUs much more efficiently.

End users will be able to take advantage of high-powered specialty servers, and applications developers will be able to write distributed programs that fully exploit the network's resources.

Features and Benefits

Open system: NCS is an open extensible system, designed to run on multiple CPUs, operating systems, and networks. Documentation for the underlying Network Computing Architecture is available to the public.

High-level interface language: NCS lets programmers specify remote computing requirements in a high-level Network Interface Definition Language (NIDL), which supports C-style syntax.

Interface software generated automatically: A compiler converts NIDL interface descriptions into C-source code (as well as C-include files), which can be compiled on any system.

Network Resources cataloged dynamically: System software automatically finds the computers required to run particular features.

Integrated remote procedure call: This facility lets programs running locally call procedures implemented on remote hosts. The RPC facility is independent of network protocol.

Automatic data conversion: Data representations, such as byte order or floating point representations, are converted automatically when required. Similar systems need not convert to and from an intermediate data representation.

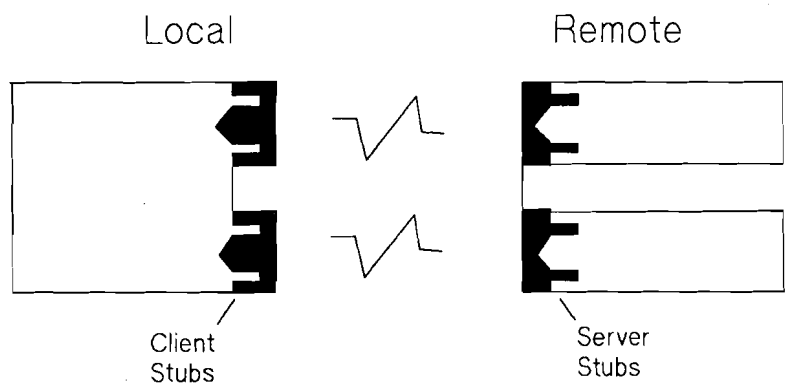
Integrated error checking: NCS provides integrated error checking and does not rely on the usually slow higher levels of network protocols. Reliable network computing can be provided over any type of transport.

Low overhead: The run-time system minimizes the number of messages per RPC call, providing high throughput.

Simplifies use of specialized processors: NCS products are designed to use the low-level hardware interfaces common to most specialized processors.

Simplifies software development: With NCS tools, distributed applications are developed using structured programming techniques. Current applications can be easily modified for network computing.

Object oriented: Procedures are handled as operations on objects rather than calls to particular machines or processes. This makes it easy to separate what is being done from where it is being done, a crucial distinction in a networked environment.



Stub routines let local and remote parts of the application communicate as one application. NCS provides a compiler that generates client and server stubs automatically.

Making Remote Procedure Calls Practical

The underlying foundation of NCS is an advanced approach for building distributed applications, the Network Computing Architecture (NCA). The purpose of NCA is to serve as a building block for distributed applications. The NCA Remote Procedure Call (NCA/RPC) facility extends the procedure call mechanism from a single-machine implementation to a distributed computing environment. The RPC concept is simple: make individual procedures in an application run on a computer somewhere else in the network. In practice though, using RPCs without any special tools can be more work than many developers are willing to devote to the task. A set of procedures must be created that looks like the original procedures. This stand-in is called a stub. Likewise, another stub must be made for the server, and this one must stand in for the application. The Network Computing System includes a compiler that generates client and server stubs automatically, greatly reducing development effort.

Two Components Work Together

The Network Computing System contains two major components that work together to provide an advanced environment for distributed computing applications. Network Computing Kernel (NCK), the RPC run-time, handles packaging, transmission, and reception of data between host and client procedures. Included with NCK is the Location Broker that determines at run-time which hosts are running the requested services. It eliminates the need for location-specific information within applications.

Network Interface Definition Language (NIDL) compiler creates C-language source code for host and client RPC stubs. It shields the application developer from the details of the target system.

RPC Run-Time Environment

The NCS RPC is designed for vendor and protocol independence. The source code for the RPC run-time environment is written in C. It uses the Berkeley UNIX® socket approach for interprocess communications, but extends the socket abstraction through a user-mode subroutine library that the RPC run-time accesses. This library allows the system to compensate for different network protocols and various operating systems.

Flexible Error Handling

The RPC environment includes sophisticated error-handling capabilities. It is robust in the face of lost, duplicated, and long-delayed messages arriving out of order, and in server crashes. The run-time can ensure that no call is ever executed more than once. Because the error handling is built into the RPC run-time, that application can call for only as much error correction as is needed. For example, if a subroutine can be executed more than once without side effects, the overhead to guard against this can be eliminated.

Protocol Independence

Great care has been taken to ensure the Network Computing System is truly independent of network protocols. Since error handling is part of the RPC run-time, it need not be part of the network protocol used. Therefore the RPC can be based on any connection, network, or protocol that provides point-to-point datagram services. As an example, NCS provides support for the UDP datagram service in the DARPA IP protocol family as well as support for the Apollo DDS datagram. Support for other services will be added in the future.

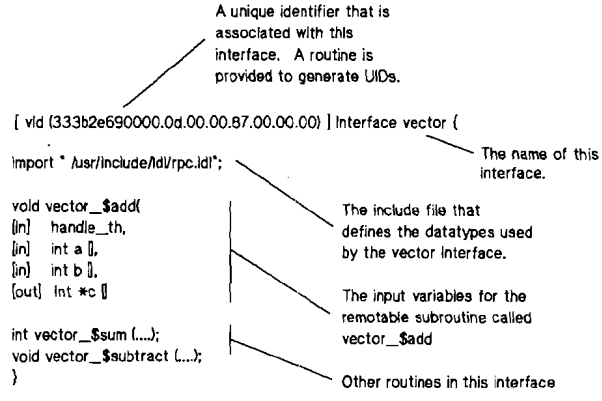
Location Broker Finds Services Automatically

To be truly practical, distributed applications should not have information about the execution environment hard-coded in the application itself. For example, if an array processor is added to a network, applications needing array processing should not need modification to use the new machine. This task of matching available services to workstation clients is done through the location broker. Servers register their capabilities with the location broker, and clients query the location broker at run-time to determine which hosts to use for the particular remote procedure calls.

An Object-oriented Approach.

The location broker uses an object-oriented approach to network computing. RPC calls are treated as operations on objects, not calls to particular machines or server processes. By approaching the problem from the standpoint of what to do rather that where to do it, applications can function in a constantly changing environment.

Anatomy of the Network Interface Definition Language



The Network Interface Definition Language allows programmers to define interfaces to a set of procedures using C syntax. The NIDL compiler then generates source code files for host and clients from this information.

NIDL Compiler

The Network Interface Definition Language compiler automatically generates the stub procedures that stand in for the remote procedure on the client side and for the caller's procedure on the server side. The syntax for these routines is described by the applications programmer in an interface specification, written in the Network Interface Definition Language. The interface specification includes information about all the procedures that can be called remotely and the numbers and types of their arguments.

Since the stub procedures must run on a variety of machines, the NIDL compiler generates C source code, which is then compiled on the target machine. Source for the client and the server is generated automatically, as are the C include files. Stub procedures may interface with procedures written in C, Pascal, FORTRAN, and many other computer languages.

The stub procedures generated by the NIDL compiler greatly simplify use of remote procedure calls. Callers do not need to involve themselves with the details of data packaging and data representation. Remote procedures execute just like local ones.

Supports Two Types of Binding: The NIDL compiler supports two types of binding: explicit binding and implicit binding. Explicit binding means that the NIDL specification states exactly which host to use, and this host is always used when the application is run. In implicit binding, the client establishes the binding as a variable before making any remote procedure calls. Thus, the application can query the location broker at run-time and establish the binding between the local and remote routines.

Portable Software

NCS is available today for HP, Alliant, Convex, Cray, DEC (VMS and Ultrix), IBM, Multiflow, Prime, Pyramid, Stellar, and Sun Microsystems. HP intends to continue to promote the architecture as an open, industry de facto standard.

Configuration and Prerequisites

For HP 9000:

- HP 9000 Series 700
  - Minimum 8 Megabytes memory
  - LAN/9000 Link
  - HP-UX Version 8.0 or later

Note: NCS/NCK is included with HP-UX Version 8.0 and later.

Ordering Information

HP B2674A NCS/NIDC 1.5.1 Series 700

HP B2674A Options
AAU CD-ROM certificate only
AAH DDS cartridge tape
OBJ Documentation

LA400BAD NCS/NIDL 2.0 Domain/OS Motorola
LA400BBD NCS/NIDL 2.0 Domain/OS (Prism)
LA38C00C NCS/NCK 1.5.1 source license
LA40CC0C NCS/NIDL 1.5.1 source license
B2685A NCS 2.0 source license

NCS Procedure Calls

Client Calls

rpc_$bind
- Allocate a handle and create an association between the client and the object's location.

rpc_$free_handle
- Release the handle and eliminate the client-object association.

lb_$lookup-interface
- Find the network addresses of all the objects that support a particular interface.

lb_$lookup_object
- Find the network addresses of all the instances of a particular object.

lb_$lookup-type
- Find the network addresses of all the objects of a particular type.

Server Calls

rpc_$use_family
- Add a network protocol family to the list of protocols used by this server to accept RPC calls.

rpc_$register
- Register an interface with the RPC run-time library.

rpc_$listen
- Listen for RPC calls from clients.

lb_$register
- Register an object as an interface with the location broker so that clients in the network can make RPC calls on that interface.

lb_$unregister
- Unregister an object and an interface.

Documentation

D-1201B Network Computing Architecture
D-10200-C Network Computing System Reference Manual
D-18355-C Network Computing System Tutorial
11895-E Managing NCS Software
B3193-90002 NCS 1.5.1 to DCE RPC Transition Guide

HEWLETT® PACKARD

HP OpenMail

Technical Data

Product Numbers
HP B2284A, B2285A, B2286A

Choice Without Compromise

HP has designed a messaging solution to give you the flexibility to choose the desktop environment you use, the type of information you distribute, and the systems you exchange information with without having to compromise the management and reliability features you are accustomed to in many legacy systems. OpenMail provides standards-based, open system messaging services. A core component of Hewlett-Packard's Electronic Messaging Solution OpenMail is built around the X.400 standard and is designed for enterprise-wide electronic information distribution. OpenMail is scalable, reliable, and economical to set up and administer.

Scalable
OpenMail is fully scalable to processor size. This is critical when usage can be heavy or peaked in nature, and when flexibility in network design and future capacity changes are anticipated.

Reliable
OpenMail is designed especially for mission critical environments. Conforming to the client/server model through a transaction-oriented protocol, OpenMail provides dependable and reliable transport of communications between client and server components. In case of component failure, the system immediately detects the failure and initiates recovery activities.

Low Cost of Ownership
In addition to low cost purchase and set-up, OpenMail is affordable to administer. HP's fully developed Electronic Messaging Solution incorporates all the resources and mechanisms required to ensure smooth and continuous operation. OpenMail features comprehensive tools and utilities combined with detailed audit and statistical information to ensure fast and effective system administration.

Superior Benefits

On Time Delivery to the Right Recipient the First Time, Every Time

Increasingly, companies are recognizing that information is a mission critical resource, and that the sophisticated applications that process and distribute information are equally mission critical. Such applications must be robust and reliable. And in multisite or global networks, particularly involving communications with trading partners, high availability is a prerequisite for user satisfaction and system performance.

OpenMail is designed for just such a mission critical role. It conforms to the client/server model with a action-oriented protocol providing the communication between client and server components. This ensures reliable transport so that should a component fail, the system is in a position to detect that failure and recover completely.

Sophisticated queuing systems ensure that data cannot be lost, even if links go down. In addition OpenMail's ability to detect anomalies such as "message loops" due to network circle routing provide added reliability. Consistent on time delivery of messages to the right recipient every time is provided through the following OpenMail features:

- Acknowledgments
- Address Resolution
- Aliases
- Attachments
- Categorization of Mail
- Directory Attributes
- Directory Synchronization Distribution Lists
- New Mail Notification
- Non-Delivery Notification
- OpenMail-to-OpenMail Transport
- Phonetic Matching
- Searching Algorithm
- Sendmail Connection
- Wildcard Searching
- X.400 Compatible-mail System Connections

Cost Effective to Set-Up and Run

The true value of a solution is measured by weighing the benefits it provides against its purchase, set-up, and administration costs over its lifetime. OpenMail provides superior benefits while cost of ownership is kept to a minimum. Low cost system administration is achieved by incorporating state-of-the-art administrative features, tools, and utilities combined with detailed audit and statistical information. In addition, HP supports both local and centrally-based administration facilities, all of which result in OpenMail's smooth and continuous operation in a networked environment.

OpenMail provides a complete range of tools and utilities that, along with detailed audit and statistical information, ensures fast and effective system administration. Preventative maintenance tools alert administrators to potential network problems before they affect performance, while specialized troubleshooting tools assist administrators in correcting problems.

As well as supporting comprehensive local administration faculties, HP provides centrally-based facilities capable of the administration of a large number of remote components, further reducing potential administrative overhead costs. Remote capabilities are especially important for large user populations, particularly when used with geographically distributed networks. Customers intending to consolidate administrative capability in a central location will especially appreciate the added security and low cost of OpenMail's administration facilities.

OpenMail also features fully developed exception reporting and problem solving features. When configured to do so, exception reporting will automatically send error reports to administrators when queues build up, links go down, messages cannot be delivered, or when other problematic situations occur. OpenMail's built-in problem solving system diagnoses problems, logs system events and message traffic, tests loop-back, and when indicated, will resubmit messages. These two features are integral to OpenMail's comprehensive and cost effective administration package.

Other features ma ensure cost effective set-up and operation include the following:

- Administrative Commands
- Audit and Statistics
- Component Monitoring
- Configurable Maintenance Times
- Context Sensitive Help
- Customer Installation
- Database Scanning
- Error Manager Server
- Local Language
- Local or Remote Administration
- Loop Detection
- Mail Queue Interrogation

- Menu Driven Administration Interface
- Message Resubmition
- Message Routing Service
- Message Tracing
- Monitor Facility
- NetLS Licensing
- Network Statistics
- Non-Delivery Reports
- One Message Copy
- People Mover
- Print Server
- Problem Solving System
- Route Filtering
- Routing Table
- Sendmail Transport
- Space Usage Reports
- Split Data Directory
- System Errors/Events Recorded
- Test Server
- Trace
- UNIX® Commands

Works with Your Current Infrastructure

Corporate networks are increasingly configured around a mix of UNIX servers from a multitude of vendors. Multiplatform, multivendor situations require that network applications and solutions similarly support a variety of UNIX servers and are available from a multitude of suppliers. OpenMail is available from a number of suppliers on all the leading UNIX platforms, including those from Data General, Digital, Hewlett-Packard, IBM, Sequent, and Santa Cruz Operation

OpenMail uses standard data communication products, another essential requirement for messaging services solutions. Support for popular transport networks is achieved through use of the Sendmail transport system on a standard ARPA, use of Berkeley Services on 802.3 LANs, X.25 WANs and RS-232 links, and use of an X.400 MTA on X.25 WANs. OpenMail supports LAN Manager and Novell for client/server links.

OpenMail is a powerful messaging services solution allowing you to make use of added value services provided by messaging enabled applications. It supports a comprehensive range of interfaces for Application Developers resulting in customized, messaging enabled solutions easily built around your messaging infrastructure.

OpenMail integrates fully with any combination of architectures, services and applications through use of the following features:

- APIA Gateway Support
- Directory Attributes
- Directory Synchronization
- Simple MAPI Support
- Multiple Platforms
- OpenMail Command Line Interface
- OpenMail GAPIs
- OpenMail-to-OpenMail Transport
- OpenMail UAL
- Request Server
- X.400 Based Messaging
- X.400 Compatible-mail System Connections

Easy-to-Use

Not only is HP's OpenMail easy to use, a key requirement of any messaging service, but it allows end-users to choose the industry-leading, best-in-class desktop applications with which they are familiar and that provide the interface and functionality they require in their work environment.

Full compatibility with existing applications is achieved through OpenMail's User Agent Layer, an application programming interface (API) that supports international and adopted standard interfaces. They allow leading third party electronic mail and other messaging applications to take advantage of the highly functional OpenMail server.

End-users are able to continue to work with their desktop applications as they are, while the increased connectivity provides additional functionality. Information Technology departments are able to provide the latest, standards-based, comprehensive messaging services that scale to support enterprise-wide network communications.

OpenMail's easy to use functions include the following:

- Attachments
- Auto-Actions
- Categorization of Mail
- Clients of Choice
- Filing
- Simple MAPI Support
- Nested Messages
- OpenMai-to-OpenMail Transport
- Text Editor

- Unlimited Message Parts
- Unlimited Message Size

The Electronic Highway of Tomorrow

HP is committed to standards and open systems. Standards and open systems give OpenMail the ability to form a messaging backbone based on an architecture that offers flexibility of choice, scalable solutions, support for multiple platforms, and present as well as future cost containment.

OpenMail is designed and written to specification in the X/Open Portability Guide entirely in the C programming language. OpenMail has been made available on multiple UNIX platforms and is a core component of many messaging service solutions.

As a true X.400-based mailing solution, OpenMail applies this standard for message addressing and message features. X.400 MTA products are used for server to server communication in a multivendor network with an available option to run Sendmail in the OpenMail and UNIX mail networks. OpenMail win support other standards as they emerge, such as the X.5OO directory standard.

The following features make Openmail the right choice for your mail highway:

- APIA Gateway Support
- GOSIP Support
- Simple MAPI Support
- Multiple Platforms
- RFC987, RFC1148 Support
- X.400 Based Messaging
- X.400 Compatible-mail System Connections
- X/Open Compliant

Complements Your Work Patterns

OpenMail is a powerful enabler, assisting with a myriad of your day-to-day communication activities using a wide range of essential electronic mail features. OpenMail complements your work routines, making every day electronic mail communications more timely and effective. Key electronic mail features supported by OpenMail include:

- Access Control Lists
- Access Password
- Acknowledgments
- Algorithm Search
- Aliases
- Auto-Actions
- Batch Print
- Blind Carbon Copies
- Bulletin Board
- Character Set Conversion
- Deferred Mailing
- Deferred Mail Cancellation
- Delegates Principle/Designates
- Directory Synchronization
- Document Conversion
- Encoded Messages
- File Type Coercion
- File Type Conversion
- LAN Fax Gateway
- Mail Categorization
- Mailbox Secure
- Message Parts Unlimited
- Message Size Unlimited
- Phonetic Matching
- Print Server
- UNIX Mail Gateway
- Wildcard Searching

Adapts to Your Changing Needs

A scalable and flexible messaging solution is demanded as the requirements for electronic information distribution grow along with increasing numbers and varieties of users. OpenMail is capable of growing with your company and adapting to its changing needs. It is fully scalable to processor size, which is especially important when usage is heavy or peaked in nature and when flexibility in network design and future capacity changes are anticipated.

OpenMail adapts to your changing needs using the following features:

- Multiple Platforms
- Multiple Sessions, Multiple Signons
- Split Data Directory
- X.400 Based Messaging
- X/Open Compliant
- Unlimited Message Parts
- Unlimited Message Size

Powerful Features

Summary

Openmail is based on standards and open systems for interoperability and use in a cost conscious environment. Designed to scale, OpenMail meets your changing needs while forming the foundation for value added message-enabled applications.

The features of OpenMail are classified under the following headings:

Messaging Services
- Directory Services
- Message Store
- Routing and Transport

Application Programming Interfaces (APIs)
- Command Line Interface
- Gateway Application
- Programming Interfaces (GAPIs)
- User Agent Layer (UAL)

User Agents, Clients
- Applix Aster*x
- Clarity Rapport
- HP AdvanceMail/TI
- HP AdvanceMail/PC
- HP NewWaveMail
- HP OpenMail Graphic User Interfaces
- HP OpenMail PhoneBook
- Lotus® cc:Mail
- Microsoft Mail

Administration
- Licensing
- Network Management
- Security
- Server Management

Auxiliary Services, Accessories
- Application Servers
- Converters
- Gateways

A summary of the main features under each of these headings is given in alphabetic order following. Note that in general these features are supported by the OpenMail User Agent Layer (UAL) but are not necessarily implemented in the AdvanceMail Terminal Interface or other User Agents. Also, the UAL functionality is restricted to the run-time use of the UAL and Application Programming Interfaces (APIs). It does not include the ability to develop using these APIs.

Messages Services—Directories

Address Resolving: Enables users to supply names with minimum address information.

Aliases: Enables alternative names to be assigned to users.

Directory Attributes: Supports additional directory attributes, such as job title, department name, office name, etc., to help users select recipients of their messages.

Distribution Lists: Manages personal and public distribution lists, including rerouting of mail via public distribution lists.

Directory Synchronization: Provides directory synchronization between OpenMail directories and between OpenMail and non-OpenMail directories.

Phonetic Matching: Enables users to obtain a list of similar sounding recipients, and then be able to pick from that list.

Searching Algorithms: Extends searching algorithms, allowing customer-specific phonetic probes, direct keyed access and full sequential search.

Wildcard Searching: Enables users to enter examples such as **/pinewood" to obtain a complete list of users at mailnode "pinewood," and then be able to pick from that list.

Messaging Services—Message Store

Acknowledgments: Confirms that messages have been delivered, read or replied to, on a per user basis (registered mail).

Auto-Actions: Acts on any messages that appear in the intray of any user, based on filters, e.g. "automatically delete all non-urgent messages". Auto-Delete, Auto-Forward, Auto-File, Auto-Print, and Auto-Reply.

Attachments: Supports the attachment of binary and other files.

Blind Carbon Copies: Splits messages by blind carbon copies. Messages containing BCC names will be split off from the original message. This allows OpenMail to correctly preserve the security of BCC names.

Bulletin Board: Supports bulletin board services.

Cancellation of Deferred Mail: Allows cancellation of deferred delivery of mail prior to the specified date and time.

Categorization of Mail: Ranks importance (Normal, Low, High), Priority (Normal, Non-Urgent, Urgent) and Sensitivity (Normal, Personal, Private, Company Confidential).

Deferred Mailing: Defers at a specified future date and time.

Delegates, Principle/ Designates: Provides one or more designated users the ability to access another user's message store (intray, out tray, and folders).

Filing: Files messages.

GOSIP Support: Supports all GOSIP'84, and most GOSIP'88 mandatory elements.

Message Parts: Limits number only by available disk space.

Message Size: Limits only by available disk space.

Multiple Sessions: Allows multiple sessions to access the same message store.

Multiple Signons: Intray, file cabinet, etc.

Nested Messages: Supports nested messages and folders.

New Mail Notification: Announces new mail.

Non-Delivery Notification: Notifies sender and OpenMail administrator of messages that cannot be delivered. Original message is also returned to the sender.

Text Editor: Easy to use text editing for creation of messages with ability to link a full word processor, or other editing application

Re-Routing: Re-routes via public distribution lists.

Split Data Directory: Splits data across multiple disks to ensure that disk I/O will not be a bottleneck to performance with large numbers of users on high-end CPUs.

X.400 Based Messaging: Provides both addressing and message features, for electronic information exchange in a multivendor environment.

Messaging Services— Routing and Transport

Address Resolution: Configures additional address resolution in the Service Router, on behalf of gateways as an aid to writing gateway applications.

File Type Coercion: Configures file type coercion to automatically identify file types.

Loop Detection: Prevents messages from "looping" around the system.

Message Routing Service: Performs file type coercion, route filtering, message routing, and loop detection.

OpenMail-to-OpenMail: Supports tunneling between OpenMail nodes and X.400 systems for transport of complex objects without losing file type information.

RFC987, RFC1148 Support: Supports message heading mapping at the UNIX Mail gateway based on the UNIX standards (by adoption) RFC987 and RFC1148.

Route Filtering: Updates the active recipient list as a message passes from one OpenMail system to another.

Routing Table: Comprehensive routing table with "wildcard" facility to group similar addresses routed to the same delivery service.

Sendmail Connections: Connects to Sendmail based mailing systems.

Sendmail Transport: Provides system for simple node-to-node transfer of messages.

X.400 Compatible-mail: Connects to other X.400 compatible-mail systems.

X.400 MTA: Uses X.400 MTA for connections to other X.400 compatible-mailing systems.

APIs—Command Line Interface

OpenMail Command: Enables users to access the system from the shell via the Line Interface commands omsend and omlist. These can also be used by application programs which do not intend to make heavy use of mailing.

APIs—Gateways (GAPIs)

APIA Gateway Support: Provides support for access to MTAs via the X/Open gateway APIs.

OpenMail GAPIs: Enables gateway applications to plug into OpenMail via a gateway API.

APIs—User Agent Layer (UAL)

Application-Generated Objects: Provides support for objects which are associated with a message or its contents.

Simple MAPI Support: Provides support for messaging enabled applications which use Microsoft's Messaging API

OpenMail UAL: Enables user interfaces to access the OpenMail system via the User Agent Layer. Client components are available for the following desktop environments:

- Macintosh
- MS-DOS®
- MS Windows®
- UNIX HP-UX
- UNIX Solaris

User Agents, Clients

Applix Aster*x: Provides an X/Windows client for X-Terminal and UNIX workstation users.

Clarity Rapport: Provides an X/Windows client for X-Terminal and UNIX workstation users.

HP AdvanceMail/TI: Provides a character-based user interface for terminal and terminal emulator users.

HP AdvanceMail/PC: Provides a character-based user interface for MS-DOS users.

HP NewWaveMail: Provides a NewWave Desktop interface for NewWave users.

HP OpenMail Graphical User Interfaces: Provides consistent windowed interfaces for users of X-Terminals , UNIX Workstations, Macintosh computers, and Microsoft Windows PCs.

HP OpenMail PhoneBook: Allows OpenMail's powerful directory capabilities to be exploited by users of X-Terminals UNIX Workstations, Macintosh computers and Microsoft Windows PCs.

Lotus cc:Mail: Provides a DOS Windows client for Microsoft Windows users.

Microsoft Mail: Provides a DOS Windows client for Microsoft Windows users.

Administration—Licensing

NetLS Licensing: "Software licensing" technology enables the purchase and management of the specific modules and number of users required.

Administration—Network Management

X/Open Compliant: Provides portability to other platforms.

Administration—Security

Access Password: Provides security, including over remote connections.

Mailbox Secure: Provides security from masquerading PC or UNIX programs.

Messages Encoded: Provides security transmission over SendMail.

Administration—Server Management

Access Control Lists: Controls access to requests, gateways, directories, and system printers and provides closed user group facilities.

Administrative Commands: Administers and maintains OpenMail, including Directory Management, Audit Logging, Distribution Lists, Routes, and Mailnodes.

Aliases: Sets aliases for whole system.

Audit and Statistics: Enables comprehensive logging of message traffic to facilitate performance analysis, detailed billing of users, etc.

Batch Print: Provides the capability to print the contents of selected user mailboxes as a batch job.

Component Monitoring: Monitors and controls local message delivery, gateways, etc.

Configurable Maintenance Times: Provides configurable maintenance times.

Context Sensitive Help: System Provides online help.

Customer Installable: Installable by user.

Database Scanning Tool: Scans directory and databases.

Error Manager Server: Aids in identifying and resolving any network and routing problems that may occur.

Local Language: Provides administration interface and user interface in local language, multiple languages per machine.

Local or Remote: Provides local or remote administration

Mail Queue Interrogation: Queries mail queue.

Menu Driven Administration Interface: Provides a simple interface that protects the administrator from administrator from UNIX

Message Resubmission: Resubmits messages from error queues.

Message Tracing: Traces messages to assist in troubleshooting.

Monitor Facility: Mails exception reports (identifying system problems) to a specified user, before they affect user performance.

Multiple Platforms: Supports multiple platforms; DEC Ultrix, HP-UX, IBM AIX, and SCO-UNIX. Flexible for different size work groups.

Network Statistics: Mails reports to a specified user.

Non-Delivery Reports: Routes to sender and to Error Manager for resolution. Generated by OpenMail servers.

People Mover: Allows administrators to easily move OpenMail users between systems.

Problem Solving System: Computer based problem solving system.

One Message Copy: Copies per server and per route to save disk space.

Print Server: Automatically prints messages (configurable).

Space Usage Reports: Mails reports to a specified user.

System Errors Recorded: Records for trouble shooting.

System Events Recorded: Records for trouble shooting.

Trace: Traces information attached to all messages.

Test Server: Replies to test messages used to test the network and routing within the network.

UNIX Commands: Are accessible from the administrators interface.

Auxiliary Services—Application Servers

Request Server: Allows special "request" scripts to be set up by administrators. Users, with appropriate permissions, can then perform or run these scripts simply by mailing to the Request Server.

Auxiliary Services—Converters

Character Set Conversion: Converting is configurable.

Document Conversion: Converts to text and browsing for AdvanceWrite, Executive Memomaker, and DCA documents.

File Type Conversion: Converts files using OpenMail and third party converters. Configurable.

Auxiliary Services—Gateways

LAN Fax Gateway: Provides facsimile gateway support.

UNIX Mail Gateway: Converts messages into a suitable form for UNIX mail and uses SMTP to pass them to send mail for delivery.

Clients of Choice

Hewlett-Packard has adopted a Clients of Choice strategy for its OpenMail messaging service solution. Based on a true client/server architecture, this solution provides a choice of industry-leading clients connected directly to the messaging server backbone.

The backbone server infrastructure provides core message store, transport, and directory functions resulting in the scalability, reliability, integrity and security demanded of enterprise-wide messaging services. The backbone also provides the administration tools, troubleshooting utilities, and preventative maintenance capabilities necessary to support a wide-area environment. This messaging service offers you a choice of desktop environments and a choice of client interfaces through which you can access corporate messaging services. OpenMail, through its User Agent Layer (UAL), supports the necessary international and adopted standards to achieve this Clients of Choice strategy, allowing you to choose a client that suits the way you work

The Clients of Choice strategy offers the following benefits:

- User acceptance with the flexibility of choice on the desktop.
- Cost effective centralization of all backbone and messaging services.
- Transparent communications across and outside of the company.
- Potential for the development and exploitation of enterprise-wide, message-enabled applications across multiple desktop platforms.
- Consolidation of administrative and maintenance resources.

OpenMail User Agents, Clients

- Applix Aster*x
- Clarity Rapport
- HP AdvanceMail/TI
- HP AdvanceMail/PC
- HP NewWaveMail
- HP OpenMail Graphical User Interfaces
- HP OpenMail PhoneBook
- Lotus cc:Mail
- Microsoft Mail

Applix Aster*x

Aster*x provides a client interface for X-Terminal and UNIX Workstation users. Applix, Inc. has used OpenMail's User Agent Layer APIs to create a mailing client that uses OpenMail as its server. The new client is part of Applix's Aster*x's suite of adaptive applications and tools for client/server environments. Aster*x runs on UNIX workstations.

Aster*x is an adaptive suite of applications and tools for the development and deployment of enterprise-wide client/server solutions. Aster*x enables you to access, share, and present information across different networks and hardware platforms, including the HP 9000 computer range. Aster*x is comprised of the following four components:

Aster*x Office
Object-based word processing, graphics, and spreadsheets with drag and drop capabilities.

Aster*x Share
This includes the mail component and Filter*Packs. Aster*x Mail provides a highly functional front-end to OpenMail and thus to X.400 mailing. Filter*Packs provide automatic conversion of documents, spreadsheets, and graphics. Filter*Packs work with most of today's popular programs including WordPerfect, Microsoft Word, FrameMaker, and InterLeaf. This allows one user community to use PC products such as Microsoft Office or Lotus Office, while another community uses Aster*x. Conversion between community file formats is seamless.

Aster*x Build and Integrate
The power of Aster*x is enhanced by the Extension Language Facility (ELF), which allows customers to create custom applications on the workstation using the office functions of Aster*x Office and Aster*x Share. For example, you can create your own clients to OpenMail or modify the standard Aster*x OpenMail client to achieve a certain look and feel. With Aster*x Build and Integrate, you can live-link Aster*x to other applications and databases creating graphical front ends that automate mission critical tasks.

"Arcade"
This new product is an object-based application development tool used for rapid construction of client/server applications. Arcade enables programmers with no prior experience in C++, SQL, or user interface development tools to build powerful graphical database applications.

Clarity Rapport

Clarity Rapport provides a client interface for X-Terminal and UNIX Workstation users. Clarity Rapport provides integrated business and communications software for the UNIX desktop. Whether you're buying your first UNIX workstation and need desktop applications to run, or adding horizontal software to take full advantage of your workstation's power, you need to establish Rapport with an array of applications, a variety of media, and different computer platforms.

Clarity Software's award-winning Rapport integrates all the tools you'll need to achieve this in one easy-to-learn, easy-to-use package, giving you maximum results with minimal effort.

Benefits

The Rapport software purchased today will remain current as your needs change. Rapport incorporates a sophisticated object-oriented architecture, offering the following advantages:

Multimedia Documents
Combines text with spreadsheets, scanned images and art, and audio annotations to build multimedia compound documents or slide presentations which can be e-mailed fully intact.

Multiple Media, Multiple Applications
You can work with all media types in one window. Embed any type of media into any application. For instance, audio may be inserted into a spreadsheet cell to help you fully communicate your ideas.

Multiple Platforms
Automatic and transparent conversion and exchange of documents enables communication between UNIX workstations, PCs, and Macintosh systems.

Open to Third Party Applications
Easy integration of third party applications and their files into Rapport protects your investment in your present applications.

Graphical Interface
One streamlined consistent graphical interface with dialog boxes and pulldown menus in every application results in "point and click" ease-of-use and reduced training time.

Additional Functionality
Individual application functionality in Rapport can be easily enhanced and new modules can be quickly added by Clarity while still retaining interoperability with other applications.

HP AdvanceMail/TI

HP AdvanceMail/TI, B.01.00 provides a character-based user interface for terminal and terminal emulator users.

Benefits

Uses Existing Investments
Existing terminals and terminal emulators are used, allowing current users to access enterprise-wide messaging services from their present desktop environment.

Simple to Use
Features character-based interface with easy-to-use menus for selecting electronic mail activities and functions.

Secure
All the messages are stored within the OpenMail message database on the server. Access to another user's messages requires knowledge of that person's password. OpenMail logs unsuccessful attempts to guess a user's password.

Data Integrity
Users' messages are stored in the OpenMail message database on the server, allowing backups to be made centrally, thus relieving this burden from individual users. Comprehensive administration tools also exist within OpenMail to monitor and maintain that database. In the event of a system crash, OpenMail is capable of transparently recovering using specialized tools to repair damage to the message database.

HP AdvanceMail/PC

HP Advance Mail/PC, A.04.02 provides a character-based user interface for MS-DOS users.

Benefits

Freedom from the Mail Server
AdvanceMail lets you create messages, read incoming messages, and print them without being connected to the server. This means that where connections are costly or time consuming, users can work independently of the server for everything except sending or receiving mail. AdvanceMail can provide transfers at pre-set times to coincide with users' work patterns or when connection times are least expensive.

Quick and Easy Connections
AdvanceMail is ideal for PC users wherever they are and however they connect. Choose between LAN or RS-232 modem, or X.25.

Valuable Time Saved
With AdvanceMail, many day-to-day tasks can be automated so that time is freed up for more important activities. Important reports can be sent without user intervention while vital information gets to the right people at the right time. AdvanceMail's filtering facility can be used to automate the process of prioritizing urgent messages, disposing of junk messages, and filing others.

HP NewWaveMail

HP NewWaveMail, A.03.30 provides a NewWave Desktop interface for HP NewWave users. It combines the intuitive, easy-to-use NewWave environment with powerful enterprise-wide communications capabilities. NewWave Mail provides users of the NewWave Desktop with a fully integrated, transparent electronic mailing solution for communicating with others on an enterprise-wide network.

Benefits

Productivity Benefits
NewWaveMail lets you take advantage of the ease and power of the NewWave Desktop when communicating with others. Creating a message is simple.

Just dropping an object on the Outtray allows you to send simple or complex compound documents and objects to other users on the network. Users can also automate mailing tasks using the NewWave Agent. NewWaveMail supports keystroke record and playback allowing you to use the NewWave Agent to record and perform tasks. Examples include sending and receiving messages at a specified time of day, or automatically sending a document to a pre-defined distribution list.

Quick and Easy Connections
NewWaveMail connects users to the server quickly and easily via network or serial connection. LAN connections are simple. And where serial connections exist, either by direct connections via a Hayes modem or by X.25, NewWaveMail's built-in data communications software can handle complex log-on procedures.

Freedom from the Mail Server
NewWaveMail lets you create messages, read incoming messages, and print them without being connected to the server. Where connections are costly or time consuming, users can accomplish everything independent of the server except sending or receiving mail.

HP OpenMail Graphical User Interfaces (GUIs)

HP OpenMail Graphical User Interfaces (GUIs) provide consistent windowed interfaces for users of X-Terminals, UNIX Workstations, MS Windows PCs, and Apple Macintosh.

Clients

- HP OpenMail Client for Macintosh A.01.10.
- HP OpenMail Client for Microsoft Windows, B.01.00.
- HP OpenMail Motif® Client for HP-UX, A.01.01.
- HP OpenMail Motif Client for Solaris, A.01.01.

Benefits

Consistent Look and Feel, Easy-to-Use
OpenMail clients are intuitive and therefore extremely easy to use. They provide a consistent user interface across platforms, while maintaining the native platform look and feel. For example, users of the client for Macintosh will find that its user interface is consistent with Macintosh applications.

Security
All messages are stored within the OpenMail message database on the server. Access to another user's messages requires knowledge of that person's password. OpenMail logs unsuccessful attempts to guess a user's password.

Data Integrity

Since the users' messages are stored in the OpenMail message database on the server, backups can be made centrally, relieving the burden from individual users. Comprehensive administration tools monitor and maintain the database. In the event of a system crash, OpenMail is capable of transparently recovering and tools exist to repair any damage to the message database.

Directories

OpenMail's Graphical User Interfaces provide access to its powerful directory capabilities, allowing large corporate databases to be searched quickly and efficiently. Wildcard searching and fuzzy logic matching simplifies this process allowing users to enter addressing information.

HP OpenMail PhoneBook

HP OpenMail PhoneBook, A.01.00 allows OpenMail's powerful directory capabilities to be utilized by users of X-Terminals, UNIX Workstations, Macintosh computers, and Microsoft Windows PCs. It enables you to search and display the OpenMail directory attributes using a telephone book paradigm and is closely integrated with the OpenMail Graphical User Interfaces to allow search results to be transferred into distribution lists.

Benefits

The OpenMail Directory is a valuable information resource. HP OpenMail PhoneBook can search and retrieve information held in the directory in any interchangeable arrangement. It can be used as a centralized store of information including individuals' phone numbers, job titles, as well as electronic mail addresses. The HP OpenMail PhoneBook provides instant access and a customizable, flexible means to search this information.

Saves Time in Every Day Tasks

Corporate or personal distribution list are built quickly and easily by searching, as an example, for all mail users at a specified location or for all those with a particular job title.

Easier Addressing of Messages

Names resulting from searches are easily transferred to a chosen distribution list within the OpenMail Graphical User Interfaces.

Lotus cc:Mail

Lotus cc:Mail, 1.12 provides a client for Microsoft Windows users. The cc:Mail and OpenMail solution is designed to meet the needs of customers with large global networks. Customers gain access to a robust standards-based messaging backbone from Hewlett-Packard, along with a leading-edge client user interface from Lotus. cc:Mail has a logical, intuitive user interface with online help capabilities. Graphical icons to initiate or execute the most common activities make cc:Mail easy to use and provide timesaving shortcuts for power users.

Benefits

You Become an E-Mail Expert in Minutes
Lotus cc:Mail is perfect for e-mail novices, even people who have never used a computer. You can send messages in minutes with no training required while the intuitive interface guides you every step of the way.

More Power for Power Users
Users will appreciate cc:Mail's rich shortcuts and speed keys for most mail functions. Not only is cc:Mail fast it is flexible enough to respond to the way you need to work. For instance, when you receive a message you have the following options:

- leave in "inbox"
- delete
- print
- forward reply to sender
- copy to private folder

Send Anything you Create or View
With cc:Mail, you can share almost anything you create or view on a personal computer.

Send up to 20 text messages, graphics flies, faxes in any combination in a single message. As multimedia technologies become more prevalent in the workplace, cc:Mail and OpenMail let you include multimedia objects too. The flexible architecture of cc:Mail can readily accommodate voice and video in the future.

Simplified Addressing
Addressing messages is easy since everyone accessible by cc:Mail, including remote and foreign mail system users, is listed on the directory. All you have to remember is the recipient's name—no complicated addresses. cc:Mail even zips through the directory as you type, zeroing in on the name you want before you've finished. cc:Mail gives you a wide variety of addressing options. Send electronic carbon copies or blind carbon copies to keep everyone in the loop. Set message priorities to convey urgency. Or even request notification of message receipt. You also have the flexibility to address messages to public or personal mailing list or to personal storage folders.

Advanced Message
You create folders and archives to manage your electronic mail the same way you would use manila folders for paper mail. Need to review a message you sent out? Create a folder called "message log" and cc:Mail automatically stores a copy of every message you send. Need to track down a certain message? cc:Mail provides easy message retrieval. Search through folders or "inbox" with just a few key strokes.

Microsoft Mail

Microsoft Mail 3.2 provides a client for Microsoft Windows users. The Microsoft Mail and OpenMail solution is designed to meet the needs of customers with large global networks. You gain access to a robust, standards-based messaging backbone from Hewlett-Packard, along with a leading-edge client user interface from Microsoft.

Benefits

Communicate More Effectively
You can add charts, pictures, sound, and other multimedia objects directly into your messages. Microsoft Mail supports object linking and embedding (OLE).

Prevent Embarrassing Mistakes
Check the spelling of important messages individually or have Microsoft Mail automatically check all your messages. Assign a priority to your messages so recipients will focus on the important ones, or ask for a return receipt so you'll know when your message is read.

Save Time with the Easy-To-Use Graphical Interface
Click on the toolbar to perform everyday tasks fast. Display folders and messages together in one window so you can store and organize messages quickly.

Sort Messages in Each Folder by Clicking Column Headings
Sort by sender, subject, priority, or time received, in ascending or descending order.

Share Files Quickly
Send them from within the Microsoft Windows operating system version 3.1. File Manager or drag them directly into a message.

Manage Your Messages Your Way
Stay on top of important messages—its easy to create message finders to filter messages based on sender, subject, recipients, and/or message text; incoming messages that match your criteria will automatically be displayed in the appropriate message finder.

Save Messages in Hierarchical Folders
The graphical folder outline gives you a visual overview, so its easy to create folders and move between them. Share valuable information with your workgroup by using shared folders.

Work With Your Other Applications
Build on Microsoft Mail using the Microsoft messaging application programming interface (MAPI).

Customize Your System
Create your own electronic forms to automate specific business operations. Add menu commands so you can perform common tasks without leaving Microsoft Mail.

Send messages while working in other applications such as Microsoft Excel and Microsoft Word for Windows. You can automatically attach the file you're working on.

Launch Applications Automatically
You can double-click on any attachment to launch the application and load the attached file; and you can continue to use Microsoft Mail without closing the launched application

Get Up To Speed Quickly
Online tutorial guides you through features step-by-step.

Online Help
Gives you answers when you need them.

Ordering Information

HP B2284A OpenMail Software for HP 9000 Series 300/400

UJH ¼-inch cartridge, HP-UX 9.x
UJC DDS (DAT), HP-UX 9.x

HP B2285A OpenMail Software for HP 9000 Series 700

UJC DDS (DAT), HP-UX 9.x

HP B2286A OpenMail Software for HP 9000 Series 800

UJA ½-inch mag tape, HP-UX 9.x
UJC DDS (DAT), HP-UX 9.x
UJD QIC media, HP-UX 9.x

OpenMail Documentation for HP-UX

HP B2280A HP OpenMail Documentation, English

OpenMail License Keys for all Platforms

HP B2016BZ OpenMail Mailbox, License

001 Single User License, 1–99 User Price
002 Single User License, 100–499 User Price
003 Single User License, 500–999 User Price
004 Single User License, 1000+ User Price

HP B2290BZ OpenMail Mailbox + Client License

001 Single User License, 1–99 User Price
002 Single User License, 100–499 User Price
003 Single User License, 500–999 User Price
004 Single User License, 1000+ User Price

HP Clients

HP B2020AZ OpenMail, HP Client License

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HEWLETT® PACKARD

HP FTAM/9000

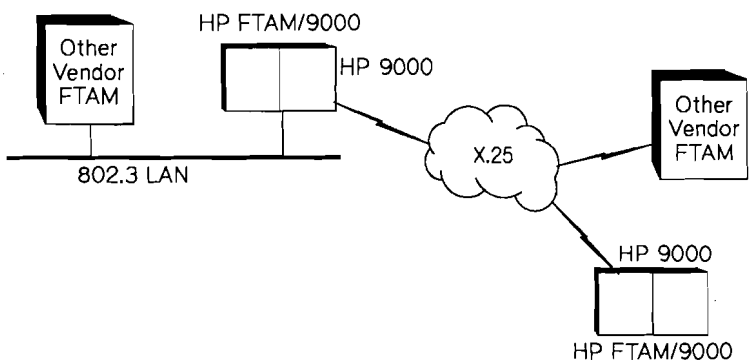
Technical Data

Product Numbers
HP B1032A, B1033A, J2163A

The HP FTAM/9000 is an OSI (Open Systems Interconnection) software product used for file transfer, access, and management of files in OSI networks.

HP FTAM/9000 provides an interactive interface for end users, a command line interface for shell programming, and an Application Programmatic Interface (API) to allow application developers to create HP FTAM/9000-based applications. HP FTAM/9000 file services expand and improve upon the capabilities of existing file transfer protocols such as ARPA File Transfer Protocol. HP FTAM/9000 services include:

- Text and binary file transfer
- INTAP file transfer
- Record level file access
- File management
  - Create/delete file
  - Read/change file attributes
- File Security



HP FTAM/9000 meets the basic distributed file system requirements as defined in industry and regional OSI profiles including the U.S. GOSIP, ISP EWOS, CEN/CENELEC, and INTAP Version 2 specifications.

Features

Standards: HP FTAM/9000 provides full purpose, standards compliant (ISO/IS 8571), multivendor file transfer capability.

Concurrency and access control: HP FTAM/9000 provides the concurrency and access control to provide file integrity and security for users' critical data.

FTP-like interface: The interactive interface is based on the popular FTP interface. New users of HP FTAM/9000 who are familiar with FTP can use HP FTAM/9000 with virtually no training.

Remote file directory access: Users can access remote file directories to determine filenames, permitted actions, etc. This capability uses the NBS-9 document type.

FTAM API: Allows software developers to create applications using the file transfer capabilities. The FTAM API is designed to the MAP/TOP industry standard. In addition, the API has been updated to include API tracing, making, developing, and debugging applications much easier.

LAN and WAN support: HP FTAM/9000 runs over OTS/9000, HP's session and transport layers, and on top of X.25 or LAN, including 802.3 and FDDI. OTS allows the network administrator to configure transport class 0, 2, or 4.

ARPA and OSI coexistence: HP FTAM/9000 and OTS/9000 can run over a LAN or X.25 Link concurrently with FTP and TCP/IP. This allows users to run both FTAM and FTP simultaneously. In addition, OTS/9000 provides the use of two LAN-configured cards.

Interoperability and troubleshooting tools: HP provides a full set of tools to help simplify the interoperability and troubleshooting process. HP's OSI tools allow the network administrator to check the interoperability of the network at various layers of the OSI stack, isolating problems quickly and easily. With HP FTAM/9000 API tracing, the FTAM application developer can quickly isolate application development problems and develop applications more efficiently.

Conformance

HP FTAM/9000 complies with the following standards:

ISO Standards:

- ISO 8571,
- ISO 8824/8825,
- ISO 8649/8650, 8822/8823,
- ISO 8326/8327.

Document Types:
FTAM-1 (Unstructured Text)
FTAM-2 (Sequential Text)
FTAM-3 (Unstructured Binary)
NBS-9 (File Directory)
INTAP-1 (Record Text)

In addition, HP FTAM/9000 is registered with NIST as being conformant to the U.S. GOSIP version 1.0 standard.

Interoperability

HP supports FTAM interoperability with the following tested vendors: Bull, Data General, DEC, IBM, Sun, CDC, Computrol, ICL, NCR, Retix, USL, and UNISYS. HP also supports FTAM/9000 interoperability with the FTAM/3000. For a current list of interoperable vendors, contact Hewlett-Packard.

Installation and Support

HP FTAM/9000 products are customer installable and configurable. Installation and configuration may also be performed by HP through the purchase of consulting services. Interoperability testing can be purchased from HP on a time-and-materials basis. HP FTAM/9000 is configured with Osiadmin, the same tool used for OTS/9000. This makes product configuration simple, understandable, and consistent.

Regional Profiles:

FTAM	NIST	CEN/CENELEC	EWOS	ISP
Simple File Transfer	T1	ENV 41204	A/111	AFT11
Positional File Transfer	T2	ENV 41206	A/112	AFT12
Positional File Access	A1	ENV 41207	A/122	AFT22
File Management	M1	ENV 41205	A/13	AFT3

Hardware and Software Requirements

	FTAM/9000 S300/400 HP B1032A	FTAM/9000 S700 HP J2163A	FTAM/9000 S800 HP B1033A
Hardware	HP 9000 Series 330 or above, Series 400 for HP-UX 8.X HP 9000/Series 360 or above, Series 400 for HP-UX 9.0	Any HP 9000 Series 700	Any HP 9000 Series 800 (Series 890 requires HP-UX 9.0)
Operating System	HP-UX 8.0, 8.02, or 9.0*	HP-UX 8.07 or 9.0*	HP-UX 8.0, 8.02 or 9.0*
Software	HP OTS/9000 HP 32069A	HP OTS/9000 HP J2160A	HP OTS/9000 HP 32070A
	*If HP-UX 9.0, STREAMS/UX **Must be ordered separately**		
Links	X.25/9000 LAN/9000 Link		
Memory	18 MB memory 30 MB free disk space		

Performance

HP FTAM/9000 performance has been tested over the OTS stack for the Series 800 and is very competitive. Over 200 Kbytes per second has been achieved using a 10K file size on a Series 840 system. For more information on FTAM performance, contact Hewlett-Packard.

Documentation

The following manuals are included with HP FTAM/9000 for HP-UX 8.0 and 8.07:

B1033-60540 Installing and Administering HP FTAM/9000
B1033-60520 HP FTAM/9000 User's Guide
B1033-60510 HP FTAM/9000 Programmer's Guide
B1033-60500 HP FTAM/9000 Reference Manual

The following manuals are included with HP FTAM/9000 for HP-UX 9.0:

B1033-60541 Installing and Administering HP FTAM/9000
B1033-60521 HP FTAM/9000 User's Guide
B1033-60511 HP FTAM/9000 Programmer's Guide
B1033-60501 HP FTAM/9000 Reference Manual

Ordering Information

HP FTAM/9000 for the Series 300/400

Order product number HP B1032A. In addition, an operating system option and media option must be specified. The other options are not required.

Operating System Option
APB HP-UX version 8.0
APH HP-UX version 9.0

Media Option
AAH Software on DAT
AA0 ¼-inch cartridge tape (Release 8.02 only)
AAU CD-ROM certificate only

Other Options
0B0 Delete documentation

HP FTAM/9000 for the Series 700

Order product number HP J2163A. In addition an operating system option and a media option must be specified. The other options are not required.

Operating System Option
APF HP-UX version 8.07
APH HP-UX version 9.0

Media Options
AAH Software on DAT
AAU CD-ROM certificate only

Other Options
0B0 Delete documentation

HP FTAM/9000 for the Series 600/800

Order product number HP B1033A. In addition an operating system option, a media option, and a processor option must be specified. The processor upgrades and other options are not required.

Operating System Options

APB HP-UX version 8.0
APH HP-UX version 9.0

Media Options

AA0 ¼-inch cartridge tape (Release 8.0 only)
AA1 ½-inch magnetic tape (1600 bpi)
AAH Software on DAT
AAU CD-ROM certificate only
AA4 QIC

Processor Option

AH0 License to use on Models 807, 808, 817, 834
AEL License to use on Models 815, 822, 827, 837
AE5 License to use on Models 825, 832, 847, 857, 635
AE6 License to use on Models 835, 842, 867, 877, 645
AEN License to use on Models 845, 852, 887, 897
AEP License to use on Models 850, 855, 860, 865, 890, 1, 2 CPU
AH1 License to use on Models 870, 890, 3, 4 CPU

Other Options

0B0 Delete documentation

Processor Upgrades

Return credit is given to customers upgrading within the Series 800 family. To order an upgrade, order P/N B1033A, select a software option, an operating system option , a processor option, and one of the following upgrade options.

Upgrade Option

0GR For Models 807, 808, 817, 834
0GE For Models 815, 822, 827, 837
0C8 For Models 825, 832, 847, 857, 635
0GS For Models 835, 842, 867, 877, 645
0GT For Models 845, 852, 887, 897
0GU For Models 850, 855, 860, 865, 890, 1, 2 CPU

Related Products

In addition to HP FTAM/9000 and HP OTS/9000, the following HP OSI products are offered:

- HP MMS/9000
- HP X.400/9000
- HP X.500 Distributed Directory

HEWLETT® PACKARD

ARPA Services/9000

Technical Data

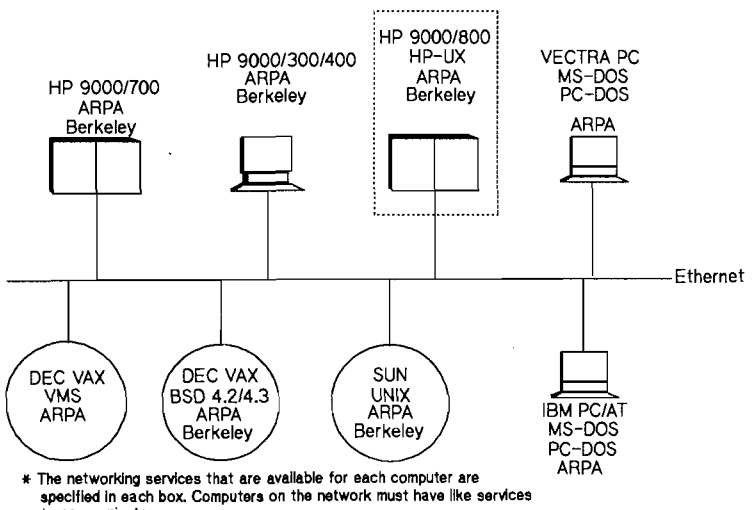
For HP 9000 Series 300, 400, 700, and 800 Series Computer Systems Product Number HP B1030B

Series 9000 HP-UX[1] computers can communicate in a multivendor environment using the networking services defined by the Department of Defense Advanced Research Project Agency (ARPA) and the Berkeley Software Distribution (BSD) UNIX® 4.3 system. ARPA Services/9000 offers the following features:

* ARPA services are de facto networking standards in the scientific and engineering communities. They define protocols for electronic mail, file transfer, and terminal access over local and wide area networks.

1. HP-UX is Hewlett-Packard's implementation of AT&T's System V UNIX operating system.

The ARPA Services/9000 software products require the LAN/9000 Series 800, Series 700, or Series 300/400 Link or X.25 Link products.



* The networking services that are available for each computer are specified in each box. Computers on the network must have like services to communicate.

HP 9000 In A Multivendor Environment

The LAN product allows connection to the IEEE 802.3/Ethernet thick or thin coax cable, EtherTwist unshielded, twisted-pair wire, or FDDI (for Series 700/800 only).

The X.25 product provides access to public or private packet-switching networks.

Note: HP's Network Services (NS) 9000 are available on the Series 800, 700, and 300/400 providing HP-to-HP communications. NS, ARPA, and Berkeley services can run simultaneously on the Series 800, 700, and 300/400.

ARPA Services

ARPA Services/9000 runs on Series 800, Series 700, and Series 300/400 computers connected to an Ethernet LAN, X.25 network, or FDDI (for Series 700/800 only). ARPA Services/9000 supports the following ARPA services:

Service/Feature

- **File Transfer Protocol** (FTP) (MIL-STD[2] 1780)
  - General file utility for performing operations on remote files and directories such as transferring, deleting, renaming, and displaying.
- **TELNET** (based on MIL-STD 1782)
  - Virtual terminal capability for accessing remote systems as a terminal.
- **Simple Mail Transfer Protocol** (SMTP) (MIL-STD 1781)
  - Enhancement of the UNIX mail facility with support for LANs and WANs.

2. MIL-STD is an industry-wide term used to abbreviate Military Standard.

The protocols underlying the ARPA services closely adhere to the following standards:

- Internet Protocol (MIL-STD 1777)
- Transmission Control Protocol (MIL-STD 1778)
- User Datagram Protocol (RFC-768)
- Internet Control Message Protocol (RFC-792)
- Address Resolution Protocol (RFC-826)

The protocols are part of the LAN/9000 Series 800, Series 700, and Series 300/400 products.

BSD Services

HP 9000 Series 800, Series 700, and Series 300/400 HP-UX machines can communicate with other UNIX computers. The Berkeley portion of ARPA services provides the following capabilities:

Service/Feature

- **Remote Copy (rcp)**
  - Transfers data and program files among computers on the network.
- **Remote Login (rlogin)**
  - Virtual terminal capability for accessing remote systems as a terminal.
- **Remote Who (rwho)**
  - Displays users logged into systems on the network.
- **Remote Uptime (ruptime)**
  - Displays information about systems running on the network.
- **Remote Shell (remsh)**
  - Runs a program or shell on a remote computer and receives output.
- **Sendmail**
  - Routes mail (integrated into HP-UX mail)
- **Berkeley Sockets**
  - InterProcess communications for creating distributed application programs (included with the LAN/9000 Series 800, Series 700, and Series 300/400 Link).
- **Berkeley Internet Name Domain (BIND)**
  - Provides centralized host-to-IP address translation.
- **Gateway Daemon (GateD)**
  - Provides dynamic routing in complex networks.
- **Boot strap Protocol (bootp)**
  - Allows clients such as HP's 700/X Terminal to discover its IP address, subnet mask, name server, and boot file.
- **Trivial File Transfer Protocol (tftp)**
  - Allows clients such as the HP 700/X Terminal to load fonts and other boot information.
- **Finger**
  - Allows queries over the network.

Diagnostics

Several diagnostic features are included with the LAN/9000 Series 800, Series 700, and Series 300/400 Link. These features allow monitoring the network, gathering statistical data, and diagnosing problems in both multivendor and HP-to-HP configurations.

Diagnostic/Feature

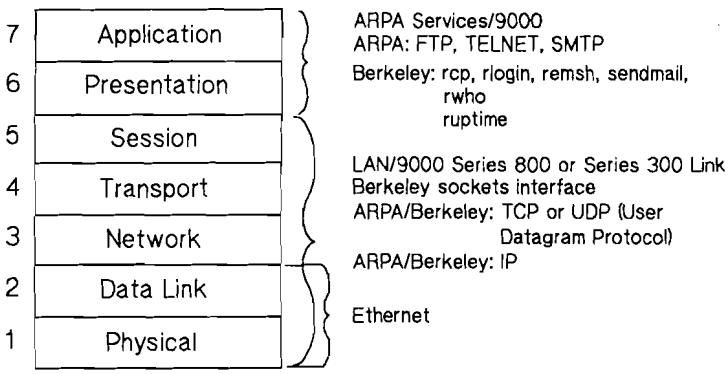
- **ping**
  - Verifies connections to remote ARPA/Berkeley systems
- **netstat**
  - Berkeley-derived command that displays statistical information on network activity
- **nettrace/netlog**
  - Sophisticated troubleshooting tool for applications programmers and network administrators to trace activity and report errors
- **landad**
  - Menu-driven diagnostic facility for troubleshooting LAN card/link level

The ARPA and Berkeley capabilities can be put in the context of the Open Systems Interconnection (OSI) reference model defined by the International Standards Organization (ISO) as follows:

Summary of ARPA Services/9000 Capabilities

Capability	ARPA	Berkeley
File Transfer	File Transfer Protocol (FTP)	Remote copy (rcp)
Terminal Access	Telnet	Remote login (rlogin)
Electronic Mail	Simple Mail Transfer Protocol (SMTP)	Sendmail (uses SMTP)
Remote Command Execution		remote shell (remsh)
InterProcess Communication		sockets (included with LAN/9000 Link)

ARPA Services/9000 and the OSI Model



FTP supports the following list of commands:

!	?	append	ascii	bell	binary
bye	cd	close	delete	dir	form
get	glob	hash	help	lcd	ls
mdelete	mdir	mget	mkdir	mls	mode
open	prompt	put	pwqd	quit	quote
recv	remotehelp	rename	rmdir	send	snedport
status	struct	tenex	user	verbose	

Functional Specifications

ARPA—File Transfer Protocol

FTP is a family of commands for performing file and directory operations over the network. You can get or put stream files on a remote UNIX or non-UNIX machine, using either ASCII or binary transfers. You can append, rename and delete files; list, change, make, and remove directories; check status, toggle switches, and ask for help.

ARPA—Teletype Network Protocol

Teletype Network Protocol (TELNET) lets you use your local workstation as a terminal to another computer on the network. The remote computer can be running an operating system other than the UNIX system. To sign on to a remote host named rnode, just type telnet rnode. The remote node will prompt you for your login user name and password.

TELNET has both a command mode and an input mode. You can recognize command mode by its **telnet** prompt. Command mode is useful for opening and closing sessions, changing parameters, checking status, and getting help. Most of the time you will use input mode. In this mode, you have terminal access to the remote node. You can run programs, edit text, or list directories, as well as execute a **telnet** command.

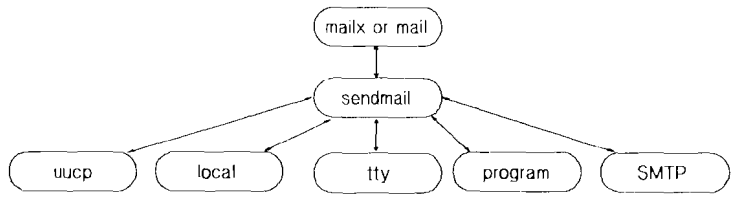
TELNET does not emulate a particular terminal type. The host computer that you are logged onto must support the terminal you are using.

ARPA/Berkeley—Simple Mail Transfer Protocol and Sendmail

Users can communicate from Series 800, Series 700, or Series 300/400 HP-UX systems to other UNIX or non-UNIX systems using either the mailx or mail commands. Series 800, Series 700, or Series 300/400 HP-UX systems running ARPA Services/9000 can send mail over RS-232 lines, Ethernet LANs, X.25 networks, and FDDI (for Series 700/800 only).

ARPA Services/9000 provides two alternatives for specifying mail addresses. Historically, HP-UX has required users to specify the complete path from the local node to the recipient's node (a relative form of addressing). These names have looked like:

The Mail System



node1!node2!node3!user

Another alternative is domain style addressing (an absolute form). **Sendmail** and SMTP allow for this form of addressing. You simply specify the name of the user and the domain/subdomain name of the company, government agency, or educational institution where the recipient is located. An example*:

joe_smith@HP.COM

Users do not interact directly with the sendmail program or the SMTP protocol. **Sendmail** acts as a unified "post office" to which all mail can be submitted. SMTP is an ARPA protocol for sending mail over wide-area and local-area networks. The relationship of mailx and mail to **sendmail** and SMTP is shown in the figure on the next page.

Berkeley—Remote File Copy

Remote UNIX file copy, rcp, lets you copy files from one UNIX node to another UNIX node over the network. Both the source and destination nodes can be remote, or one can be local and the other remote. You must have a login (user name and password) and permission for remote command execution on each node.

In the simplest case, you can copy a file on a local node to a file on another node. For example, to copy a file named /file in the current working directory on the local node to a file named rfile in your login directory on the remote node rnode, type

rcpl/file rnode:rfile.

You can also copy several files, or an entire directory subtree within a directory, from one node to a directory on another node.

Here is a simple example of how you might use FTP:

Command	Result
ftp rhost	Establish a connection to the computer named rhost. Prompt for login name and password.
pwd	Print the name of the current working directory on the remote machine.
ls	Print an abbreviated listing of the contents of the current working directory on the remote machine.
put file1 rfile1	Store a local file on the remote machine.
get rfile2 file2	Retrieve a remote file and store it on the local machine.
delete rfile	Delete a file on the remote machine.
bye	Terminate the FTP session with the remote server and exit FTP.

* The degree to which the user can address mail in this simplified manner depends on the availability and extent of the name servers on the network.

Berkeley—Remote Login

Remote UNIX login, rlogin, gives you terminal access to a remote UNIX node on the network. Rlogin has several options for connecting to other systems. You can sign on to the remote host simply by typing rlogin rnode. This method assumes that your user name is the same on both the local and remote systems. You can specify a different user name on the remote system with the -l option to rlogin. You may or may not need to specify a password, depending on how your network is configured.

Rlogin also supports **control-S** for stopping the flow of output to the terminal and **control-Q** for starting the flow of output to the terminal.

Berkeley—Remote Shell

Remote shell or remsh lets you execute a command on a remote UNIX host. For example, remsh rnode cc test.c compiles the C program test.c on the remote node named rnode. Remsh normally terminates when the remote command terminates. For interactive commands such as more or vi, you must use rlogin instead of remsh. Remsh is the same service as Berkeley's rsh. The name rsh conflicts with another HP-UX command.

Remsh, which runs on the local system, copies its standard input to the standard input of the command that will be executed on the remote system. Remsh also copies the standard output and standard error from the command running on the remote system to its own standard output and standard error. For example, consider cat f1 f2:remsh rnode sort. The output from cat f1 f2 becomes the standard input to remsh. Remsh sends this input to the sort program running on rnode. Remsh copies the sorted output to its standard output on the local system. If the sort produces any error messages, remsh copies errors to its standard error on the local system.

Berkeley—Sockets and Libraries

Berkeley sockets and libraries are standard tools for InterProcess Communication on UNIX systems. Application developers use these tools to create networked solutions. Since Berkeley sockets and libraries are widely available, applications based on them can be ported to Series 300/400, Series 700, and Series 800 HP-UX systems.

Two types of sockets, stream and datagram, are supported. Stream sockets are appropriate for transferring large volumes of data reliably. A connection is set up, data is transferred, and each packet is checked at the receiving end to verify accurate transmission. Stream sockets use the Transmission Control Protocol (TCP).

Datagram sockets are appropriate for short, fast data transfers without error checking. For example, a program may query some status information from another program and wait for a reply, requiring no follow up. Application developers often prefer datagram sockets because they are faster and easier to use. Datagram sockets use the User Datagram Protocol (UDP).

ARPA Services/9000 supports two different socket domains: Internet domain and UNIX domain. Internet domain sockets are typically used for processes on systems that communicate across a network. UNIX domain sockets are used exclusively for processes that communicate on the same machine and move large amounts of data between themselves. An example of where UNIX domain sockets are used would be an X-Windows application where the client and server processes are running on the same system. UNIX domain sockets have less overhead and run faster than Internet domain sockets, so they are used for

quicker applications that do not need to run across a network.

The Berkeley libraries give the applications developer a way to look up important data about the network. For example, the user can look up the Internet addresses, port numbers, and protocol numbers. Berkeley utilities such as rexec are also available. The Berkeley libraries and utilities are usually used with socket programming. For detailed information, please refer to Using ARPA Services Manual (P/N B1014-90009 for HP-UX 9.0 and P/N B1014-90006 for HP-UX 8.0).

Berkeley Internet Name Domain (BIND)

The BIND Domain Name Server provides for administering host-to-IP address mapping on selected servers, with most systems on a network looking up IP addresses by accessing a server. By using BIND, local systems can do away with local/etc/hosts files (which often are very large) and utilize the hierarchical nature of Domain Name Servers. BIND also allows for easier mail routing between independent domains or entities. All ARPA and Berkeley commands that do host-to-IP address translation can utilize a Domain Name Server.

Services	Computer	Operating Systems	Network Software Package
ARPA	DEC VAX 7xx	VMS 4.7*	Wollongong's WIN/VX Rel 3.0
ARPA (FTP and TELNET only)	HP Vectra or IBM PC-AT	MS-DOS® or PC-DOS 3.1*	Network Research Corporation FUSION Rel.3.1.13(FNS-PC-TCP)
ARPA (FTP, TELNET, rcp, and rsh)	HP Vectra or IBM PC-AT	MS-DOS or PC-DOS 3.1*	HP PC-ARPA Services/Vectra
ARPA/BSD	SUN (68010)	SUN Release 4.0	SUN 4.0 networking
ARPA/BSD	SUN (68020)	SUN Release 4.0	SUN 4.0 networking
ARPA/BSD	SUN (SPARC)	SUN Release 4.0	SUN 4.0 networking
ARPA/BSD	DEC VAX 7xx	BSD UNIX 4.2/4.3	BSD 4.2/4.3 networking

* This version or later

Gateway Daemon (GateD)

GateD is a routing daemon that allows for dynamic routing of packets through complex networks. GateD supports three routing protocols:

- RIP (Routing Information Protocol),
- HELLO (least-path-first) for local routing, and
- EGP (External Gateway Protocol) for external routing between entities.
  - EGP is needed for connecting to the Defense Data Network (DDN).
  - GateD can be configured to perform all routine protocols or any combination of these three.

Connectivity to Other Vendors' Products

HP has certified operation of ARPA services and Berkeley services and sockets by testing communication with products from HP and other vendors. ARPA and Berkeley Services use the Ethernet protocol. The following configurations are certified: communication between HP 9000 Series 800, Series 700, and Series 300/400 computers, DN Series computers, and HP 9000 Model 1240 systems. Model 1240 systems support a subset of the ARPA/Berkeley commands.

HP has an ongoing program to certify ARPA Services/9000 with additional products. If you would like to use ARPA Services/9000 to communicate with products that are not listed here, please contact your local HP sales office. Testing may have occurred or may be planned in the near future.

Configuration Information

Computer

- HP 9000 Series 800
- HP 9000 Series 700
- HP 9000 Series 300/400

Operating System

- HP-UX Version 9.02 or later for 800
- HP-UX Version 9.0 or later for 700
- HP-UX Version 9.0 or later for 300/400

Memory and Data Storage

- 4 bytes RAM for 300
- 8 MB RAM for 800
- At least 152 MB (HP 7959B) or greater capacity for 800
- Series 300 can be run diskless or with minimum 152 MB or greater capacity (HP 7959B)

Documentation

Documentation for the ARPA Services/9000 for the Series 300/400, Series 700, and Series 800 is the same.

The following manuals comprise the ARPA/9000 documentation set. The first number indicates the part number for HP-UX 9.0. The numbers in parentheses show HP-UX 8.0 part numbers.

B1012-90013 *(B1012-90012)*
HP 9000 Computers Networking Overview
B1014-90009 *(B1014-90006)*
Using ARPA Services
B1014-90008 *(B1014-90007)*
Administering ARPA Services (9.0 version is called "Installing and Administering ARPA Services")

Ordering Information

Beginning with HP-UX 8.0, there will be no independent product numbers for the ARPA/9000 Services, for the Series 300/400 or Series 700/800 systems. For these systems, the ARPA services are included with the HP-UX Run-Time product.

HEWLETT® PACKARD

HP LAN Manager/X for HP 9000

Technical Data

Product Numbers
HP B1011C

HP LAN Manager/X for the HP 9000[1] is a powerful, networking product that provides transparent integration of MS-DOS® and OS/2 PCs with UNIX® systems. HP LAN Manager/X is an advanced, full-featured network operating system that enables UNIX-based machines to operate as file and resource servers to PC workstations. It runs on and takes advantage of HP's full range of powerful HP-UX servers and workstations. HP LAN Manager/X also provides a standard application program interface to which developers can write distributed applications across the network between UNIX systems and PC workstations.

HP's LAN Manager products form a networking foundation for HP's NewWave client/server computing. The client/server architecture is the most efficient, powerful, and cost-effective way to solve individual, workgroup, and company wide computing needs. These solutions include database servers and applications, electronic mail, user-friendly interfaces, etc. HP's NewWave Office products provide users with workgroup applications and solutions for client/server computing.

With HP LAN Manager/X, users have the best of both worlds: access to a wealth of PC applications PLUS access to the power, resources, and security of UNIX. Users can continue to use PC applications from the familiar PC environment. In addition, users can also access resources of UNIX, which includes a wide range of CPUs, a variety of large disks, and high-quality printers and plotters. HP LAN Manager/X complements other Hewlett-Packard networking products such as the ARPA/Berkeley Services, HP Network Services (NS), and Network File System (NFS)™ Services. HP LAN Manager/X is also the networking platform for HP's NewWave Office for HP-UX.

HP LAN Manager/X increases workgroup productivity in both technical and commercial markets. The emergence of the powerful Intel-based PC has increased the number of PCs found in engineering environments. HP LAN Manager/X solves the engineer's and system administrator's problem of integrating these PCs with their existing UNIX equipment and resources.

The commercial marketplace already contains a large installed base of PCs. As workgroups grow, users need greater server performance and capabilities. HP LAN Manager/X provides an easy growth path from existing PC servers to high powered UNIX systems. HP LAN Manager/X can be easily added to PC networks, providing a growth path for increased server performance.

Functionality

HP LAN Manager/X provides a comprehensive set of capabilities for MS-DOS and OS/2 PC users, as well as for LAN Manager/X administrators. These include:

Network File and Peripheral Sharing

With HP LAN Manager/X, users can easily create, delete, modify, and access files and directories, and store their PC applications on HP-UX servers from their MS-DOS and OS/2 PC workstations. PC users are also able to share with UNIX users a multitude of devices such as printers and plotters.

High Performance

HP LAN Manager/X runs on the entire range of HP-UX servers and workstations. It takes advantage of HP's high performance HP-UX systems including the powerful HP 9000 Series 7x0 and 8x7 systems.

"Best in the Industry" LAN Manager Administration Tools

HP LAN Manager/X provides a flexible set of network management, administration, and diagnostic tools. An X Windows/Motif-based interface is included with HP LAN Manager/X. The administrator can manage, configure, and troubleshoot LAN Manager servers from the X Window interface at the HP-UX console or terminal, from any computer on the network running X Windows, or from any X terminal. This user-friendly, intuitive interface allows the administrator to easily add, modify, or delete users' accounts, set up and manage peripherals, and print queues, as well as modify LAN Manager configuration parameters for both HP-UX and OS/2 servers. Online help is included with this interface to assist with administration, configuration, and tuning. For those who prefer a command line style interface, the HP LAN Manager/X server can be administered from an MS-DOS PC, OS/2 PC, HP-UX console, or another LAN Manager server using the command line interface. Administrators can easily administer their HP-UX or OS/2 servers from anywhere on the network, using a variety of systems (MS-DOS PCs, OS/2 PCs, UNIX computers, X terminals, the system console) and using their interface of choice (X Windows, command line, or LAN Manager "character-oriented window" interface).

Non-lp Support

The HP LAN Manager/X print spooler supports both the HP-UX lp spooler as well as non-lp spoolers such as HP OpenSpool. Administrators can easily configure print jobs to access the lp spooler or OpenSpool.

Comprehensive Printer Management and Print Spooling

HP LAN Manager/X provides a powerful and flexible set of print spooling services. Print spooling capabilities include:

- Configurable print priorities
- Multiple queues for one printer
- One queue for multiple printers
- Printer access subject to the same permissions as file access
- Print jobs routed to first available printer
- Print jobs routed to specifically configured printers
- Optional notification of job status
- Ability for users to display print queues and manage their own jobs
- Ability to print jobs at specified times

Advanced Security System

HP LAN Manager/X has a comprehensive security system. Access privileges are managed by the network administrator. Access rights can be established for individual files, subdirectories, or entire directory trees using the same security model as the HP-UX file system. In addition, guest accounts can be set up with limited resource permissions. The number of users who can simultaneously access the same shared resource is configurable. Security capabilities include:

- User-level and share-level security
- HP-UX access via UNIX security mechanisms

Multiple LAN Card Support

HP LAN Manager/X supports multiple LAN cards or LAN subnets on a single server. HP LAN Manager/X also supports the new Token Ring LAN card from Hewlett-Packard. The RFC NetBIOS naming protocol is limited to one LAN card or subnet which is configurable. A utility is included for reading host tables for clients not

connected to the subnet running the RFC NetBIOS protocol.

Application Program Interface (API)

HP LAN Manager/X provides a standard set of APIs that allows developers to write to the same APIs on HP-UX as on MS-DOS and OS/2. This extends the API capabilities of MS-DOS and OS/2 across the network to HP-UX systems. APIs supported on HP-UX include:

Administrative APIs—Enable programs to work with the basic server functions such as sharing resources and administering sessions, connections, and open files.

Interprocess Communication (IPC) APIs—HP LAN Manager/X provides a rich set of programming tools for interprocess communication. These APIs enable processes on any LAN Manager MS-DOS or OS/2 PC workstation to communicate with processes on UNIX or OS/2 servers as though they were local processes. The two IPC mechanisms supported by HP LAN Manager/X are named pipes and mailslots.

- Named pipes. A mechanism for passing variable-length, variable-content data between two processes. By possessing a name, named pipes can be addressed across the network and can provide highly reliable two-way communication (e.g., virtual circuit service). Access to named pipes can be controlled by the HP LAN Manager/X security system, so only specified users can gain access to them. Named pipes is now supported in Windows.

- Mailslots. An IPC mechanism for reading and writing blocks of data. Mailslots provide high-speed one-way communication (e.g., datagram service). While named pipes can be thought of as similar to a telephone conversation, mailslots are similar to sending a letter.

Station-to-Station Messaging

HP LAN Manager/X provides a pop-up messaging facility to send text messages from PC to PC and from server to PC. The HP LAN Manager/X Application Program Interface (API) enables applications to send messages as well as allow automatic administrative alerts.

Features and Benefits

Scalability

HP LAN Manager/X runs on HP's full line of HP-UX servers and workstations. This wide range of processing power allows users to buy exactly the price/performance server needed to get their jobs done.

HP LAN Manager client software can access the full line of PCs, HP-UX, and MPE servers. This not only extends the range of processing power available for PC users, it also protects the user's hardware and software investment.

It is easy to upgrade existing servers as workgroups and departments grow. Users do not need to learn another network operating system when upgrades are necessary.

Network File and Peripheral Sharing

Data can be transparently shared among PC and HP-UX users. Sharing data reduces the number of redundant copies in existence. All users can work from one source which increases data integrity.

PC users can access HP-UX files without having to learn UNIX commands. This reduces learning time and increases productivity.

PC users can store their files on HP-UX and have them automatically backed-up as part of the backup routine for the HP 9000. This increases data integrity and security.

PC users can transparently access large disks available on UNIX. This makes it easy to use HP-UX resources and reduces the amount of disk space needed for each PC.

Workgroups and departments save money by sharing expensive peripherals instead of having to dedicate a peripheral to each PC. Users have access to a wide variety of powerful printers and plotters attached to HP-UX systems. This allows users to choose the most appropriate output device for their particular processing needs.

Groups can better utilize existing peripherals by allowing them to be accessible to entire groups and departments. This protects the workgroup's current investment in hardware.

Comprehensive Spooler

Comprehensive spooling capabilities allow users to print or plot without needing to verify the availability of a specified device. Users can also view and delete their own print jobs. This saves considerable time and effort.

Users can send their files to be printed or plotted, while keeping their own systems available for other work. This increases productivity.

HP LAN Manager/X utilizes the features of the HP-UX spooler program. This gives users greater spooler flexibility and power.

Internetting

HP LAN Manager/X DOS clients can access remote HP LAN Manager/X or HP LAN Manager servers through routers and gateways. This allows users to access servers anywhere on a TCP/IP-based network. Users have easy access to an increased amount of data and information.

Windows 3.1

HP LAN Manager/X MS-DOS clients are now supported under Microsoft® Windows 3.1. Integration of networking with the latest windowing technology allows users to be more productive.

Standard Microsoft Client

The client shipped with the LM/X product is the standard LAN Manager client from Microsoft. Users see greater consistency in client software.

Standard Application Program Interfaces (APIs)

HP LAN Manager/X provides most of the standard APIs on HP-UX that are available on HP LAN Manager for OS/2 and MS-DOS. This enables application developers to write applications across all three platforms (MS-DOS, OS/2, and HP-UX) without having to change the HP LAN Manager API calls. Users benefit by having more applications available in a shorter amount of time.

Servers work well for the compute-intensive and disk-intensive part of the application, while PCs provide easy-to-use graphics for the interface part of the application. Distributed network applications make better use of available resources, reduce processing time, and save money.

Distributed applications reduce the amount of network traffic. Instead of passing entire files and data blocks over the network, only information needed by the PC is transferred. Since less data is transferred over the network, users benefit from increased security and better performance.

Industry-Standard Network Transport (TCP/IP)

HP LAN Manager/X servers can be installed on existing and new TCP/IP networks. Users can continue to use current networking services such as ARPA/Berkeley Services, HP Network Services, and NFS Services while benefiting from the new HP LAN Manager capabilities. The use of standards protects user's investments in both hardware and software.

Wide Range of Industry Standard Links

HP LAN Manager/X supports the standard Ethernet/IEEE 802.3 LAN interface card on HP 9000 systems. This card can connect to either EtherTwist or IEEE 802.3/Ethernet (thinLAN or thickLAN) wiring configurations. HP LAN Manager/X also supports the new Token Ring card on HP 9000 systems.

Open Architecture

The HP LAN Manager/X specification has been published by X/Open and is therefore available to any vendor. In addition, the HP LAN Manager/X source code can be licensed by OEMs. This allows customers to run one network operating system across multiple platforms. Customers have greater confidence that their hardware and their software investments are protected.

LAN Manager specifications are available from Microsoft or X/Open, enabling any vendor to implement LAN Manager. Additionally, specifications are available to enable developers to port applications to LAN Manager. This makes LAN Manager one of the most widely supported LAN standards today. So far, it has been endorsed by HP, Microsoft, IBM®, DEC®, AT&T®, and others. Today, LAN Manager runs on DOS, OS/2, UNIX, VMS, and other operating systems. This allows users to run one network operating system across multiple platforms. Users have greater confidence that their hardware and software investments will be protected through the use of standards.

Sophisticated Network Administration and Management Tools

Users can easily monitor and update the network resources to ensure that the network is properly functioning. This increases overall user productivity and reduces the effort needed for network administration.

Network administration can be performed either at the server or remotely from PCs. This allows the administrator to administer servers from anywhere on the network. This reduces the amount of time needed to configure, maintain, and troubleshoot the network.

Administration tools assist the administrator in easily maintaining the network. This increases the amount of time the network is available to users.

High-Performance, Nondedicated Server

With HP LAN Manager/X, a single HP-UX system can support more users than Intel-based PC servers, depending on the configuration. This reduces the number of systems necessary to administer. Not only does this reduce administration effort and time but it also increases security.

The multitasking capability of HP-UX makes it possible to concurrently run many applications and services in addition to HP LAN Manager/X. This increases the user's ability to do work productively.

Product Requirements

Required Hardware

Server Hardware:

- HP 9000 Series 300/400 or Series 600/700/800 Computer (except 310, 318, and 320)
- Recommended minimum memory requirements—8 Mbytes
- LAN/9000 Series 300/400 or 600/700/800 Link (Note: some systems come bundled with a link)

For the MS-DOS PC Client and/or the OS/2 PC Client, a list of currently supported PC hardware should be obtained from Microsoft.

Required Software

Server Software:
HP-UX 8.X or 9.0

DOS Client Software:
MS-DOS 3.X, 4.01, or 5.0

OS/2 Client Software:
OS/2 version 1.3

Installation and Support

Installation

HP LAN Manager/X is a customer installable product. The customer can however, purchase installation services from HP if desired.

Hardware Support Services

Provides customers with standard hardware support for their HP 9000 and HP PC hardware.

Software Support Services

HP Software Materials Update Service—Entitles customers to receive updated software and documentation for any revisions to the product up to but not including the next major upgrade.

HP BasicLine Software Support—Provides customers with self-support through right-to-use updates and access to an electronic database.

HP ResponseLine Software Support—Provides all the services of HP BasicLine Software Support plus unlimited access to the Response Center for problem resolution assistance.

HP TeamLine Software Support—Provides all the services of HP ResponseLine Software Support plus a local account-assigned HP Service Engineer who will assist the customer with pro-active planning and other support needs.

Network Support Services

HP WireTest—Verifies the suitability of the customer's existing twisted pair cabling for their network. By utilizing sophisticated tests, which quickly and accurately evaluate existing cabling, the customer can potentially save a substantial investment that would be required for rewiring. Please refer to the HP WireTest data sheet for more information.

Network Planning and Design—Provides customers with a comprehensive network strategy that supports their business objectives. HP Network consultants analyze the customer's communication requirements and create a detailed network design based on these requirements. Please refer to the HP Network Planning and Design data sheet for more information.

Network Startup—Provides customers with quick implementation of their network, a simplified service interface, verified network operation, and assured on-going supportability. Please refer to the HP Network Startup data sheet for more information.

NetAssure—Provides customers with fault isolation and assistance with problem resolution anywhere on their network. Please refer to the HP NetAssure data sheet for more information.

HP LAN Manager/X for HP 9000 Ordering Information

Ordering Instructions

- A user license is required for each server running HP LAN Manager/X.
- User licenses DO NOT include software and documentation.
- Each media option includes a complete set of HP LAN Manager/X documentation, server software on the selected media, and client software for DOS and OS/2 on 3.5" and 5.25" floppy disks.

HP B1011C HP LAN Manager/X for the HP 9000 Series 700/800

UA3	8 User License
UA5	16 User License
UA7	32 User License
UA9	64 User License
UAB	128 User License
UAD	256 User License
UCQ	512 User License
UCR	1024 User License
UB3	8 User Credit
UB5	16 User Credit
UB7	32 User Credit
UB9	64 User Credit
UBA	128 User Credit
UBV	256 User Credit
UCP	512 User Credit
021	Upgrade B1011B to B1011C, 8 User License
022	Upgrade B1011B to B1011C, 16 User License
023	Upgrade B1011B to B1011C, 32 User License
024	Upgrade B1011B to B1011C, 64 User License
025	Upgrade B1011B to B1011C, 128 User License
026	Upgrade B1011B to B1011C, 256 User License
027	Upgrade B1011B to B1011C, 512 User License
028	Upgrade B1011B to B1011C, 1024 User License
OB1	Additional User's Manual
AA0	Cartridge tape and manuals
AA1	½-inch magnetic tape and manuals
AA4	Software on QIC media
AAH	DDS tape and manuals

Ordering Examples

- For a new installation of HP LAN Manager/X, order a user license and media option. For example, if you have a Series 700 computer (DDS tape drive) and 14 PC users, order B1011C options UA5 and AAH.

- For an existing installation of HP LAN Manager/X Version 1.1 or 1.3, order an upgrade license with the same number of users as your current license and a media option. For example, if you are running HP LAN Manager/X 1.1 or 1.3 (32 user license) on a Series 800 computer (cartridge tape drive), order B1011C options 023 and AA0. Note that there was a version upgrade in January 1993 for the B1011C and B1003 products. LM/X 1.4 provides support for HP-UX 9.0 and the new Microsoft LAN Manager clients: Version 2.1a.

- For installation of HP LAN Manager/X on additional servers, order a license for each server. Order the media option only if you want an additional set of documentation and software.

- To add additional PC users, order a user credit for the same number of users as your current license and a user license for a larger number of users than your current license allows. For example, if you currently have a license for 8 users and would like to add an additional 20 users to your Series 700 computer, order B1011C option UB3 and UA7.

- To upgrade your existing HP LAN Manager/X 1.1 or 1.3 server and add additional users, order an upgrade license with the same number of users as your current license, a media option, a user credit for the same number of users as your current license, and a user license for a larger number of users than your current license allows. For example, if you are currently running HP LAN Manager/X 1.1 or 1.3 on a Series 800 (16 user license, cartridge tape) and you would like to upgrade to the current HP LAN Manager/X product and add an additional 5 users, order B1011C options 022, AA0, UB5, and UA7.

The next version of HP LAN Manager for UNIX, Version 2.1a, will be a new and separate product. In the next release, an upgrade credit for version 1.x will be offered.

Support Products

H2012A + L00 HP BasicLine

H2011B + H00
HP ResponseLine

H2010A + T00 HP TeamLine

H2014A + S00 HP Software Update Materials

Documentation

The following manuals are included with the media options for the HP LAN Manager/X for HP 9000 product:

B1003-90010 Installing & Administering Guide--HP LAN Manager/X for HP 9000
B1003-90011 Error Messages and Troubleshooting Guide--HP LAN Manager/X for HP 9000
B1003-90012 Using Microsoft LAN Manager Clients with the HP LAN Manager/X Server

Related Products

32015A HP LAN Manager/iX (Named Pipes)

D1811B HP Network Services 2.1/MS-DOS

D1812B HP ARPA Services 2.1/MS-DOS

(1) Based on Microsoft LAN Manager/X
(2) For a list of currently supported PCs and LAN cards, contact your local HP sales representative.
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HP OSI Transport Services/9000

Technical Data

Product Numbers
HP 32069A, J2160A, 32070A

HP OSI Transport Services/9000 (OTS/9000) networking software provides the Transport, Session, Presentation, ROSE, and ACSE layers of the OSI reference model. OTS/9000 also provides OSI network layer services over the X.25/9000, FDDI/9000, or LAN/9000 Link. These layers supply the necessary foundation to run OSI services, such as MMS, FTAM, X.400, and X.500.

These OSI products operate in both a local area and wide area network environment. By supporting international standards specified by the International Standards Organization (ISO) and the International Telegraph and Telephone Consultative Committee (CCITT), HP's OSI products operate in a multivendor environment.

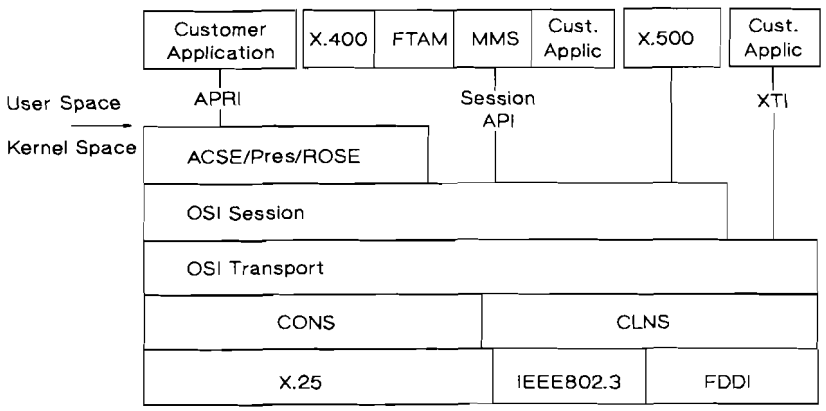

Figure 1

Features

For OTS/9000, features include:

- Highly conformant to many GOSIP profiles (see Figure 2 for supported profiles).
- Support of the OSI and TCP/IP protocols simultaneously, over the same interface card.
- Support of dynamic routing for LAN using ES-IS protocol.
- Ability to act as an Active Transport Layer Relay to bridge CONS and CLNS networks using MSDSG (Multi-System Distributed System Gateway).
- Superior administration support through the tool Osiadmin; a single user interface to all administration functions users need to manage their local OSI systems. Configuration data can also be accessed through ASCII files.
- Application interface to the ISO Session layer.
- APRI, an application interface to the ISO ACSE, Presentation, and ROSE layers, based on an emerging standard interface.

- XTI, the X/Open standard application interface to the ISO Transport layer, fully XPG3 compliant, allows XTI applications to run in a multivendor environment.
- Application interface trace facility allows developers to trace calls and input/output parameters for the purpose of debugging.
- Dynamic reconfiguration; using Osiadmin, some stack parameters, and information about remote systems can be modified without rebooting the system.
- Support of HP MMS/9000, HP FTAM/9000, HP X.500/9000, and HP X.400/9000.
- Tracing of data and header information at each layer (2–7) of stack.
- MP safe through use of STREAMS; the HP-UX 9.0 version of OTS uses STREAMS for interprocess communication and can run on an MP (Multiple Processor) system. The HP-UX 8.0 version of OTS uses a special version of STREAMS and does not run on MP systems.

For X.25, features include:

- Support of up to 448 transport connections and switched virtual circuits.
- Support of up to eight X.25 cards.
- Load balancing across cards for improved performance and availability.
- Support of transport classes 0, 2, and 4 over CONS.
- Support of transport class 4 over CLNS.

For 802.3 and FDDI, features include:

- Support of up to 448 connections.
- Support of one or two LAN cards.
- Support of transport class 4 over CLNS.

OTS/9000 supports a total of 448 connections through the transport layer. This limit applies to connections established through APRI, Session API, XTI (the Transport API), or by a supported OSI application (X.400, FTAM, MMS, or X.500).

Figure 2

- CEN/CENELEC
  - EN/ENV 41 101
  - EN/ENV 41 102
  - EN/ENV 41 104
  - EN/ENV 41 105
  - EN/ENV 41 106
  - EN/ENV 41 107
- COS
  - TA51
  - TA1111
  - TD1111
- MAP Version 3.0
- NIST Version 3 Addition 1
- POSI/INTAP
- TOP Version 3.0
- UK GOSIP Version 3.1
  - subprofile GOSIP CO WAN
  - subprofile GOSIP CL WAN
- US GOSIP Version 1.0 (FIPS 146)

Tools

HP's Osiadmin provides superior OSI node administration through its menu-driven access to all configuration, administration, verification, and diagnostic tools. After installing the product from tape, Osiadmin is the only tool needed to configure, start, and verify an OSI node (including interoperability with remote nodes). Using Osiadmin, users can reconfigure some stack parameters and information about remote systems without rebooting the system.

For Osiadmin, features include:

- Extensive online help
- Integrated configuration for:
  - X.400/9000 software
  - FTAM/9000 software
  - MMS/9000 software
  - OTS/9000 software
  - LAN/9000 Link
  - X.25/9000 Link
  - FDDI/9000 Link
- Automated configuration verification for OTS, FTAM, and MMS
- Integrated administration for the above components (start/stop) except OTS/9000, which doesn't support the stop option
- Integrated diagnostics for the above components, including:
  - local verification tests
  - remote interoperability tests
  - automated trace and log generation
  - cause/action error reporting

ACSE/Presentation and ROSE Interface

OTS/9000 includes APRI which provides an application programmatic interface (API) in C. This interface is based on the UNIX® International OSI ACSE/Presentation Library specification, Version 1.0.0 dated October, 1990. The emerging X/Open interface at these layers is derived from this specification, but was not finalized at the time of product release. Through this interface, users can establish associations (connections) with another application process, send and receive data, and release or abort associations. This API also allows users to negotiate the association release. The ROSE services may be used in conjunction with the ACSE/Presentation services to perform ROSE request/reply operations.

Session Interface

OTS/9000 includes an application programmatic interface to the ISO Session layer. This API is a library of function calls providing developers open access to session services and the ability to develop applications with session layer peer-to-peer communication. The session API provides connection management for connection establishment, orderly release and aborts, and data transfer management for the exchange of normal and expedited data. This API also provides access to other session services such as token management, session synchronization, activity management, capability data, and exception reporting.

X/Open Transport Interface

OTS/9000 also includes XTI, an API offering open access to the transport services. HP's XTI has been developed specifically for OSI and complies with the X/Open Portability Guide, Version 3 (XPG3). XTI is implemented as a C library and enables processes on the same or different computers to communicate through the use of programmatic calls. For 8.0, XTI provides access to COTS only. For 9.0, XTI provides access to COTS and CLTS.

Coexistence

The X.25/9000, FDDI/9000, and LAN/9000 link products provide simultaneous support for both TCP/IP and OSI standards.

Functional Description

OSI ROSE and ACSE Services

These services reside at Layer 7 of the OSI Reference Model. OTS/9000 complies with ISO 9072 parts 1 and 2 (ROSE) and ISO 8649 and ISO 8650 (ACSE). ROSE supports the invoke, result, error, and reject operations.

OSI Presentation Layer

The Presentation layer corresponds to Layer 6 of the OSI Reference Model. OTS/9000 complies with ISO 8822/CCITT X.216 and ISO 8823/CCITT X.226. OTS/9000 provides the kernel functional unit, negotiated release, and "normal mode" connections.

OSI Session Layer

The Session layer corresponds to Layer 5 of the OSI Reference Model. OTS/9000 complies with ISO 8326/CCITT X.215 and ISO 8327/CCITT X.225 and T.62. OTS/9000 supports OSI Session versions 1 and 2.

On session version 1, OTS/9000 supports infinite SSDUs on normal and typed data. Nine bytes of user data are allowed on abort; the maximum data size for expedited data is 14 octets; no user data is allowed on give tokens, give control, activity interrupt, activity discard. On other Session services, user data is limited to a maximum of 512 bytes.

On session version 2, OTS/9000 supports infinite SSDUs on normal and typed data. The maximum data size for expedited data is 14 octets. Extended user data up to 10240 bytes maximum is supported on all other Session services.

OTS/9000 supports the following session functional units: kernel, half-duplex, duplex, typed data, capability data, minor synchronize, major synchronize, resynchronize, expedited data, exceptions, and activity management.

OSI Transport Layer

The Transport layer corresponds to Layer 4 of the OSI Reference Model. OTS/9000 transport complies with ISO 8072/CCITT X.214 and ISO 8073/CCITT X.224 and T.70. User options include: expedited data, preferred and alternate classes, implicit or explicit flow control in class 2.

OTS/9000 supports TP classes 0, 2, and 4 using Connection Oriented Network Service (CONS) and TP class 4 using Connectionless Network Service (CLNS) over X.25. OTS/9000 also supports TP class 4 using CLNS over 802.3 or FDDI Local Area Networks.

OTS/9000 running HP-UX 9.0 also supports Connectionless Transport Service (CLTS) over either X.25, FDDI, or 802.3 Local Area Networks. CLTS complies with ISO 8072/AD1 and 8602 and is a transport layer datagram service. It consists of three services: send unit data, receive unit of data, and an error function. These services are supported over the CLNP network layer and are made available through the XTI programmatic interface.

Multi-System Distributed System Gateway (MSDSG)

MSDSG addresses the issue of internetworking between Connection Oriented (CONS) and Connectionless (CLNS) systems. The functionality is described in ISO Technical Report 10172 and is referred to as an Active Transport Layer Relay. OTS/9000 provides the MSDSG functionality, so that systems on CONS networks may communicate at the Transport layer and above with systems on CLNS networks, using the OTS/9000 node as a relay.

OSI Network Layer

The Network layer corresponds to layer 3 of the OSI Reference Model. OTS/9000 running on HP-UX 8.0 supports both the 1980 and 1984 X.25 addressing schemes. OTS/9000 running on HP-UX 9.0 also supports the 1988 X.25 standards. 1984 NSAP addressing is supported over X.25 by taking advantage of the extended addressing facilities. OTS/9000 also supports the ISO 8473 CLNP protocol and ISO 9542 ES-IS routing protocol.

CLNP options include null subset, nonsegmenting subset, and full subset.

Product Requirements

HP OSI products are customer installable. OTS/9000 includes the software and manuals necessary to install, configure, use, and troubleshoot the product. X.25/9000, FDDI/9000, and/or the LAN/9000 Link is required. The HP-UX 9.0 version of OTS requires STREAMS/UX (P/N J2231A, J2232A, or J2237A). Concurrent purchase of HP MMS/9000 (P/N 32018A, J2161A, or 32019A), HP FTAM/9000 (P/N B1032A, J2163A, or B1033A), and/or HP X.400/9000 (P/N 32031A, J2162A, or 32032A) and/or X.500/9000 (P/N J2165A or J2153A) is optional. If updating from OTS/9000 Version C.03.00 or earlier, the services, FTAM, X.400, and MMS must be updated as well. Applications using XTI, the Session API, or APRI need to be recompiled and relinked.

Hardware and Software Requirements

	OTS/9000 S300/400 32069A	**OTS/9000 S700 J2160A**	**OTS/9000 S800 32070A**
C.03.00 Hardware	S330 or above, S400	S700	S800 except S890
C.03.00 Software	HP-UX 8.0 or 8.02	HP-UX 8.07	S8X7: HP-UX 8.02 other S800: HP-UX 8.0
C.04.00 Hardware	S330 or above, S400	S700	S800
C.04.00 Software	HP-UX 9.0 STREAMS/UX; **Must be ordered separately**		
Memory	16 MB memory 20 MB free disk space		
Links	X.25/9000 Link LAN/9000 Link FDDI/9000 Link		

Documentation

The following manuals are included with OTS/9000 running HP-UX 8.0:

32069-60001 OSI Planning and Troubleshooting Guide
32069-60002 HP-UX/9000 XTI Programmer's Guide
32069-60003 Installing and Administering OSI Transport Services
32069-60004 Session Access Programmer's Guide
32069-60005 ACSE/Presentation and ROSE Interface Programmer's Guide

OTS/9000 running HP-UX 9.0 includes the manuals listed above as well as the following addendums:

32069-90014 Addendum to Installing and Administering OTS
32069-90015 Addendum to XTI Programmer's Guide

For PICS information contact your local HP Sales office.

Ordering Information

For the Series 300 or 400, order P/N 32069A. You must also order one of each of the options shown below.

Software Option
AAH Software on DDS
AA0 ¼-inch cartridge tape (Release 8.02 only)
AAU CD-ROM certificate only

Operating System Option
APB HP-UX version 8.0
APH HP-UX version 9.0

For the Series 700, order P/N J2160A. You must also order one of the software and operating system options shown below. The other option is not required.

Software Option
AAH Software on DDS
AAU Software on CD ROM

Operating System Option
APB HP-UX version 8.0
APH HP-UX version 9.0

Other Option
0B0 Delete documentation

For the Series 800, order P/N 32070A. You must also order one of the software, operating system, and processor options shown below. The other options are not required.

Software Option
AAH DDS cartridge tape
AA0 ¼-inch cartridge tape (Release 8.02 only)
AAU CD-ROM certificate only
AA4 QIC
AA1 ½-inch magnetic tape (1600 bpi)

Operating System Option
APB HP-UX version 8.0
APH HP-UX version 9.0

Processor Option
AH0 Tier 1 SPU
AEL Tier 2 SPU
AE5 Tier 3 SPU
AE6 Tier 4 SPU
AEN Tier 5 SPU
AEP Tier 6 SPU
AH1 Tier 7 SPU

Other Option
0B0 Delete documentation

Processor Upgrades

Return credit is given to customers upgrading within the series 800 family. To order an upgrade, order P/N 32070A, select a software option, an operating system option , a processor option, and one of the following return credit options.

Upgrade Option
OGR Tier 1 SPU
OGE Tier 2 SPU
OC8 Tier 3 SPU
OGS Tier 4 SPU
OGT Tier 5 SPU
OGU Tier 6 SPU

Related Products

In addition to HP OTS/9000, the following HP OSI products are offered:

- HP X.400/9000
- HP FTAM/9000
- HP MMS/9000
- HP X.500/9000

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HP X.400

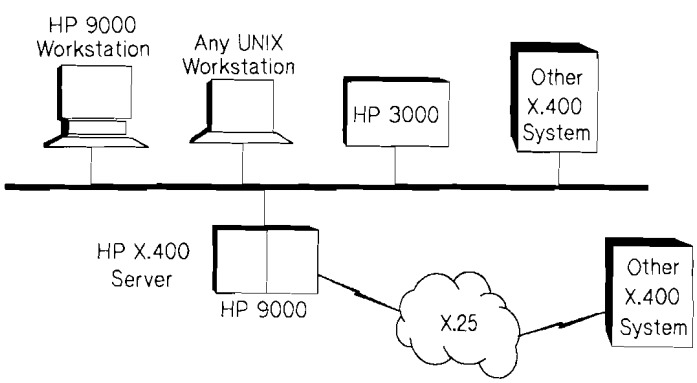
Technical Data

Product Numbers
HP 32031A, 32032A, 32055A, 32056A, J2162A, J2387A, J2388A

HP X.400 is an Open System Interconnection (OSI) product based on the 1988 CCITT X.400 standards. HP X.400 offers multivendor electronic messaging for HP 9000 and HP 3000 computers. With HP X.400 users of HP OpenMail, HP Desk, and RFC 822°based mail systems (UNIX® Mailers) can exchange electronic mail messages worldwide by using a single HP X.400 server. Additionally, the HP X.400 High-Level API and X/Open X.400 Gateway API can be used to develop other messaging applications such as EDI, Fax, and Telex. HP X.400 can also provide the foundation upon which an entire X.400 backbone network can be built.

Features

Integrated with HP OpenMail
HP OpenMail is an electronic mail system that can utilize X.400. Together, HP X.400 and HP OpenMail enable users to exchange text and binary file types (e.g. spreadsheet, word processing, and graphics) with other X.400 electronic mail systems. The addressing scheme in HP OpenMail is consistent with the X.400 standard.



Email Gateways
HP X.400 supports gateways to OpenMail, UNIX Mail, and HP DeskManager networks. HP X.400 can transform one node of an OpenMail, UNIX (ARPA) and/or HP Desk network into the gateway node to an X.400 environment.

HP X.400 APIs
The HP X.400 product provides the application developers with two alternatives when it comes to writing X.400 applications such as EDI, Fax, Telex, gateways, and other store-and-forward applications. The first alternative is the HP X.400 High Level API. This API allows applications to be quickly and easily written. The other alternative is the X/Open-XAPIA Gateway API. This standards based API provides greater flexibility and greater portability of the applications. The X/Open-XAPIA Gateway API is currently available with the HP-UX 9.0 version of the HP X.400 product (Version C.05.00).

HP X.400 Management Tools
HP X.400 provides administration tools that can automatically warn network administrators if HP X.400 nodes are encountering potential error conditions. HP X.400 also includes logging facilities for billing and troubleshooting.

HP X.400 is also manageable using HP OpenView. This allows for central management of the X.400 backbone. From the HP OpenView Management Station, the administration can: start and stop X.400; monitor the status of the X.400 processes; invoke administration and configuration tools; and receive a graphical display of the messages in the queues and the messages processed.

Binary File Support
HP X.400 allows HP OpenMail, HP Desk users, and user written applications to send binary files such as spreadsheets, graphics, and word processing files in addition to ASCII text messages. Users can send and receive these binary files using the X.400 "unidentified body part."

HP X.400 allows HP OpenMail to use the 1988 Externally Defined body part to explicitly identify binary files.

Interoperability and Troubleshooting Tools
HP provides a full set of tools to help simplify the interoperability and troubleshooting process. HP's OSI tools allow the network administrator to check the interoperability of the network at various layers of the OSI stack, isolating problems quickly and easily.

PC to X.400 Access
Users of HP AdvanceMail and NewWave Mail for the PC can also create X.400 messages. AdvanceMail and NewWave Mail provide remote user agent capabilities. Users can compose messages on their PCs and later transfer them to HP OpenMail or HP Desk for distribution within the X.400, HP OpenMail, HP Desk, and UNIX environments.

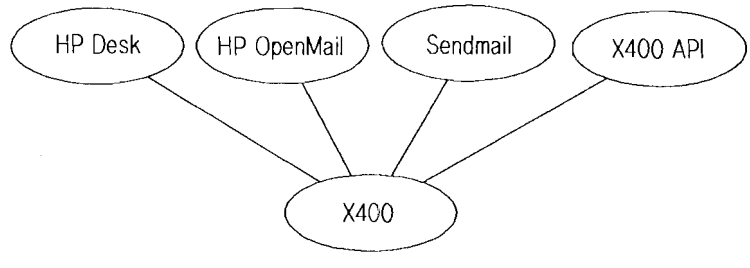
Third party products are available on the HP 9000 Series 800s that provide connectivity from popular PC environments (MS Mail, cc:Mail, and others) to HP X.400.

X.25, 802.3, and FDDI; Transport Classes 0, 2, and 4
HP X.400 runs over OTS/9000, HP's OSI Transport Services Product, on top of X.25, 802.3, or FDDI. OTS allows the network administrator to configure transport class 0 (TP0), 2 (TP2), or 4 (TP4) with negotiation from a higher class down to a lower class when running over X.25.

	TP0	TP2	TP4
X.25	X	X	X
802.3			X
FDDI			X

Functional Description

HP X.400 provides a foundation for electronic messaging. HP X.400 can be used for the implementation of electronic mail gateways, X.400 backbone networks, or the development of store-and-forward applications with the X.400 high-level API.



HP Desk to X.400 Gateway
HP X.400 when used in conjunction with HP X.400/HP Desk (P/N 32055A or 32056A) can transform a single node or multiple nodes of an HP DeskManager network into connecting nodes to an X.400 environment. Through these nodes, users anywhere in the HP DeskManager network can access the X.400 environment.

HP Desk to X.400 gateway requires two components: An HP X.400 server and the HP X.400/HP Desk Gateway software. An HP X.400 server consists of any HP 9000 with 802.3 and/or X.25 links along with the HP X.400 software and OSI Transport Services software.

The X.400/HP Desk Gateway software runs on an HP 3000 and links HP DeskManager to an HP X.400 server. Multiple HP DeskManager nodes, each with their own X.400/HP Desk Gateway, can talk directly to a single HP X.400 server. HP DeskManager nodes without the X.400/HP Desk software can also send X.400 messages using the X.400/HP Desk nodes as a common gateway to the X.400 server.

HP 3000 systems communicate with the X.400 server using NS over LAN or X.25.

Sendmail Gateway to X.400
HP X.400 can send and receive messages between Sendmail based electronic mail and X.400 networks.

Messages are submitted to Sendmail from UNIX mailers. Sendmail then routes the message to either SMTP, UUCP, or X.400 based on the recipient's address.

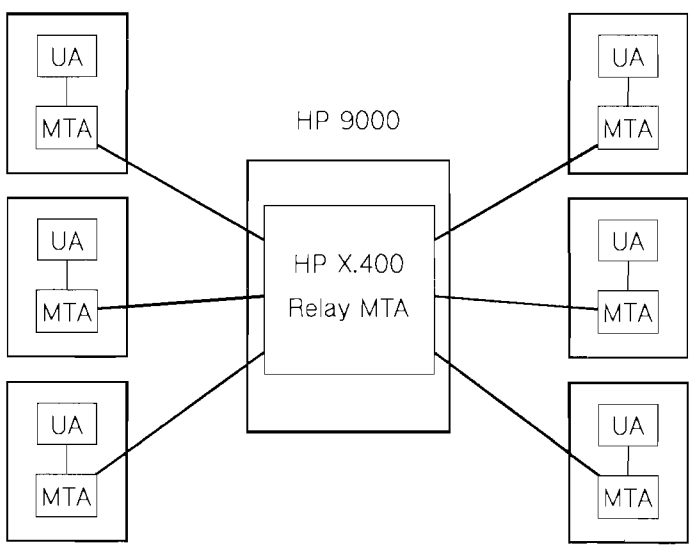
When the message is X.400 bound, HP X.400 maps the address to an X.400 format, then sends the message to the appropriate destination.

X.400 Backbone

HP's X.400 can be used as a high-performance message switch. As an X.400 backbone, HP X.400 acts as a relaying MTA, routing messages from other MTAs throughout an X.400 network.

HP's flexibility in routing and our easy-to-use configuration interface make it ideal for X.400 backbones. Additionally, HP's network management tools simplify the maintenance of X.400 networks making implementation of large X.400 networks possible.

HP OpenMail and HP X.400 together allow for the creation of an entire electronic mail network based on an X.400 backbone



Conformance

HP's X.400 is certified with NIST as U.S. GOSIP I compliant and has received the COS Mark for X.400/84.

HP supports the leading X.400 implementor's agreements from the U.S. and Europe: CCITT X.400, X.402, X.411, X.420, X.200, X.208, X.209, X.218, and X.228; and ENV 41201 and 41202.

Interoperability

HP has tested interoperability with the following X.400 vendors: Apple, AT&T, CDC, Data General, Digital, IBM, NCR, Nixdorf, Olivetti, Prime, Retix, Siemens, SoftSwitch, Sun Microsystems, Touch, Wang, and Xerox.

HP has tested interoperability with the following public carriers: AT&T Mail, British Telecom, Canadian PTT, DialCom, Dutch PTT, EasyLink, Finnish PTT, France Telecom, MCI Mail, and SprintMail.

For a current list of interoperable vendors, contact Hewlett-Packard.

X.400 Application Programmatic Interfaces (APIs)

The HP X.400 High-Level API allows application developers to create X.400 store-and-forward applications. Applications such as Fax and Telex gateways to X.400 along with EDI applications are easily integrated with X.400 using nine basic programmatic calls:

x4_register ( )
x4_begin_send ( )
x4_put_attribute ( )
x4_send ( )
x4_receive ( )
x4_get_attribute ( )
x4_end_receive ( )
x4_get_error ( )
x4_cancel ( )

The HP implementation of the X/Open-XAPIA X.400 Gateway API conforms to the v3.0 (X/Open CAE) version of the API, and includes both 1984 and 1988 capabilities.

Performance

Performance for HP X.400 is measured in messages per hour over LAN. A message is 1K byte long with one recipient. A single X.400 node can route X.400 messages at the below maximum rates with two disk drives on the system.

X.400 Performance

SPU	S/827	S/870
Number of Messages per hour	8000	12000

Documentation

The following manuals are included with HP X.400/9000 (P/N 32031A, J2162A, 32032A):

32034-90005 Installing and Administering HP X.400
32034-90006 Managing HP X.400
32034-90007 Using HP X.400 with Elm and MailX
32034-90008 HP X.400 High-Level API Programmer's Guide (HP-UX 8.0)
32034-90009 HP X.400 Read-Me-First (HP-UX 9.0 Version only)
32034-90010 HP X.400 High-Level API Programmer's Guide (HP-UX 9.0)
32034-90011 HP X.400 Gateway API Programmer's Guide
32034-90012 HP X.400 Read-Me-First (C.05 Release)

The following manual is included with the HP OpenView X.400 Manager Products (J2387A, J2388A):

J2388-90001 HP OpenView X.400 Manager Administer's Guide

The following manuals are included with HP Desk to X.400 Gateway Products (P/N 32055A, 32056A):

32055-90001
HP X.400/HP Desk Node Administrator's Guide
32055-90002 Using HP DeskManager Connected to HP X.400

Hardware and Software Requirements for HP X.400/9000

	X.400/9000 S300/400 HP 32031A	X.400/9000 S700 HP J2162A	X.400/9000 S800 HP 32032A
Hardware	HP 9000 Series 330 or above, Series 400 for HP-UX 8.X HP 9000 Series 360 or above, Series 400 for HP-UX 9.0	Any HP 9000 Series 700	Any HP 9000 Series 800 (Series 890 requires HP-UX 9.0)
Operating System	HP-UX 8.0, 8.02, or 9.0*	HP-UX 8.07 or 9.0*	HP-UX 8.0, 8.02, or 9.0*
Software	HP OTS/9000 HP 32069A	HP OTS/9000 HP J2160A	HP OTS/9000 HP 32070A
	*If HP-UX 9.0, STREAMS/UX **Must be ordered separately**		
Memory	No additional RAM beyond HP OTS/9000 requirements 80 MB free disk space (as load increases additional disk space will be needed)		
Links	X.25/9000 LAN/9000 Link HP FDDI/9000 ARPA Services/9000 is also required for use of X.400 with Sendmail		

Hardware and Software Requirements for X.400/HP Desk

	MPE XL Version HP 32055A	MPE V Version HP 32056A
Hardware	HP 3000 Series 9XX	HP 3000 Series 37 39, 4X, 5X, 6X, or 7X
Operating System	MPE XL Version 2.0 or later	MPE V Version V delta 8 or later
Software	HP Desk Version B.03.B0 or later	
Links	NS Point-to-Point Network Link/XL HP 36922A	NS Point-to-Point Network Link/V HP 30284A or 30285A
	ThinLAN 3000/XL Link HP 36923A	ThinLAN 3000/V Link HP 30240A
	On the HP-UX machine, NS/9000 is required. HP B1012B for Series 300/400 HP J2140A for Series 700 HP B1029B for Series 800	
Memory	No additional memory 20,000 sectors of free disk space (as load increases additional disk space will be needed)	

Installation and Support Policy

The HP X.400 software is customer installable and configurable. Installation and configuration can also be performed by HP through the purchase of consulting services. The HP X.400/HP Desk Gateway software for MPE systems is also customer installable.

HP X.400 works with most UNIX Mail user agents which interface to Sendmail.
HP currently supports only the HP OpenMail, Elm, and MailX user interfaces when used with supported configurations of Sendmail. Support services for HP X.400 are available through standard HP support channels.

Interoperability testing can be purchased from HP on a time-and-materials basis.

Hardware and Software Requirements for HP OpenView X.400 Manager

	HP OV X.400 Series 700	HP OV X.400 Series 800
Hardware	Any HP 9000 Series 700	Any HP 9000 Series 800
Operating System Software	HP-UX 9.0 HP OpenView Version 3.2 Network Node Mgr	HP-UX 9.0 HP OpenView Version 3.2 Network Node Mgr
Memory	No additional RAM beyond HP OpenView and Network Node Manager 10 MB free disk space in addition to the disk space required by HP OpenView and Network Node Manager (as the number of systems being managed increases and messaging traffic increases additional disk space will be needed)	
Links	ARPA Services/9000	

Ordering Information

HP X.400/9000 includes email gateways for Sendmail and HP OpenMail. HP X.400/9000 also includes the HP X.400 API. The HP X.400/HP Desk Gateway must be purchased separately.

HP X.400/9000 for the Series 300/400

Order product number 32031A. In addition, an operating system option and a media option must be specified. The other options are not required.

Operating System Option
APB HP-UX version 8.0
APH HP-UX version 9.0

Media Option
AAH Software on DAT
AA0 Software on ¼-inch cartridge tape
AAU CD Certificate for CD-ROM

Other Options
0B0 Delete documentation

HP X.400/9000 for the Series 700

Order product number J2162A. In addition, an operating system option and a media option must be specified. The other options are not required.

Operating System Option
APF HP-UX version 8.07
APH HP-UX version 9.0

Media Option
AAH Software on DAT
AAU CD Certificate for CD-ROM

Other Options
0B0 Delete Manuals

HP X.400/9000 for the Series 600/800

Order product number 32032A. In addition, an operating system option, a media option, and a processor option must be specified. The processor upgrade and other options are not required.

Operating System Option
APB HP-UX version 8.0
APH HP-UX version 9.0

Media Options
AA0 Software on ¼-inch cartridge tape
AA1 Software on ½-inch 1600 bpi tape
AAH Software on DAT
AAU CD Certificate for CD-ROM
AA4 QIC Cartridge Tape

Processor Option
AH0 Tier 1—License to use on Models Fxx and Gxx
AE5 Tier 2—License to use on Models Hxx and Ixx
AEP Tier 3—License to use on Model 890

Other Option
0B0 Delete documentation

Processor Upgrades

Return credit is given to customers upgrading within the Series 800 family. To order an upgrade, order P/N 32032A, select a software option, an operating system option , a processor option, and one of the following upgrade options.

Upgrade Option
0GR Return credit for processor Tier 1 (AH0)

0C8 Return credit for processor Tier 2 (AE5)

HP OpenView X.400 Manager for the Series 700

Order product number HP J2387A. In addition, an operating system option and a media option must be specified. The other options are not required.

Operating System Option
APH HP-UX version 9.0

Media Option
AAH Software on DAT
AAU CD-ROM certificate only

Other Options
0B0 Delete documentation

HP OpenView X.400 Manager for the Series 800

Order product number HP J2388A. In addition, an operating system option, a media option, and a processor option must be specified. The processor upgrade and other options are not required.

Operating System Option
APH HP-UX version 9.0

Media Options
AA0 ¼-inch cartridge tape (Release 8.02 only)
AA1 ½-inch magnetic tape (1600 bpi)
AAH Software on DAT
AAU CD-ROM certificate only
AA4 QIC

Processor Option
AH0 Tier 1—License to use on Models Fxx and Gxx
AE5 Tier 2—License to use on Models Hxx and Ixx
AEP Tier 3—License to use on Model 890

Other Option
0B0 Delete documentation

Processor Upgrades

Return credit is given to customers upgrading within the Series 800 family. To order an upgrade, order P/N J2388A, select a software option, an operating system option, a processor option, and one of the following upgrade options.

Upgrade Option
0GR Return credit for processor Tier 1 (AH0)
0C8 Return credit for processor Tier 2 (AE5)

HP X.400/HP Desk for MPE/iX

Order product number HP 32055A. In addition a user license option must be specified.

User License Option
OAF 20 user license
UCY 40 user license
UA9 64 user license
UBD 100 user license
UCN 160 user license
UAT Unlimited user license

User License Upgrades
Return credit is given to customers upgrading the number of user licenses. To order an upgrade, order P/N 32055A, selecting one of the user license options above and one of the following return credit options:

UD8 Credit for 20 user license
UCZ Credit for 40 user license
UB9 Credit for 64 user license
UD9 Credit for 100 user license
UDV Credit for 160 user license
UBP Credit for unlimeted user license

HP X.400/HP Desk for MPE V

Order product number 32056A. In addition, a processor option must be specified.

Processor Option
310 For use on MICRO 3000 (Tier 1)
320 For Series 39-58 (Tier 3)
330 For Series 6X-70 (Tier 4)

Processor Upgrades
0CD Upgrade Credit for Tier 1
0CE Upgrade Credit for Tier 3

Related Products

In addition to HP X.400/9000 and HP OTS/9000, the following HP OSI products are offered:

- HP FTAM/9000
- HP MMS/9000
- HP X.500 Distributed Directory
- HP OpenMail

HEWLETT® PACKARD

HP MMS/9000

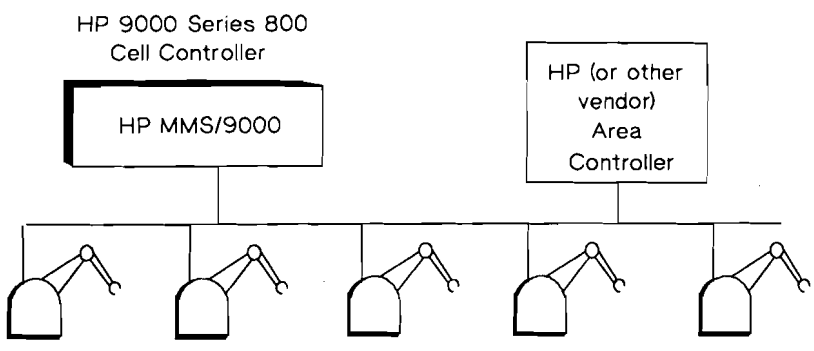
Technical Data

Product Number
HP 32018A, 32019A, and J2161A

HP MMS/9000 is an Open Systems Interconnection (OSI) product addressing the critical need for multivendor communications manufacturing.

HP MMS/9000 is an OSI layer seven service for the HP 9000. Manufacturing Message Specification (MMS) is the protocol that OSI-connected cell controllers use to direct the activities of factory floor devices, that is robots, PLCs, NC machines, etc.
HP MMS/9000 complies with the international standard ISO/IS 9506.

HP MMS/9000, in combination with HP OTS/9000 and LAN/9000 Link, allows HP 9000 Series 300, 400, 700, and 800 computers to connect to 802.3 or Ethernet networks.



Functional Description

MMS (ISO/DIS and IS 9506) is a substantial specification containing more than 80 service calls spread over 10 categories of capability. The intent of MMS is to give cell controllers control of factory floor device activities. For instance, MMS can control Programmable Logic Controllers (PCLs) by downloading and executing programs, by reading and writing PLC variables, and by setting and reading status conditions. MMS also contains computer-to-computer communications functionality, such as the binary file transfer service and the ability to transfer messages between programs (via a remote read/write variable mechanism).

Feature	Benefit
• Comprehensive, direct control of OSI conformant factory floor devices (FFDs)	• Reduced communications costs (writing and programming)
• Standard programmatic interface (MAP 3.0 MMS-I)	• Portable applications; reduced programming costs
• Investment Protection	• Customers can utilize their installed communication media
• Proven Interoperability with leading MMS vendors	• Eliminates the need for customers to perform interoperability testing.
• Easy to use installation, configuration and troubleshooting tools	• Reduced operating and maintenance costs
• Flexible logging and tracing utilities	• Effective fault isolation and efficient application development

HP MMS/9000 includes the following MMS categories:

- Connection/Context Management—establishment and release of associations between MMS peers.
- Virtual Manufacturing Device (VMD) Support Services—device status and resource interrogation.
- Variable Access and Management—services to read and write remote variables.
- File Transfer and Management—binary file transfer to and from remote node; file delete.

Note: This capability is separate from, and not interoperable with ISO FTAM.

- Domain Management Services—upload and download of program execution images or data files.
- Program Invocation Management—start, stop, and resume of remote FFD programs.
- Operator Communication Services—services to exchange messages with remote consoles.
- Semaphore Management—services to synchronize network resources.
- Event Management—services to define and manage event objects and to obtain notification of event occurrences.

HP's MMS is accessed exclusively through an application programmatic interface (API). The MMS API is a "C" language interface adhering to the MAP 3.0 MMS-I specification.

Despite its rich feature set, MMS alone cannot tap all the capabilities of FFDs. MMS Companion Standards are presently being written to extend MMS to allow full control of certain classes of factory devices, that is, there are fledgling Companion Standards for robots, NC machines, PLCs, and vision systems. Currently HP's MMS product does not support Companion Standards.

Customer Site Requirements

An 802.3 or ethernet cable plant is required at the customer site.

Ethernet Cable Plant: Cable system: 50-ohm coaxial cable and nondirectional taps, meeting the IEEE 802.3 Medium Layer Specifications.

Hardware and Software Requirements

	MMS/9000 S300/400 HP 32018A	MMS/9000 S700 HP J2161A	MMS/9000 S800 HP 32019A
Hardware	HP 9000 Series 330 or above, Series 400 for HP-UX 8.X HP 9000/Series 360 or above, Series 400 for HP-UX 9.0	Any HP 9000 Series 700	Any HP 9000 Series 800 (Series 890 requires HP-UX 9.0)
Operating System	HP-UX 8.0, 8.02, or 9.0*	HP-UX 8.07 or 9.0*	HP-UX 8.0, 8.02 or 9.0*
Software	HP OTS/9000 HP 32069A	HP OTS/9000 HP J2160A	HP OTS/9000 HP 32070A
	*If HP-UX 9.0, STREAMS/UX **Must be ordered separately**		
Links	X.25/9000 LAN/9000 Link		
Memory	18 MB memory 30 MB free disk space		

Ordering Information

HP MMS/9000 for the Series 300/400

Order product number HP 32018A. In addition, an operating system option and media option must be specified. Other options are not required.

Operating System Option
APB HP-UX version 8.0
APH HP-UX version 9.0

Media Option
AAH Software on DAT
AA0 ¼-inch cartridge tape (Release 8.02 only)
AAU CD-ROM certificate only

Other Options
0B0 Delete documentation

HP MMS/9000 for the Series 700

Order product number J2161A. In addition an operating system option and a media option must be specified. Other options are not required.

Operating System Option
APF HP-UX version 8.07
APH HP-UX version 9.0

Media Option
AAH Software on DAT
AAU CD-ROM certificate only

Other Options
0B0 Delete documentation

HP MMS/9000 for the Series 600/800

Order product number HP 32019A. In addition an operating system option, a media option, and a processor option must be specified. The processor upgrade and other options are not required.

Operating System Option

APB HP-UX version 8.0
APH HP-UX version 9.0

Media Options
AA0 ¼-inch cartridge tape (Release 8.0 only)
AA1 ½-inch magnetic tape (1600 bpi)
AAH Software on DAT
AAU CD-ROM certificate only
AA4 QIC

Processor Option
AH0 License to use on Models 807, 808, 817, 834
AEL License to use on Models 815, 822, 827, 837
AE5 License to use on Models 825, 832, 847, 857, 635
AE6 License to use on Models 835, 842, 867, 877, 645
AEN License to use on Models 845, 852, 887, 897
AEP License to use on Models 850, 855, 860, 865, 890, 1, 2 CPU
AH1 License to use on Models 870, 890, 3, 4 CPU

Other Options
0B0 Delete documentation

Processor Upgrades

Return credit is given to customers upgrading within the Series 800 family. To order an upgrade, order P/N 32019A, select a software option, an operating system option, a processor option, and one of the following upgrade options.

Upgrade Option

0GR For Models 807, 808, 817, 834
0GE For Models 815, 822, 827, 837
0C8 For Models 825, 832, 847, 857, 635
0GS For Models 835, 842, 867, 877, 645
0GT For Models 845, 852, 887, 897
0GU For Models 850, 855, 860, 865, 890, 1, 2 CPU

Documentation

The following manuals are included with HP MMS/9000 for HP-UX 8.0:

32019-60500 HP MMS/9000 Reference Manual
32019-60510 HP MMS/9000 Programmer's Guide
32019-60530 Installing and Administering HP MMS/9000

The following manuals are included with HP MMS/9000 for HP-UX 9.0:

32019-60501 HP MMS/9000 Reference Manual
32019-60511 HP MMS/9000 Programmer's Guide
32019-60531 Installing and Administering HP MMS/9000

Installation and Support

HP OSI products are customer installable. HP OSI products provide a complete toolset for effective management of HP OSI nodes within an OSI multivendor network. The HP OSI communication subsystem includes a thorough set of utilities for diagnosis and resolution of communication problems.

The full complement of HP network support services: HP Network Planning and Design, NetPrepare, NetStartup, and NetAssure are available for use within the OSI environment. Combined with the HP OSI diagnosis and support tools, HP Support services offer complete assistance in the planning, design, preparation, startup, and maintenance of OSI multivendor networks.

Related Products

In addition to HP MMS/9000, the following HP OSI products are offered:

- HP X.400/9000
- HP FTAM/9000
- HP OSI Transport Service/9000
- HP X.500 Distributed Directory

HEWLETT® PACKARD

Cryptographic Security Module

Technical Data

For the HP 9000 Series 800 Business Server Product Number J2463A

While distributed processing, global networking and open architectures make computer systems easier to use than ever before and give computer access to a wider population, they dramatically complicate the challenge of securing an organization's information resources.

The Cryptographic Security Module for HP 9000 Series 800 Business Servers is an HP-PB card (HP Precision Bus) which along with associated software and firmware, provides security services such as data privacy and data integrity. Applications invoke these services directly through a cryptographic API. Additional security services can be provided by using a smart card (plus reader) in conjunction with the security module.

Superior Key Protection

The security module is a place for the safe storage of secret cryptographic keys. Secret keys cannot be extracted as clear text from the module they reside in. The critical circuitry resides within a special sealed enclosure to prevent external monitoring of internal signals, and special sensors to detect any attempts at tampering. If any such attempts are ever detected, the secret information within the module will be erased instantly.

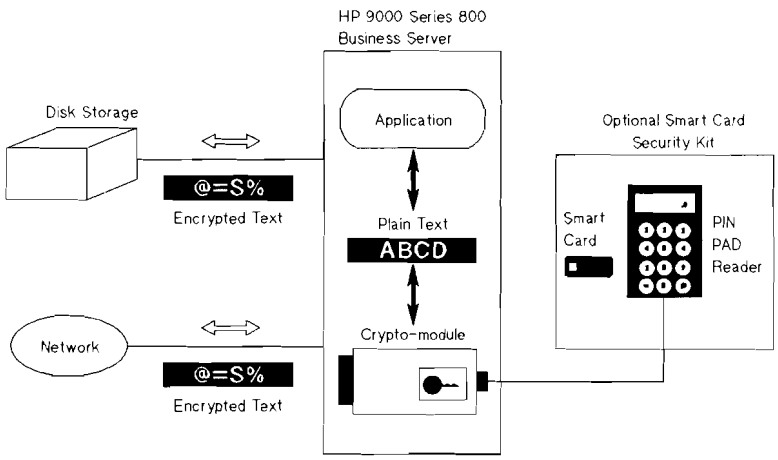
High Performance

The security module provides special hardware for high-speed cryptography, including a specialized chip for DES and a DSP for other algorithms. Cryptographic services can be done without consuming the main SPU's bandwidth. Multiple modules can be configured in a system to increase its cryptographic throughput.

High Degree of Trust

The security module provides a secure mechanism for enforcing specific security policies. It provides key separation features by enforcing control vector policies which govern precisely which specific operations any given cryptographic key can be used for.

Application Controlled Encryption Capability



In combination with supported smart cards and reader, it provides a means for additional operator authentication, for well-controlled operator/application privileges, for the secure distribution of secret keys and other data, and for "locking" keys within a smart card, so they can be used only when and where the smart card is physically present.

This degree of security is far beyond the trust placed with computer operators, maintainers, applications, or even that of the main operating system software. This makes it particularly well suited for instance, to banking applications that implement Electronic Funds Transfer.

Cryptographic Security Module Features

Basic security services:

- data confidentiality
- data integrity
- message non-repudiation
- cryptographic key storage and management

Miscellaneous:

- high-speed DES encryption of big blocks (2 Mbytes/sec)
- other encryption algorithms possible with the DSP (Digital Signal Processor)
- up to 4 cards per system supported
- programmable with downloadable firmware
- sealed plastic module prevents external monitoring of internal signals
- secret internal information actively erased if tampering detected (tamper-resistent)
- designed to support interoperability with systems conforming to IBM's "Common Cryptographic Architecture" (CCA), of which IBM's "Transaction Security System" (TSS) is an implementation

Special services available via optional smart card:

- user/operator authentication via PIN (Personal Identification Number)
- secure cryptographic key and data transport
- secure Cryptographic Security Module management in unsecure environments

Functional Specifications

Hardware:

- 20 Mhz Motorola 56001 DSP (Digital Signal Processor)
- 20 Mhz Lintel VLSI DES chip
- direct DMA to/from DES chip
- real-time clock
- 384 kbytes RAM
- 128 kbytes ROM
- lithium battery for RAM power back-up
- voltage temperature and casing monitors
- active RAM erasure circuits
- RS232C serial port for smart card readers

Software:

- HP cryptographic API (supports a subset of IBM's TSS functionality)
- HP-UX driver
- Security management utilities

Smart Card components:
The Cryptographic Security Module supports GEMPLUS COS microprocessor card in conjunction with Buli CP8 reader/PIN pad.

Product Requirements

Hardware:
HP 9000 Series 800

Software:
HP-UX release 9.0

Ordering Information

HP J2463A Cryptographic Security Module for the HP 9000 Series 800 Business Servers. Consist of the HP-PB card, module firmware, library software, management and configuration utilities, and appropriate documentation.

Please contact your local HP sales representative for more information.

Note on Cryptography

The US and other governments currently restrict the export of cryptographic technology, particularly with DES and/or algorithms with cryptographic keys over certain lengths. Appropriate licenses are required.

Printed in France
5091-9092E

HEWLETT® PACKARD

NS/9000 for Series 700 and Series 800

Technical Data

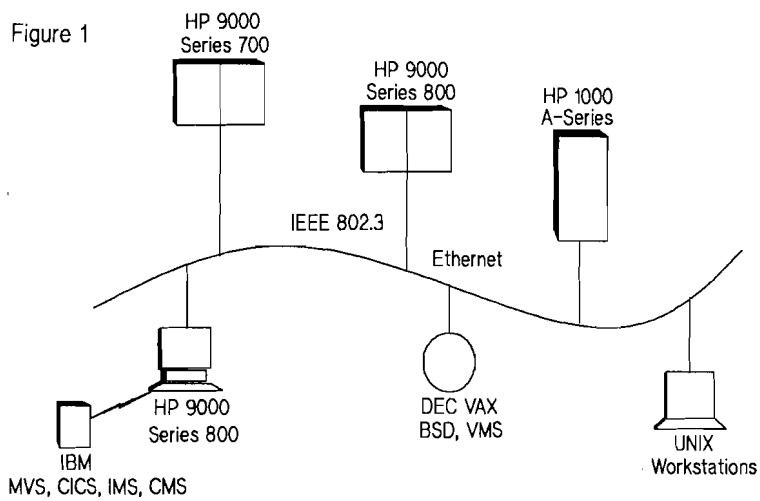
Product Numbers
HP B1029B for Series 800
HP 2140A for Series 700

Network Services/9000 (NS/9000) provides engineering and manufacturing environments with the ability to communicate in a multivendor environment. NS/9000 has been designed in a layered approach following the International Standards Organization's Open Systems Interconnection (ISO/OSI) Model. NS/9000 supports communication between the HP 9000 Series 800 and 700, the HP 1000 A-Series, and the HP 3000 over a local area or X.25 network. Users can easily access remote systems while error checking is performed automatically. The NS/9000 product requires the LAN/9000 Series 800 and Series 700 Link product, or the X.25 Link product. The Token Ring and FDDI links are not supported with NS/9000.

Features

- NS/9000 supports two network services over the high-speed IEEE 802.3 Local Area Network Link:
  - Network File Transfer (NFT)—enables the user to transfer files across a Local Area Network (LAN) between HP 9000 Series 800 and 700, HP 1000 A-Series, and the HP 3000 computers.
  - Virtual Terminal to HP 3000 (VT3K)—provides virtual terminal capability from Series 700s and Series 800s into HP 3000 systems. Can be used in combination with X-Window-based HPTERM on Series 300, 400, 700, or with a direct-connected terminal on the Series 800.
- Industry standards-based protocols: NS/9000 runs on the LAN/9000 Series 800 or 700 Link product, which supports IEEE 802.3/Ethernet thick or thin coax cable or EtherTwist twisted-pair, as well as transport and internet protocol layers based on the Advanced Research Projects Agency (ARPA) Transport Control Protocol and Internet Protocol (TCP/IP).

Figure 1



Functional Description

NS/9000 functionality combines the NS Common Services transports with the capabilities of the LAN transports and the IEEE 802.3 LAN/9000 Series 800 and Series 700 Links. These facilities are described in detail in figure 2, which shows the relationship between the NS Common Services, transports, and like components of the product.

User Level Services

Network File Transfer
Network File Transfer (NFT) copies files between any two NS nodes on a network. The HP NFT protocol is common to all HP Network Services implementations. Files can be copied interactively or programmatically. Network File Transfer includes features that allow users to:

Copy Remote Files:
Using NFT on all local Series 700 or 800 systems, a user can copy files from a local node to a remote node, from a remote node to a local node, and between remote nodes.

Translate File Attributes:
File attributes are translated transparently and on demand when files are copied between different systems. This means that when an HP-UX file is copied to an HP 1000 A-Series computer, the file attributes will be translated into RTE-A file format.

Access Remote Accounts:
Files under any account can be accessed if the user provides the correct user name and password.

The **dscopy** command is used to copy files from system to system over the network. This command is similar to the HP-UX cp command, which is used for local file copies. With **dscopy**, however, you must specify a system name and the appropriate login information before a remote file can be copied. For example, to copy a file from a system named **pc_design** to a system named **pc_fab**, you could execute the command (command is typed on only one line):

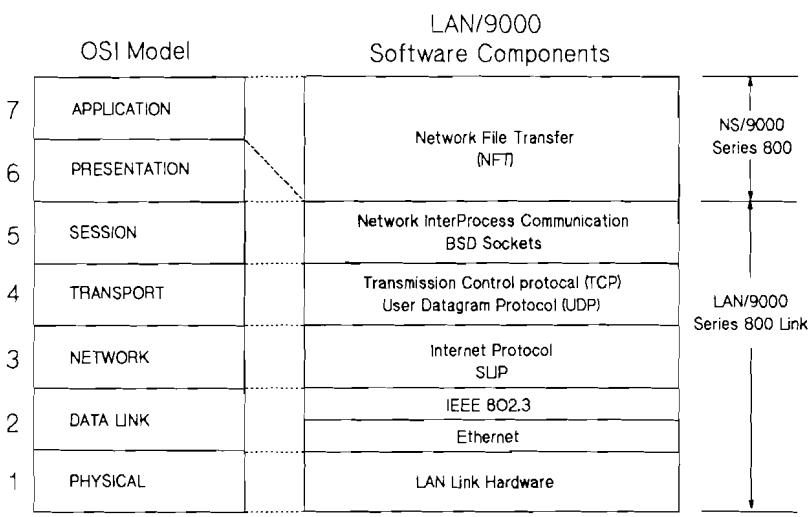
dscopy pc_design#alpha:beta #source_file\pc_fab#delta:gama #dest_file

The source and destination files are **source_file** and **dest_file**, respectively. The login for **pc_design** is **alpha:beta**, and the login for **pc_fab** is **delta:gama**.

Virtual Terminal to HP 3000
Virtual Terminal to HP 3000 (VT3K) allows users on HP 9000 Series Series 700 and Series 800 systems to log into HP 3000 systems running MPE V and MPE/iX. VT3K is supported on two configurations: HP 2392 or HP 700/92 terminals connected via RS-232 to a Series 800, or on the X-Window based HPTERM on a Series 300/400/700 system. VT3K is not supported over TELNET connections.

VT3K is invoked using the VT3K command on an HP 9000 and specifying an HP 3000 hostname. For example, the user opens an HPTERM window on a Series 800 and types:

vt3k host3000



where host3000 is either an MPE V or MPE/iX based HP 3000. The connection is established and the user logs into the HP 3000 normally.

VT3K supports the use of an input file (script) for automatic login and command execution by using the **vt3k-a** command. It also provides options for logging input and output to a file and enabling and disabling type ahead buffering.

VT3K supports line-oriented and VPLUS blockmode applications on the HP 3000. Non-VPLUS applications or hybrid applications that mix VPLUS and MPE intrinsic calls for terminal communications are not supported. Character-at-a-time applications that require type ahead to be enabled on the HP 3000 are not supported.

Network Link Requirements
Use of NS/9000 requires the Local Area Network Link. The LAN/9000 Series 800 and Series 700 Links alone enable Series 800 and Series 700 computers to communicate with other HP 9000 computers using BSD Sockets. Service Products available to run on the LAN/9000 Links are NS/9000 (as described in this data sheet) and ARPA Services/9000 (see table 1).

Token Ring and FDDI LAN Links are not supported with NS/9000.

Communication with other Series 800 and 700 computers over the LAN requires that the remote systems be equipped with a LAN/9000 Series 800 or 700 Link and either NS/9000 or ARPA Services/9000 software. Specific requirements for intersystems communication with LAN/9000 Series 800 and 700 Links and NS/9000 between HP 9000 and non-HP 9000 processors are described in table 2.

Table 2: **HP 9000 NS and LAN Links**

Computer System	LAN Link	Software
HP 9000 Series 800	LAN/9000 Series 800 (36967A) (choose appropriate options)	NS/9000 Series 800 (B1029B)
HP 9000 Series 700	Built-in LAN interface Additional LAN interfaces require 25567A	NS Services/ 700 (J2140A)
HP 1000 A-Series	LAN/1000 Link (12076A)	NS/1000 (91790A)
HP 3000	LAN/3000	NS/3000

Compatibility

NS/9000 Series 800 and 700 software is compatible with:

- NS/1000 (91790A) NFT and TELNET* Services
- NS/3000 NFT and VT Services

* TELNET service requires the ARPA Service/800 or ARPA Services/300/400/700 product also.

System Environment

Series 800 and 700 computers running NS/9000 must be running the HP-UX operating system version 8.0 or later. A minimal configuration for NS/9000 Series 800 functional operation is 8 MB of memory, which includes the memory requirements for the HP-UX operating system, and at least one disk drive.

Table 1 Model #	LAN/9000 Link Product	Network Services 9000	ARPA Services 9000
Series 800	HP 36967A	HP B1029B	HP B1030B (included with all 8x7 systems)
Series 700	HP 25567A	HP J2140A	Included with HP-UX OS

Hewlett-Packard System Engineers and Data Communications Specialists are available to consult in network design, and can assist in designing an effective network. Consult your HP sales representative for more details.

Installation Policy

Customer Responsibility

The NS/9000 Series 800 and 700 customer must assume the following responsibilities with the purchase of NS/9000.

1. LAN/9000 Series 800 and Series 700 Link products must be installed prior to the NS/9000 software. The customer is responsible for network configuration and installation of the NS/9000 software.
2. It is highly recommended that one person in the customer's organization be designated as the Network Manager. This person will assume responsibility for configuration and maintenance of the customer's systems, and will function as the focal point for Hewlett-Packard's support of the network.
3. Hewlett-Packard strongly recommends that the customer purchase support from HP for NS/9000 and related hardware and software support products.

Documentation

The following documentation is provided with the NS/9000 product. This material describes the functionality and versatility of NS/9000.

5958-8563 NS Cross System NFT Reference Manual
B1012-90009 Using Network Services
B1012-90010 Installing and Administering Network Services
B1012-90012 HP 9000 Computers Network Overview
0B0 Deletes 5958-8563

Ordering Information

Software

HP B1029B NS/9000 for Series 800 options

AH0 For Tier 1 SPUs
AE5 For Tier 2 SPUs
AEP For Tier 3 SPUs
UJA ½-inch mag tape for HP-UX 9.0
UJB CD certificate for HP-UX 9.0
UJC DDS cartridge for HP-UX 9.0
UJD QIC cartridge for HP-UX 9.0
UJE QIC cartridge for HP-UX 8.02

Order the appropriate upgrade option if moving to a larger system:

0CA Return credit for the 500 processor
0G8 Return credit for HP 3000 option 350
0GJ Return credit for option 315, Tier 2
0GR Return credit for option AH0, Tier 1

HP J2140A NS/9000 for Series 700

UJ8 CD certificate for HP-UX 8.07
UJ9 DDS cartridge for HP-UX 8.07
UJB CD certificate for HP-UX 9.0
UJC DDS cartridge for HP-UX 9.0

Hardware

Consult LAN/9000 Link data sheet.

HEWLETT® PACKARD

HP-UX SNAplus3179G

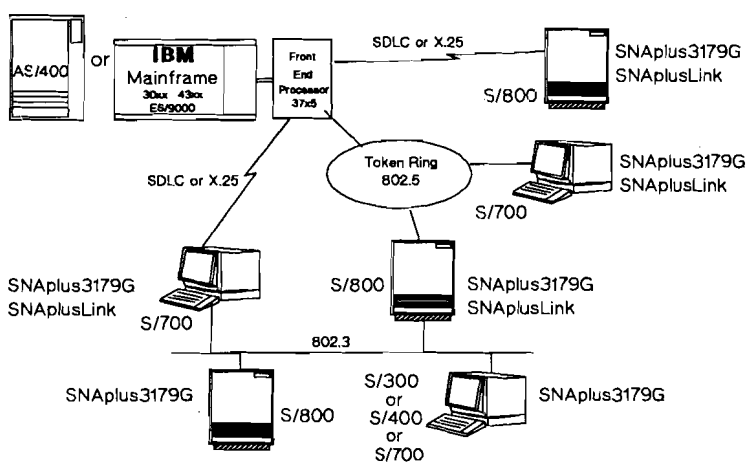
Technical Data

For HP 9000 Series 300, 400, 700, and 800 Computer Systems
Product Numbers
HP J2236A, J2230A, J2224A

The HP-UX SNAplus3179G software product enables the HP 9000 Series 300, 400, 700, and 800 running the HP-UX operating system, and the X Windows System, to emulate an IBM 3179G/3192G color graphics display station. SNAplus3179G allows interactive communications between an HP 9000 Series 300, 400, 700, and 800 and an IBM System/370 or compatible mainframe using SNA communications and 3270 8-bit and 16-bit* data streams.

The HP-UX SNAplus3179G can be configured as either stand-alone or client/server. The standalone configuration provides IBM mainframe access for a single HP-UX computer which has its own HP-UX SNAplusLink. The client/server configuration permits access to the IBM mainframe from multiple HP-UX computers on an Ethernet or Token Ring LAN. These computers generally use a single HP 9000 computer with an SNAplusLink as a server to access the IBM mainframe.

The HP-UX SNAplusLink provides the major features of an IBM 3274 cluster control unit and the lower four levels of SNA. Physical Unit Type 2 and Type 2.1 (PU2 and PU 2.1) are emulated, Logical Unit Types 0, 1, 2, 3, and 6.2 (LU0, LU1, LU2, LU3, LU6.2) are supported. When used with HP-UX SNAplusLink, SNAplus3179G allows access to the Graphical Data Display Manager (GDDM) and 3270 applications on the mainframe, such as TSO, CMS, and CICS.



Features

The HP 9000 Series 300, 400, 700, and 800 with SNAplus3179G supports host interactive color graphics on IBM System/370 or compatible mainframes, by emulating a subset of the features of an IBM 3179G color graphics display station. The SNAplus3179G product supports the following features:

- Alphanumeric/APL keyboard
- HP-UX X11R5 Window system support allows the user to create, move, shuffle, iconify, or refresh windows; the window manager allows the execution of several HP-UX SNAplus3179G applications in a multitasking mode; the graphics, color, and special effects of the IBM 3179G applications are maintained while executing SNAplus3179G in the X Windows System
- PC3270 file transfer enables interactive file transfers of 8-bit and 16-bit* data streams on the HP 9000 to IBM systems running TSO, CICS, or VM/CMS.
- In addition to English (8-bit) data streams, SNAplus3179G provides Native Language Support (NLS) which handles IBM's Double Byte (16-bit)* Character Set (DBCS) data. Supported Asian languages include Japanese JIS0201, JIS0208, and 2-byte EUC; Traditional Chinese, NHC and Big 5; and Korean.
- Supports ISO 8859.1 for Western European languages and ISO 8959.8 for Hebrew.
- Up to 10 sessions and hot key capability through windows environments enable the user to control multiple host sessions on the same monitor.
- Supports IBM's Response Time Monitor (RTM) which allows users to display statistics on how quickly the IBM host is responding to requests for data.
- Supports NetView 3270 User Alerts for communicating with the host operator.
- High-Level Language Application Programming Interface (HLLAPI) provides a programmable interface for automating data transfer operations and repetitive tasks, such as automating startup of host 3270 applications.
- Motif graphical user interface provides seven colors: red, blue, green, yellow, pink, white, and turquoise.
- Highlight attributes: normal, intense, reverse video, and underscore.
- Keyboard remapping with view, swap, and disable key assignments.
- International language support variants of EBCDIC
- Type-ahead of keystrokes that will be required after the host has responded.
- Keystroke record and replay to start up host application, log on, or perform any standard initialization.
- File pull-down menu to open, create, save style files, setup multiple style files, and control host sessions.

Functional Specifications

When SNAplusLink and SNAplus3179G are used together, the SNAplusLink emulates an IBM 3274 model 51C cluster controller, and SNAplus3179G emulates a 3179G Model G1 or G2 display.

- Local screen print is available with SNAplus3179G through the functionality of X Windows. All printers supported by X Windows are supported by SNAplus3179G.
- IND$FILE for file transfer to CICS, VM/CMS, or MVS/TSO.
- APVUFILE for file transfer to CICS, VM/CMS, or MVS/TSO on IBM hosts in Asian language environments.
- HLLAPI allows C language application programs to be written to communicate with the IBM system.
- SNAplus3179G allows communications with an IBM 370 or compatible mainframe running VM, VM/XA, MVS/SP, MVS/XA, or MVS/ESA operating systems and ACF/VTAM through an IBM 3705, 3725, or 3745 communications controller running ACF/NCP.

Features Not Supported

The following major features of an IBM 3179G color display station are not implemented by SNAplus3179G:

- Attached plotter
- Fields or characters with the blinking attribute
- Operator selection of:
  - Alternate alpha and graphic cursor type
  - Graphic/alpha cursor select using +Cr key
  - Cursor blink, keyboard click, numeric lock, audible alarm volume
- Alpha cursor movement using a mouse
- Accelerated or diagonal cursor movement
- Cursor position display
- Keyboard entry assist
- Cancel screen copy in progress
- Basic assurance test
- Offline test
- Attribute/null display test
- Underpaint background mix

Customer Installation Responsibility

Installation of these products requires knowledge in several overlapping areas. The staff engineer responsible for this task must have strong knowledge of (or have direct contact with staff with strong knowledge of) SNA networks, application environments, HP-UX system administration, and X Windows setup.

Installation requires basic SNA knowledge. This includes knowledge of interface nodes, network routers, NAUs, PUs, LUs, link types, IBM hardware and software.

The installer must understand why the SNAplus products are being installed, how the users are going to use SNAplus and how SNAplus fits into the network solution.

Installation of SNAplus requires a thorough user-level knowledge of HP-UX commands. In addition, the installer must be familiar with:

- running update on an HP-UX system
- running SAM (in order to add users)
- the HP-UX file system
- running LAN and PSI diagnostics on an HP-UX system
- HP-UX kernel configuration

Customers who cannot compose a team with this skill set should purchase HP Installation and Network Startup services.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP-UX SNAplus3179G includes right-to-use license and software. For Series 300, 400, and 700, customer must specify software version option and a media option, and for the Series 800, a processor option.

HP-UX SNAplus3179G requires HP STREAMS/UX for Series 300, 400, 700, and 800 running HP-UX 9.0.

HP J2236A HP-UX SNAplus3179G for Series 300, 400

AA0	¼-inch cartridge tape (Release 8.02 only)
AAU	CD-ROM certificate only
APH	Software Version HP-UX 9.0
0B0	Delete documentation

Product Requirements

Environment	SNAPlus3179G Series 300, 400	SNAPlus3179G Series 700	SNAplus3179G Series 800
Models	3xx, 4xx	7xx	Fxx, Gxx, Hxx, Ixx, 800
Operating System	HP-UX 9.0 or later		
STREAMS/UX	J2231A	J2232A	J2237A
SNAplusLink	Not available	J2226A	J2220A
LAN/9000		Bundled with HP-UX 9000 systems	
Token Ring/9000	Not available	J2165A	J2166A
Memory	8 MBytes	8 MBytes	8 MBytes
Disk Space	750 KBytes	750 KBytes	750 KBytes
IBM Midrange	AS/400		

ABJ Japanese Manuals HP-UX SNAplus3270/ 3179G Japanese Administrator's Guide (J2221-61016)* HP-UX SNAplus3270/3179G Japanese User's Guide (J2221-61015)*

HP J2230A HP-UX SNAplus3179G for Series 700

AA0 ¼-inch cartridge tape (Release 8.02 only)
AAU CD-ROM certificate only
APH Software Version HP-UX 9.0
0B0 Delete documentation
ABJ Japanese Manuals HP-UX SNAplus3270/ 3179G Japanese Administrator's Guide (J2221-61016)* HP-UX SNAplus3270/3179G Japanese User's Guide (J2221-61015)*

HP J2224A HP-UX SNAplus3179G for Series 800

Media options
AA1 ½-inch magnetic tape (1600 bpi)
AAH DDS cartridge tape
AAU CD-ROM certificate only
AA4 QIC
APH Software Version HP-UX 9.0
0B0 Delete Manuals
ABJ Japanese Manuals HP-UX SNAplus3270/ 3179G Japanese Administrator's Guide (J2221-61016)* HP-UX SNAplus3270/3179G Japanese User's Guide (J2221-61015)*

Processor options
AH0 Fxx, Gxx, 807, 808, 817, 815, 822, 827, 837
AE5 Hxx, Ixx, 825, 832, 847, 857, 635, 835, 842, 867, 877, 645, 840, 845, 852, 887, 897
AEP 890/1-2, 890/3-4, 850, 855, 860, 865, 870/100, 870/200, 870/300, 870/400

HP-UX SNAplus3179G requires previous installation of HP-UX SNAplusLink (HP J2220A or HP J2226A) either on the stand-alone or on the server system.

The software which the customer orders contains both the stand-alone and client/server configuration software. During installation, the customer chooses which configuration is required.

Upgrade options are available for Series 800 SNAplus products. Please consult the HP 9000 price guide for details.

Note: A copy of HP-UX SNAplus3179G must be ordered for each HP-UX system which is to communicate with the IBM mainframe through the server.

Documentation

included with product

J2221-61012 HP-UX SNAplus3270/3179G Administrator's Guide
J2224-61000 HP-UX SNAplus3270/3179G User's Guide
J2220-61021 HP-UX SNAplus Installation Guide
J2220-61025 HP SNA Products Remote System Configuration Guide
J2220-61022 HP-UX SNAplus Diagnostics Guide
J2220-61026 HP-UX SNAplus Text Configuration Guide*

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP representative, or refer to the HP data sheets for specific support services.

* Available with Release 3, February 1994

Printed in the U.S.A.

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HP-UX SNAplusAPI

Technical Data

For HP 9000 Series 300, 400, 700 and 800 Computer Systems
Product Numbers
HP J2235A, J2229A, and J2223A

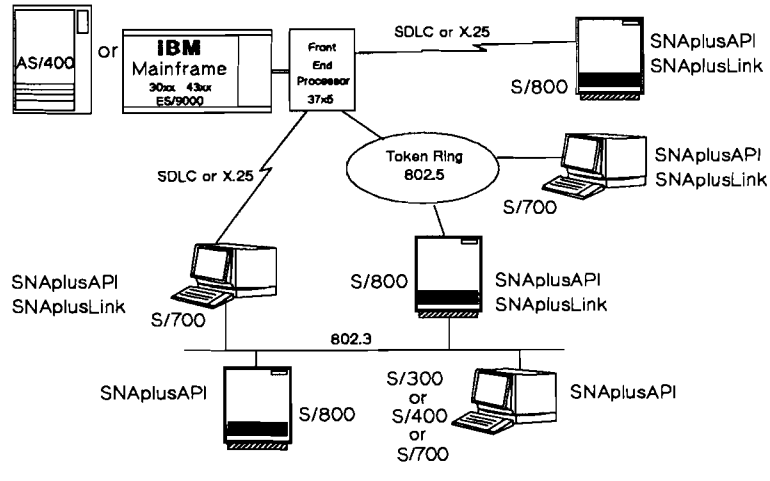
The HP-UX SNAplusAPI (Application Programming Interface) product provides programmatic interfaces for developing applications for program-to-program communication in hierarchical or peer-to-peer environments.

HP-UX SNAplusAPI includes LU type 6.2 API, Common Programming Interface for Communications* (CPI-C), LUA API, and Network Management API.

LU type 6.2 allows for Advanced Program-to-Program Communication (APPC) between applications distributed across a network;.CPI-C* provides a standard interface for peer-to-peer communications among programs; LUA enables access to remote applications using any of the LU types 0, 1, 2, or 3; and Network Management API, provides an application program interface for communicating with the NetView program.

Combined with the HP-UX SNAplusLink product, HP-UX SNAplusAPI gives HP customers the ability to develop applications that are distributed between an HP 9000 computer and an IBM System.

The HP-UX SNAplusAPI product can be run in either a stand-alone or client/server environment. The stand-alone environment allows access to IBM systems from a single HP-UX computer which has its own HP-UX SNAplusLink. The client/server environment permits access to the IBM systems from multiple HP-UX systems on an Ethernet or Token Ring LAN. Client systems generally use a single HP 9000 system with SNAplusLink as a server to access the IBM systems.



Features

LU 6.2 API provides:

- Basic and mapped conversation verbs allow HP 9000 programmers to implement program-to-program communication in an SNA network.
- Systems running SNAplusAPI can communicate with peer systems directly by taking advantage of SNAplusLink's Node Type 2.1 or systems can communicate with an IBM mainframe using Node Type 2.0 or Type 2.1.
- Up to 254 LU-LU sessions per system can run simultaneously, each session is responsible for a separate communication task or for adding additional bandwidth to a single communication task. Each application Transaction Program can handle up to 64 LU-LU sessions.
- A system running SNAplusAPI application can act as a Low Entry Network (LEN) node in an IBM Advance Peer-to-Peer Network (APPN) environment.
- Enables a remote LU 6.2 application to request an HP 9000 LU 6.2 application to start running and begin communicating with it.
- The HP-UX SNAplusAPI is completely compatible with other HP 9000 SNAplus services. These products may all be running simultaneously over the same SNAplusLink to the SNA network..
- HP 9000 application programmers can track all LU 6.2 verb calls within applications being developed. This acts as a valuable debugging aid during program development.
- Application programs on the HP 9000 are written in C Language.
- Support for Dependent and Independent LUs
- Session-level and conversation-level security with encrypted passwords
- Ability to send Program Initialization Parameters (PIP)
- Control Operator Verbs for controlling and monitoring APPC sessions

CPI-C*, the Common Programming Interface for Communications, is an SAA adherent API. CPI-C allows application programs distributed across a network to communicate with each other and exchange data as peers. CPI-C supports the OS/2 Extended Services (version 1.0).

The LUA interface:

- Allows user applications to communicate using LU types 0, 1, 2, or 3.
- Is compatible with the Request Unit Interface (RUI) interface of IBM OS/2 Extended Edition version 1.2 LUA.
- Supports the following verbs:
  RUI_BID
  RUI_INIT
  RUI_PURGE
  RUI_READ
  RUI_TERM
  RUI_WRITE

The Network Management API interface:

- Communicates with the NetView program
- Can send and receive NetView Network Management Vector Transport messages (NMVTs).
- Supports the following verbs:
  NM_OPEN
  NM_CLOSE
  NM_RECEIVE
  NM_SEND

Functional Description

LU6.2 API provides a set of basic and mapped conversation and type-independent verbs for application programmers to use for program-to-program communication. The product is a C library which is linked into the user's application Transaction Program (TP) to gain access to the IBM system. Communication can take place between an HP 9000 application program and either a CICS application program running on an IBM mainframe or an application program running on an IBM peer system such as the AS/400. These verbs initiate LU 6.2 conversations, send and receive data over these conversations on behalf of program pairs needing to communicate to complete a "transaction." Examples of transactions are database updates and file transfers.

HP-UX LU 6.2 API Verb Summary

Verb	Function
[mc_]allocate	Establishes a conversation between two TPs.
[mc_]confirm	Sends a confirmation request to the remote TP and waits for a reply.
[mc_]confirmed	Sends a confirmation reply to the remote TP in response to receiving a confirmation request..
[mc_]deallocate	Ends a conversation between TPs.
[mc_]flush	Flushes the LU's send buffer.
[mc_]get_attributes	Returns information pertaining to a conversation.
[mc_]prepare_to_receive	Changes the conversation from send to receive state in preparation for receiving data.
[mc_]receive_and_post	Causes the LU to post the conversation when information is available for the local TP to receive.
[mc_]receive_and_wait	Waits for information to arrive on the conversation and then receives the information. The information can be data, conversation status, or request for confirmation.
[mc_]receive_immediate	Receives any information available on the conversation without waiting.
[mc_]request_to_send	Notifies the remote TP that the local TP is requesting to send data for the conversation.
[mc_]send_data	Sends data to the remote TP.
[mc_]send_error	Informs the remote TP that the local TP has detected an error.
[mc_]test_rts	Tests the conversation for the receipt of a conversation control request.
convert	Converts EBCDIC data to ASCII and ASCII data to EBCDIC.
get_state	Returns the current state of the APPC conversation.
get_type	Returns information pertaining to a conversation.
receive_allocate	Receives the request from a remote TP to start a conversation and then establishes the conversation.
tp_started	Starts the TP, establishes an IPC connection to a named SNAplusLink server.
tp_ended	Ends the TP, stops an IPC connection to a named SNAplusLink server.

Note: [mc_] is optional form for mapped conversations verbs.

In addition to the LU 6.2 verbs, the product provides the following option sets as defined by IBM in the "Transaction Programmer's Reference Manual for LU 6.2":

Option Sets

- Immediate allocation of a session
- PIP data (send only)
- Flush the LU's send buffer
- Prepare to receive
- Long locks
- Post on receipt with wait
- Post on receipt with test for posting
- Test request-to-send received
- Receive immediate
- Get conversation attributes
- Session level LU-LU verification
- User ID verification
- Program supplied user ID and password
- Logging of data in system log
- Get attributes
- Mapped conversation LU Services component
- Minimum contention winners (target) parameter
- Drain target (no) parameter
- Force parameter
- LU-LU session limit
- Locally known LU names
- Maximum RU size bounds
- Contention winner automatic activation limit

Customer Installation Responsibility

Installation of these products requires knowledge in several overlapping areas. The staff engineer responsible for this task must have strong knowledge of (or have direct contact with staff with strong knowledge of) SNA networks, application environments, and HP-UX system administration.

Installation requires basic SNA knowledge. This includes knowledge of interface nodes, network routers, NAUs, PUs, LUs, link types, IBM hardware and software.

The installer must understand why the SNAplus products are being installed, how the users are going to use SNAplus and how SNAplus fits into the network solution.

Installation of SNAplus requires a thorough user-level knowledge of HP-UX commands. In addition, the installer must be familiar with:

- running update on an HP-UX system
- running SAM (in order to add users)
- the HP-UX file system, privilege groups, and real-time features
- running LAN and PSI diagnostics on an HP-UX system
- HP-UX kernel configuration

Customers who cannot compose a team with this skill set should purchase HP Installation and Network Startup services.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP-UX SNAplusAPI includes right-to-use license and software. For Series 300, 400, and 700, customer must specify software version option and a media option, and for the Series 800, a processor option.

HP-UX SNAplusAPI requires HP STREAMS/UX for Series 300, 400, 700, and 800 running HP-UX 9.0.

HP J2235A HP-UX SNAplusAPI for Series 300/400

AA0	¼-inch cartridge tape (Release 8.0 only)
AAU	CD-ROM certificate only
APB	HP-UX 8.0
APH	HP-UX 9.0
0B0	Delete documentation
0BG	HP-UX SNAplusAPI APPC Programmer's Migration Guide (J2223-61012)

Product Requirements

Environment	SNAplusAPI Series 300, 400	SNAplusAPI Series 700	SNAplusAPI Series 800
Models	3xx, 4xx	7xx	Fxx, Gxx, Hxx, Ixx, 8xx
Operating System		HP-UX 9.0 or later	
STREAMS/UX	HP J2231A	HP J2232A	HP J2237A
SNAplusLink	Not available	HP J2226A	HP J2220A
LAN/9000		Bundled with HP-UX 9000 systems	
Token Ring/9000	Not available	HP J2165A	HP J2166A
Disk Space	3 MBytes	5.9 MBytes	3.8 MBytes
Memory Space	800 KBytes	800 KBytes	800 KBytes
IBM Host	IBM System/370 or compatible mainframe (Series 30xx, 43xx, or ES/9000) in an SNA environment, MVS, or MVS/XA operating systems, ACF/VTAM, and ACF/NCP, CICS (version 1.7 or later)		
IBM Midrange	AS/400		

HP J2229A HP-UX SNAplusAPI for Series 700

AAH DDS cartridge tape
AAU CD-ROM certificate only
APF HP-UX 8.07
APH HP-UX 9.0
0B0 Delete documentation
0BG HP-UX SNAplusAPI APPC Programmer's Migration Guide (J2223-61012)

HP J2223A HP-UX SNAplusAPI for Series 800

AA0 ¼-inch cartridge tape (Release 8.02 only)
AA1 ½-inch magnetic tape (1600 bpi)
AAH DDS cartridge tape
AA4 QIC
AAU CD-ROM certificate only
APB HP-UX 8.0
APH HP-UX 9.0
0B0 Delete documentation
0BG HP-UP SNAplusAPI APPC Programmer's Migration Guide (J2223-61012)

Processor options
AH0 Fxx, Gxx, 807, 808, 817, 815, 822, 827, 837
AE5 Hxx, Ixx, 825, 832, 847, 857, 635, 835, 842, 867, 877, 645, 840, 845, 852, 887, 897
AEP 890/1-2, 890/3-4, 850, 855, 860, 865, 870/100, 870/200, 870/300, 870/400

HP-UX SNAplusAPI requires previous installation of HP-UX SNAplusLink (HP J2220A or HP J2226A) either on the stand-alone or on the server system.

The software which the customer orders contains both the stand-alone and client/server configuration software. During installation, the customer chooses which configuration is required.

Upgrade options are available for Series 800 SNAplus products. Please consult the HP 9000 price guide for details.

Note: A copy of HP-UX SNAplusAPI must be ordered for each HP-UX system which is to communicate with the IBM mainframe through the server.

Documentation for HP-UX 9.0

J2223-61008 HP-UX SNAplusAPI Administrator's Guide
J2223-61009 HP-UX SNAplusAPI APPC Programmer's Guide
J2223-61010 HP-UX SNAplusAPI LUA Programmer's Guide
J2223-61011 HP-UX SNAplusAPI Common Service Verbs Programmer's Guide
J2223-61013 HP-UX SNAplusAPI Network Management API Programmer's Guide
J2220-61021 HP-UX SNAplus Installation Guide
J2220-61025 HP SNA Products Remote System Configuration Guide
J2220-61022 HP-UX SNAplus Diagnostics Guide
J2220-61026 HP-UX SNAplus Text Configuration Guide*
J2223-61027 HP-UX SNAplusAPI CPI-C Programmer's Guide*

Documentation for HP-UX 8.0

J2220-61001 HP-UX SNAplus Installation Guide
J2220-61002 Getting to Know SNAP-IX
J2220-61003 SNAP-IX User Interface Guide
J2220-61004 SNAP-IX Management Guide
J2220-61005 SNAP-IX Configuration Guide
J2220-61006 SNAP-IX Glossary
J2220-61007 SNAP-IX Diagnostics Guide
J2223-61000 SNAP-IX APPC Programmer's Guide
J2223-61001 CSV Programmer's Guide
J2220-61025 HP SNA Products Remote System Configuration Guide

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP representative, or refer to the HP data sheets for specific support services.

* Available with Release 3, February 1994

Technical information in this document is subject to change without notice.

Printed in the U.S.A.

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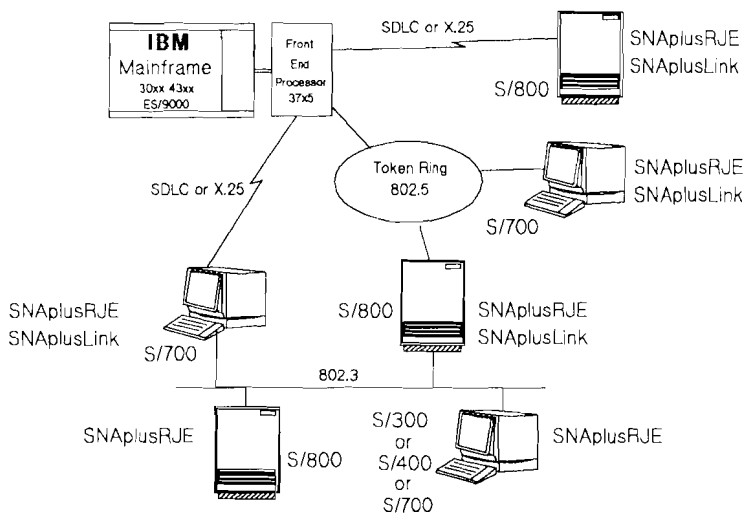
HP-UX SNAplusRJE

Technical Data

For HP 9000 Series 300, 400, 700, and 800 Computer Systems
Product Numbers
HP J2234A, J2228A, J2222A

HP-UX SNAplusRJE is a software product that provides batch data transfer between an HP 9000 Series 300, 400, 700, or 800 computer and an IBM System/370-compatible mainframe, in a System Network Architecture (SNA) environment. The HP 9000 running SNAplusRJE emulates a standard subset of capabilities of the IBM 3770 terminal.

The HP-UX SNAplusRJE product is available in two configurations: stand-alone and client/server. The stand-alone configuration provides IBM mainframe access for a single HP-UX computer which has its own HP-UX SNAplusLink. The client/server configuration permits access to the IBM mainframe from multiple HP-UX computers on an Ethernet or Token Ring LAN. These computers generally use a single HP 9000 computer with the HP-UX SNAplusLink as a server to access the IBM mainframe.



The HP-UX SNAplusLink provides the major features of an IBM 3274 cluster control unit and the lower four levels of SNA. Physical Unit Type 2 and Type 2.1 (PU2 and PU2.1) are emulated, Logical Unit Types 0, 1, 2, 3, and 6.2 (LU0, LU1, LU2, LU3, LU6.2) are supported.

Features

- Communications with MVS/JES2 (Multiple Virtual Storage/Job Entry Subsystem) MVS/JES3 and VSE/Power (Virtual Storage Extended).
- Jobs can be submitted to the host through a script file. Host output can be routed to a disk file or piped as standard input to a program or shell script for processing.
- Immediate or time-deferred job submission.
- Host console commands can be sent and host console data can be received interleaved with file transmission or receipt.
- Notification of output via mail or message to the user's terminal.

- The RJE process runs in the background and uses a simple send command to initiate a transmission. The background process will accept data from the host without user intervention.
- Security – access can be restricted to a group of users.
- Multiple RJE workstations can be configured on a single SNAplusRJE system to provide different RJE configurations for different groups of users.
- Jobs submitted for a remote system are queued locally on a spool before being sent to the remote system.
- Up to 9 printer and 9 punch output devices may be configured for each RJE workstation.
- A full-screen console program allows you to view host system console information for an RJE workstation and to issue commands to JES.
- PDIRs (Peripheral Data Information Records) are accepted from the host.
- ASCII to EBCDIC code conversion is supported.
- Allows specification of variable record size of 80 to 248 bytes for inbound punch and exchange data.
- Inbound and outbound data compression is supported.
- Up to 5 LUs on the same host connection may be configured for each RJE workstation.
- A device can be configured to send output to the rjeusr or rjeusrpad programs which route output according to a usr card specification.
- An environment variable enables padding of punch output.
- Supports printer forms control by SNA Character Strings (SCS) or using Forms Control Blocks (FCBs)
- Data stream profile 0 or 1 is supported.

Functional Specifications

All printers and terminals supported by the HP 9000 Series 300, 400, 700, and 800 running HP-UX are supported by HP-UX SNAplusRJE.

The SNAplusRJE user interface has commands for submitting a job, displaying job queue and workstation status, and sending and receiving console commands (see table of user commands on next page). These commands can be used interactively. The HP 9000 will concurrently process user applications and data communications with an IBM mainframe.

SNAplusRJE runs in the background. As a result, jobs may be queued or status may be checked at any time. Jobs submitted to the host are held in a transmission queue and automatically sent to the host when a session is established. Output from the host can be received at any time a host session is active, even when the user has logged off.

Output can be configured to be sent to a file, directory or user supplied post-processor. Additionally, the user can specify the destination of their output with a usr card in their job. The rjeusr and rjeusrpad post-processors will then direct the output to the specified file, directory or post-processor.

Using SNAplusRJE and a high-speed printer, an HP 9000 can be used as a remote print station for an IBM host. This is an effective way for users at remote sites to print large reports from IBM hosts.

SNAplusRJE does not require a dedicated processor. Concurrently, while reports are being received, the HP 9000 can be used for other tasks, such as another session with an IBM host or program development.

SNAplusRJE can be used to access or update databases. SNAplusRJE may be used to transmit large files to a centralized database and then to periodically receive an updated copy of the entire database or portions of it.

With SNAplusRJE and SNAplus3270 sharing an SNAplusLink, users have the capability of both batch and interactive communications. This allows programmers to do development work using SNAplus3270 and then run larger batch jobs with SNAplusRJE.

Files can be sent and received in binary mode. Translation between ASCII and EBCDIC is not done, allowing transmission of binary data such as graphics data files.

Printer output may be formatted using Forms Control Blocks (FCBs). These are defined locally and can be specified in the outbound data using the PDIR. If the PDIR is not used to select an FCB, a configured default FCB is used. Printer output may also be formatted by SCS codes.

SNA Function Management Headers (FMHs)ed

Inbound and outbound FMHs supported:

- FMH-1 Begin Destination Select (BDS)
- FMH-1 End Destination Select (EDS)
- FMH-1 Abort Destination Select (ADS)
- FMH-1 Suspend Destination Select (SDS)
- FMH-1 Resume Destination Select (RDS)
- FMH-1 Continue Destination Select (CDS)

For outbound writer data streams FMH-2 (PDIR) is supported.

Features Not Supported

- The following SNA Character Stream (SCS) printer control codes are not supported:

BEL	Bell
SLD	Set Line Density
GE	Graphic Escape
SA	Set Attribute

List of User Commands

Command	Function
snaprjesend	Submits a job file to the workstation.
snaprjestart	Starts the RJE workstation.
snaprjestop	Stops the RJE workstation.
snaprjecon	Starts the RJE console and places user in a full screen console interface.
snaprjecmd	Allows entry of host commands from the command line or from a file of commands.
snaprjestat	Checks the status of RJE workstation devices and LUs.
snaprjelst	Provides information about queued jobs.
snaprjecan	Cancels a job on the spool.

Product Requirements

Environment	SNAplusRJE Series 300, 400	SNAplusRJE Series 700	SNAplusRJE Series 800
Models	3xx, 4xx,	7xx	Fxx, Gxx, Hxx, Ixx, 8xx
Operating System		HP-UX 9.0 or later	
STREAMS/UX	HP J2231A	HP J2232A	HP J2237A
SNAplusLink	Not available	HP J2226A	HP J2220A
LAN/9000		Bundled with HP-UX 9000 systems	
Token Ring/9000	Not available	HP J2165A	HP J2166A
Memory	1MB	1MB	1MB
Disk Space	3MB	3MB	3MB
IBM Host	IBM System/370 or compatible mainframe (Series 30xx, 43xx, or ES/9000) in an SNA environment, MVS/JES2, MVS/JES3, VSE/Power, ACF/VTAM, and ACF/NCP TSO, CMS, or CICS.		

Customer Installation Responsibility

Installation of these products requires knowledge in several overlapping areas. The staff engineer responsible for this task must have strong knowledge of (or have direct contact with staff with strong knowledge of) SNA networks, application environments, and HP-UX system administration.

Installation requires basic SNA knowledge. This includes knowledge of interface nodes, network routers, NAUs, PUs, LUs, link types, IBM hardware and software.

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- running update on an HP-UX system
- running SAM (in order to add users)
- the HP-UX file system, privilege groups, and real-time features
- running LAN and PSI diagnostics on an HP-UX system
- HP-UX kernel configuration

Customers who cannot compose a team with this skill set should purchase HP Installation and Network Startup services.

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Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP-UX SNAplusRJE includes right-to-use license and software. For Series 300, 400, and 700, customer must specify software version option and a media option, and for the Series 800, a processor option.

HP-UX SNAplusRJE requires HP STREAMS/UX for Series 300, 400, 700, and 800 running HP-UX 9.0.

HP J2234A HP-UX SNAplusRJE for Series 300, 400

AA0 ¼-inch cartridge tape (Release 8.0 only)
AAU CD-ROM certificate only
APH Software Version HP-UX 9.0
0B0 Delete documentation
ABJ Japanese Manuals HP-UX SNAplusRJE Japanese User's Guide (J2222-61002)*

HP J2228A HP-UX SNAplusRJE for Series 700

AAH DDS cartridge tape
AAU CD-ROM certificate only
APH Software Version HP-UX 9.0
0B0 Delete documentation
ABJ Japanese Manuals HP-UX SNAplusRJE Japanese User's Guide (J2222-61002)*

HP J2222A HP-UX SNAplusRJE for Series 800

Media options
AA1 ½-inch magnetic tape (1600 bpi)
AAH DDS cartridge tape
AAU CD-ROM certificate only
AA4 QIC
APH Software Version HP-UX 9.0
0B0 Delete documentation
ABJ Japanese Manuals HP-UX SNAplusRJE Japanese User's Guide (J2222-61002)*

Processor options
AH0 Fxx, Gxx, 807, 808, 817, 815, 822, 827, 837
AE5 Hxx, Ixx, 825, 832, 847, 857, 635, 835, 842, 867, 877, 645, 840, 845, 852, 887, 897
AEP 890/1-2, 890/3-4, 850, 855, 860, 865, 870/100, 870/200, 870/300, 870/400

HP-UX SNAplusRJE requires previous installation of HP-UX SNAplusLink (J2220A or J2226A) on the stand-alone or server system.

The software which the customer orders contains both the stand-alone and client/server configuration software. During installation, the customer chooses which configuration is required.

Upgrade options are available for Series 800 SNAplus products. Please consult the HP 9000 price guide for details.

Note: A copy of HP-UX SNAplusRJE must be ordered for each HP-UX system which is to communicate with the IBM mainframe through the server.

Documentation

Included with the product

J2222-61001 HP-UX SNAplus User's Guide
J2222-61000 HP-UX SNAplusRJE Administrator's Guide
J2220-61021 HP-UX SNAplus Installation Guide
J2220-61025 HP SNA Products Remote Systems Configuration Guide
J2220-61022 HP-UX SNAplus Diagnostics Guide
J2220-61026 HP-UX SNAplus Text Configuration Guide*

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP representative, or refer to the HP data sheets for specific support services.

* Available with Release 3, February 1994

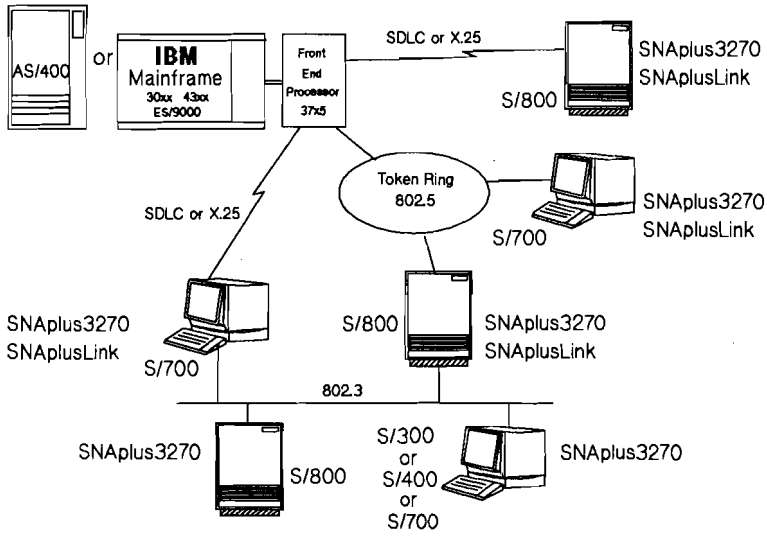
HEWLETT® PACKARD

HP-UX SNAplus3270

Technical Data

For HP 9000 Series 300, 400, 700, and 800 Computer Systems
Product Numbers
HP J2233A, J2227A, J2221A

HP-UX SNAplus3270 allows interactive communications between an HP 9000 Series 300, 400, 700, or 800 and an IBM System/370-compatible mainframe or an IBM peer system such as the AS/400 using SNA 3270 protocols, handling 8-bit and 16-bit* data streams. HP terminals, monitors, and printers on the HP 9000 running SNAplus3270 emulate the functions of IBM 3278 terminals and 3287 printers. SNAplus3270 provides additional functionality beyond emulation to include features such as file transfer, HLLAPI application programming interface, Motif graphical user interface, a character oriented windows user interface, and multiple session support.



The HP-UX SNAplus3270 can be configured as either stand-alone or client/server. The stand-alone configuration provides access to IBM mainframes or peer systems for a single HP-UX computer which has its own HP-UX SNAplusLink. The client/server configuration permits access to the IBM system from multiple HP-UX computers on an Ethernet or Token Ring LAN. These computers generally use a single HP 9000 computer with HP-UX SNAplusLink as a gateway to access the IBM system.

The HP-UX SNAplusLink provides the major features of an IBM 3174 and 3274 cluster control unit and the lower four levels of SNA. Physical Unit Type 2 and Type 2.1 (PU2, PU2.1) are emulated, Logical Unit Types 0, 1, 2, 3 and 6.2 (LU0, LU1, LU2, LU3, and LU6.2) are supported. When used with HP-UX SNAplusLink, SNAplus3270 allows access to 3270 applications on the mainframe such as TSO, CMS, and CICS.

Features

- Allows HP 9000 Series 300, 400, 700, or 800 system monitors, terminals, and printers to emulate the major features of IBM 3278 terminals and 3287 printers. Terminal access can be through the standard HP-UX supported options (asynchronous or bit-mapped display) or through PCs running AdvanceLink's terminal emulator. Access can also be through workstation's X-Windows environments by using the SNAplus3270 Motif graphical user interface.
- PC3270 file transfer enables interactive file transfers of 8-bit and 16-bit* data streams on the HP 9000 to IBM systems running TSO, CICS, or VM/CMS.
- In addition to English (8-bit) data streams, SNAplus3270 provides Native Language Support (NLS) which handles IBM's Double Byte (16-bit)* Character Set (DBCS) data. Supported Asian languages include Japanese JIS0201, JIS0208, and 2-byte EUC; Traditional Chinese, NHC and Big 5; and Korean.
- Up to 10 sessions and hot key capability through windows environments enables the user to control multiple host sessions on the same monitor.
- Escape to UNIX® shell provides terminal users with the ability to access other HP-UX programs while maintaining the 3270 session in the background.
- Supports IBM's Response Time Monitor (RTM) which allows users to display statistics on how quickly the IBM host is responding to requests for data.
- Supports ISO 8859.1 for Western European Languages and ISO 8859.8 for Hebrew.
- Supports NetView 3270 User Alerts for communicating with the host operator.
- HLLAPI (High-Level Language Application Programming Interface) provides a programmable interface for automating data transfer operations and repetitive tasks, such as automating startup of host 3270 applications.
- Motif graphical user interface provides seven colors: red, blue, green, yellow, pink, white and turquoise.
- Highlight attributes: normal, intense, blinking (non-Motif only), reverse video, and underscore.
- Keyboard remapping with view, swap and disable key assignments.
- International language support variants of EBCDIC.
- Background operation of the ASCII version of the 3270 emulation program enables host printing, HLLAPI applications and command-line file transfers.
- Type-ahead of keystrokes that will be required after the host has responded.
- Keystroke record and replay to start up host application, log on, or perform any standard initialization.
- Character oriented windows user interface provides pull-down menu to open, create, save style files, setup multiple style files, and control host sessions.

Functional Specifications

When used with HP-UX SNAplusLink, SNAplus3270 emulates a 3174 or 3274 cluster controller and 3287 Model 2, 3, 4, and 5 displays or 3287 Model printers. Some of the functionality of SNAplus3270 includes:

- All printers and terminals supported by the HP 9000 Series 300, 400, 700, and 800 running HP-UX are supported by SNAplus3270. (See Technical Reference Guide, HP Vectra PCs, Monitors, and Terminals for specific terminals.)
- Local screen print, screen logging to disk, 3287 printer output redirection to printer, file or user program.
- IND$FILE for file transfer to CICS, VM/CMS, or MVS/TSO.
- APVUFILE for file transfer to CICS, VM/CMS, or MVS/TSO on IBM hosts in Asian language environments.
- HLLAPI allows C language application programs to be written to communicate with the IBM system.

Features Not Supported

For the 3278 Model 2, 3, 4, and 5 displays: test key, keyclick; extended attributes: programmed symbols, alt character sets, multiple partition, encryption. For the 3287 Model 1 printer: PA1, PA2. For Motif: blinking characters.

Customer Installation Responsibility

Installation of these products requires knowledge in several overlapping areas. The staff engineer responsible for this task must have strong knowledge of (or have direct contact with staff with strong knowledge of) SNA networks, application environments, and HP-UX system administration.

Installation requires basic SNA knowledge. This includes knowledge of interface nodes, network routers, NAUs, PUs, LUs, link types, IBM hardware and software.

The installer must understand why the SNAplus products are being installed, how the users are going to use SNAplus and how SNAplus fits into the network solution.

Installation of SNAplus requires a thorough user-level knowledge of HP-UX commands. In addition, the installer must be familiar with:

- running update on an HP-UX system
- running SAM (in order to add users)
- the HP-UX file system
- running LAN and PSI diagnostics on an HP-UX system
- HP-UX kernel configuration

Customers who cannot compose a team with this skill set should purchase HP Installation and Network Startup services.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Product Requirements

Environment	SNAplus3270 Series 300, 400	SNAplus3270 Series 700,	SNAplus3270 Series 800
Models	3xx, 4xx	7xx	Fxx, Gxx, Hxx, Ixx, 8xx
Operating System	HP-UX 9.0 or later		
STREAMS/UX	J2231A	J2232A	J2237A
SNAplusLink	Not available	J2226A	J2220A
LAN/9000	Bundled with HP 9000 systems		
Token Ring/9000	Not available	J2165A	J2166A
Disk Space	3 MBytes	6.9 MBytes	4.6 MBytes
Memory Space	1.6 MBytes	1.6 MBytes	1.6 MBytes
IBM Host	IBM System/370 or compatible mainframe (Series 30xx,43xx, or ES/9000) in an SNA environment, ACF/VTAM and ACF/NCP TSO, CMS, or CICS		
IBM Midrange	AS/400		

Ordering Information

HP-UX SNAplus3270 includes right-to-use license and software. For Series 300, 400, and 700, customer must specify software version option and a media option, and for the Series 800, a processor option.

HP-UX SNAplus3270 requires HP STREAMS/UX for Series 300, 400, 700, and 800 running HP-UX 9.0.

HP J2233A HP-UX SNAplus3270 for Series 300/400

- **AA0** ¼-inch cartridge tape (Release 8.0 only)
- **AAU** CD-ROM certificate only
- **APB** Software version HP-UX 8.0
- **APH** Software version HP-UX 9.0
- **0B0** Delete documentation
- **0BD** HP-UX SNAplus3270 HLLAPI Programmer's Guide, version HP-UX 8.0 (J2221-61001)
- **0BG** HP-UX SNAplus3270 HLLAPI Programmer's Guide, version HP-UX 9.0 (J2221-61016)
- **ABJ** Japanese Manuals HP-UX SNAplus3270/3179G Japanese Administrator's Guide (J2221-61014)* HP-UX SNAplus3270/3179G Japanese User's Guide (J2221-61015)*

HP J2227A HP-UX SNAplus3270 for Series 700

- **AAH** DDS cartridge tape
- **AAU** CD-ROM certificate only
- **APF** Software version HP-UX 8.07
- **APH** Software version HP-UX 9.0
- **0B0** Delete documentation
- **0BD** HP-UX SNAplus3270 HLLAPI Programmer's Guide, version HP-UX 8.0 (J2221-61001)
- **0BG** HP-UX SNAplus3270 HLLAPI Programmer's Guide, version HP-UX 9.0 (J2221-61014)
- **ABJ** Japanese Manuals HP-UX SNAplus3270/3179G Japanese Administrator's Guide (J2221-61016)* HP-UX SNAplus3270/3179G Japanese User's Guide (J2221-61015)*

HP J2221A HP-UX SNAplus3270 for Series 800

Media options

- **AA0** ¼-inch cartridge tape (Release 8.0 only)
- **AA1** ½-inch magnetic tape (1600 cpi)
- **AAH** DDS cartridge tape
- **AA4** QIC
- **AAU** CD-ROM certificate only
- **0BD** HP-UX SNAplus3270 HLLAPI Programmer's Guide, version HP-UX 8.0 (J2221-61001)
- **0BG** HP-UX SNAplus3270 HLLAPI Programmer's Guide, version HP-UX 9.0 (J2221-61014)
- **ABJ** Japanese Manuals* HP-UX SNAplus3270/3179G Japanese Administrator's Guide (J2221-61016)* HP-UX SNAplus3270/3179G Japanese User's Guide (J2221-61015)*

Processor options

- **AH0** Fxx, Gxx, 807, 808, 817, 815, 822, 827, 837
- **AE5** Hxx, Ixx, 825, 832, 847, 857, 635, 835, 842, 867, 877, 645, 840, 845, 852, 887, 897
- **AEP** 890/1-2, 890/3-4, 850, 855, 860, 865, 870/100, 870/200, 870/300, 870/400

HP-UX SNAplus3270 requires previous installation of HP-UX SNAplusLink (J2220A or J2226A) on the stand-alone or server system.

The software which the customer orders contains both the stand-alone and client/server configuration software. During installation, the customer chooses which configuration is required.

Upgrade options are available for Series 800 SNAplus products. Please consult the HP 9000 price guide for details.

Note: A copy of HP-UX SNAplus3270 must be ordered for each HP-UX system which is to communicate with the IBM mainframe through the server.

Documentation for HP-UX 9.0
included with product

J2221-61012 HP-UX SNAplus3270/3179G Administrator's Guide
J2221-61013 HP-UX SNAplus3270 User's Guide
J2220-61021 HP-UX SNAplus Installation Guide
J2220-61022 HP-UX SNAplus Diagnostics Guide
J2220-61025 HP SNA Products Remote System Configuration Guide
J2220-61026 HP-UX SNAplus Text Configuration Guide*

Documentation for HP-UX 8.0
included with product

J2220-61001 HP-UX SNAplus Installation Guide
J2220-61002 Getting to Know SNAP-IX
J2220-61003 SNAP-IX User Interface Guide
J2220-61004 SNAP-IX Management Guide
J2220-61005 SNAP-IX Configuration Guide
J2220-61006 SNAP-IX Glossary
J2220-61007 SNAP-IX Diagnostics Guide
J2221-61000 SNAP-IX UNIX 3270 User's Guide
J2220-61025 HP SNA Products Remote System Configuration Guide

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Representative, or refer to the HP data sheets for specific support services.

* Available with Release 3, February 1994

Printed in the U.S.A.

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HP-UX SNAplusLink

Technical Data

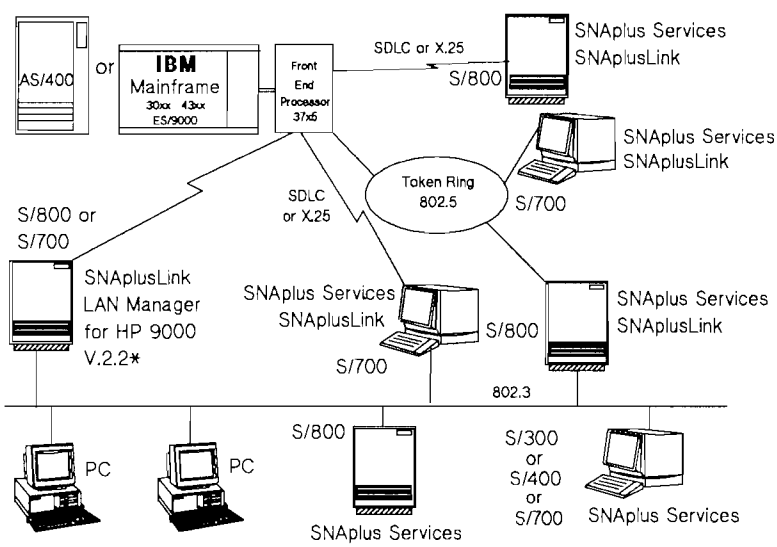
For HP 9000 Series 700 and 800 Computer Systems Product Numbers HP J2226A, J2220A

HP-UX SNAplusLink provides communications between an HP 9000 Series 700 or 800 and an IBM mainframe or an IBM peer system such as the AS/400. The HP-UX SNAplusLink manages the SDLC, QLLC, and Token Ring lines to the host and emulates the major features of an IBM 3274 cluster control unit using the lower four layers of SNA. Node Type 2.0 (T2.0) for hierarchical connectivity and Node Type 2.1 (T2.1) for peer-to-peer connectivity are supported. Logical Unit Types 0, 1, 2, 3, and 6.2 (LU0, LU1, LU2, LU3, LU 6.2) are supported.

The HP-UX SNAplusLink can be configured as either stand-alone or as a client/server. The stand-alone environment provides access to IBM mainframes or IBM peer systems for a single HP-UX computer which has its own HP-UX SNAplusLink. Running in the client/server environment permits access to the IBM systems from multiple HP-UX computers on either an Ethernet or Token Ring LAN. These computers generally use a single HP 9000 computer with HP-UX SNAplusLink as a gateway to the IBM system.

HP-UX SNAplusLink also supports LAN Manager for HP 9000 V.2.2 to provide connectivity for PC clients to access the IBM mainframe or peer systems.

The HP-UX SNAplusLink product is used in conjunction with a service product: HP-UX SNAplus3270, SNAplusAPI, SNAplusRJE, or SNAplus3179G. (Please refer to the appropriate data sheets for more information.) A copy of a service product must reside on each HP-UX computer which is to communicate with the IBM system through the server system.



Features

- SNAplusLink allows the HP 9000 to emulate the major features of a 3174 and 3274 cluster controller using SNA protocols.
- SNAplusLink supports a maximum of 254 Logical Session Units (LUs) as terminals and printers concurrently per link card with a maximum of 2,000 active LUs per system.
- Supports PU 2.1 primary to initiate connections with peer systems including other HP 9000s.
- The HP-UX SNAplusLink running on the HP 9000 Series 700 and 800 systems acts as a server for SNAplus clients running SNAplus3270, SNAplusAPI, SNAplusRJE, and SNAplus3179G on an HP 9000 Series 300, 400, 700, and 800 and can communicate simultaneously to the mainframe using any or all of these services.
- An HP 9000 Series 700, or 800 with HP-UX SNAplusLink can function as a non-dedicated gateway. Depending on the customer's specific application requirements, SNAplusLink easily operates on a Series 700 or 800 while running other HP-UX applications.
- BSD Sockets is the defacto industry standard interface used between the SNAplusLink and the SNAplus service products in an HP-UX client/server environment.
- LAN Manager for HP 9000 V.2.2 is the interface for PC client to UNIX server connectivity.
- PC client software supported is available from DCA/Microsoft: Irma Workstation for Windows, Irma Workstation for DOS, and Irma Workstation for OS/2.
- SNA and TCP/IP can run concurrently over the same Token Ring card.
- SNA and OSI can run concurrently over the same X.25 link card.
- The SNAplusLink product supports line speeds up to 64 Kbps over switched or leased lines for SDLC or QLLC connections, and 4Mb and 16Mb for Token Ring connections.

Functional Specifications

- All printers and terminals supported by the HP 9000 Series 700 or 800 running HP-UX are supported by HP-UX SNAplusLink.
- SNAplusLink allows communication with an IBM 370 or compatible mainframe running VM, VM/XA, MVS/SP, MVS/XA, MVS/ESA, or DOS/VSE operating systems and ACF/VTAM through an IBM 3705, 3725 or 3745 communications controller running ACF/NCP. SNAplusLink also allows comunication with IBM midrange systems such as the AS/400, S/36 or S/38 as peers.
- Up to ten SDLC link cards may be supported in a single Series 700 or 800 depending on the number of card slots available. This allows links to multiple IBM systems.
- Up to five Token Ring cards may be supported in a single Series 700 or 800 depending on the number of card slots available.
- NetView alarms and alerts are sent to the NetView console.
- The SNAplusLink supports synchronous modem speeds up to 64Kbps as described below. SNAplusLink requires synchronous modems that support RS-232-C handshake signals. Modems must also provide transmit and receive clocks for the SDLC interface and ensure ground isolation between the communication systems.
- The SNAplusLink supports auto-dial async/sync modems. The auto-dial modem must supply clock signals and must switch to synchronous mode after the modem drops DSR or DCD.
- Message encoding: NRZ (Non Return to Zero) or NRZI (Non Return to Zero Inverted) is supported on the Series 700 and 800 systems.

Product Requirements

Environment	SNAplusLink Series 700	SNAplusLink Series 800
Models	720, 730, 750 715, 725, 735, 755	Fxx, Gxx, Hxx, Ixx, 8xx
Operating System	HP-UX 9.0 or later	
STREAMS/UX	J2232A	J2237A
Services Supported	SNAplus3270 SNAplusAPI SNAplusRJE SNAplus3179G	
LAN 9000	Bundled with HP 9000 system	
Token Ring/9000	J2165A	J2166A
X.25/9000 (for QLLC)	J2159A	36960A
LM/U	J2256A	J2256A
Disk Space	7.2 MBytes	5.2 MBytes
Memory Space	2.1 MBytes	2.1 MBytes
IBM Midrange	AS/400	
IBM Host	IBM System/370 or compatible mainframe (Series 30xx, 43xx, or ES/9000) in an SNA environment, ACF/VTAM, and ACF/NCP	

Customer Installation Responsibility

Installation of these products requires knowledge in several overlapping areas. The staff engineer responsible for this task must have strong knowledge of (or have direct contact with staff with strong knowledge of) hardware configuration and HP-UX system administration.

Installation requires basic SNA knowledge. This includes knowledge of interface nodes, network routers, NAUs, PUs, LUs, link types, IBM hardware and software.

Installation of SNAplus requires a thorough user-level knowledge of HP-UX commands. In addition, the installer must be familiar with:

- running update on an HP-UX system
- the HP-UX file system, privilege groups, and real-time features
- running LAN and PSI diagnostics on an HP-UX system
- HP-UX kernel configuration

The installer must be familiar with HP 9000 Series 300, 400, 700, and 800 systems, be able to install interface cards, shut down and restart the system and have the ability to configure a modem for QLLC and SDLC, and perform token ring link setup. The installer should also know peripheral hardware capabilities.

Hardware configuration also includes an understanding of client/server topologies, and what products will be on the client or the server.

Customers who cannot compose a team with this skill set should purchase HP Installation and Network Startup services.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP-UX SNAplusLink includes right-to-use license, software, and hardware. For Series 700, customer specifies software version option, media option, hardware option, and for the Series 800, a processor option.

HP-UX SNAplusLink requires HP STREAMS/UX for Series 700 and 800 running HP-UX 9.0.

J2226A HP-UX SNAplusLink Series 700

UG3 EISA card and RS232-C cable (28606-63006)
1AU V.35 Cable (64 Kbps) (28606-63008)
AAH DAT
AAU CD-ROM
AHN Right to Use License and software
APF HP-UX 8.07
APH HP-UX 9.0
0BD HP-UX SNAplus Migration Guide for HP-UX 8.0 (J2220-61000)
0BG HP-UX SNAplus Migration Guide for HP-UX 9.0 (J2220-61020)
0B0 Delete Manuals
ABJ Japanese Manuals HP-UX SNAplusLink Japanese Administrator's Guide (J2220-61028)*
100 PC Clients - HP-UX SNAplus3270/3179G Administrator's Guide (J2221-61012)*

Note: Token Ring requires Token Ring/9000 for Series 700 (J2165A)
Note: QLLC requires X.25/9000 Link (J2159A)

J2220A SNAplusLink for Series 800

Media options
AA0 ¼-inch cartridge tape
AA1 1600 bpi magnetic tape
AAH Digital Audio Tape (DAT)
AA4 QIC Cartridge Tape
APB HP-UX 8.0
APH HP-UX 9.0
0BD HP-UX SNAplus Migration Guide for HP-UX 8.0 (J2220-61000)
0BG HP-UX SNAplus Migration Guide for HP-UX 9.0 (J2220-61020)
0B0 Delete Manuals
ABJ Japanese Manuals HP-UX SNAplusLink Japanese Administrator's Guide (J2220-61028)*
100 PC Clients - HP-UX SNAplus3270/3179G Administrator's Guide (J2221-61012)*
004 Central Bus PSI Card (30263-60003) (825, 835, 840, 845, 850, 855, 860, 865, 635, and 645), RS232-C cable (28606-63006) and stub cable (J30263-63009)
005 Precision Bus PSI Card (28606-60001) (Fxx, Gxx, Hxx, Ixx, 8x7, 808, 815, 822, 832, 842, 852, 870, 890 and RS232-C cable (28606-63006)
1AU V.35 Cable (64 Kbps) (28606-63008)

Processor options
AH0 Fxx, Gxx, 807, 808, 817, 815, 822, 827, 837
AE5 Hxx, Ixx, 825, 832, 847, 857, 635, 835, 842, 867, 877, 645, 840, 845, 852, 887, 897
AEP 890/1-2, 890/3-4, 850, 855, 860, 865, 870/100, 870/200, 870/300, 870/400

Note: Token Ring requires Token Ring/9000 for Series 800 (J2166A opt. 20N)

Note: QLLC requires X.25/9000 Link (36960A)

Upgrade options are available for Series 800 SNAplus products. Please consult the HP 9000 price guide for details.

Documentation

For HP-UX 9.0

Included with the product

J2220-61021 HP-UX SNAplus Installation Guide
J2220-61022 HP-UX SNAplus Diagnostics Guide
J2220-61023 HP-UX SNAplusLink Administrator's Guide
J2220-61024 HP-UX SNAplusLink Network Management Administrator's Guide
J2220-61025 HP SNA Products Remote System Configuration Guide
J2220-61026 HP-UX SNAplus Text Configuration Guide*

For HP-UX 8.0

J2220-61001 HP-UX SNAplus Installation Guide
J2220-61002 Getting to Know SNAP-IX
J2220-61003 SNAP-IX User Interface Guide
J2220-61004 SNAP-IX Management Guide
J2220-61005 SNAP-IX Configuration Guide
J2220-61006 SNAP-IX Glossary
J2220-61007 SNAP-IX Diagnostics Guide
J2220-61025 HP SNA Products Remote System Configuration Guide

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Representative, or refer to the HP data sheets for specific support services.

Customers with hardware support agreements must add the appropriate level of coverage for the link product to their support agreements.

* Available with Release 3, February 1994

Technical information in this document is subject to change without notice.

Printed in the U.S.A.

HEWLETT® PACKARD

The DTC Management Products

Technical Data

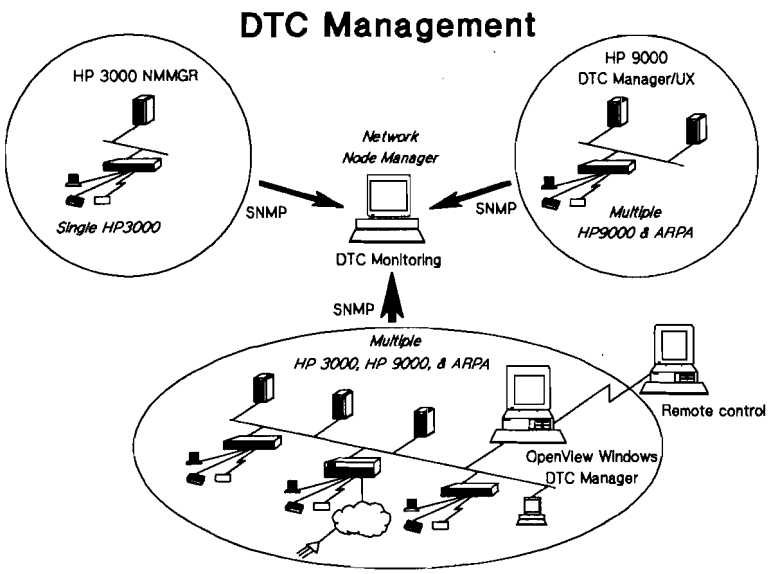
Product Numbers
HP J2120A, D2355A,
32054E #201

Introduction

The DTC solution consists of a scalable family of multivendor terminal servers, and a scalable family of network management products. The DTC products are configured and managed with the use of a DTC Manager application that can run on three different platforms: HP 3000/900, HP 9000/800, or PC OpenView Windows.

- With the DTC host-based management, a simple terminal connected locally or remotely to the HP 3000/900 or HP 9000/800 system is used to manage DTCs. It provides a user interface similar to other system administration tools.
  - The HP 3000/900-based DTC management software provides a means to configure DTCs for use in HP 3000/900 standalone environments.
  - The HP 9000/800-based DTC management software provides a means to configure DTCs in HP 9000 standalone or multisystem Telnet-TCP/IP environments.
- The HP OpenView (PC-based) DTC Manager software provides an easy-to-use graphical user interface to manage DTCs. It is possible to integrate other management applications of network elements (such as HP X.25 Switches and PADs) on the same OpenView Windows workstation.

HP OpenView DTC Manager provides a means to configure DTCs for use to connect to HP 3000/900 or HP 9000/800 systems and to other systems in multivendor environments. It provides powerful network management features for complex network topologies.



In both host-based and PC-based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

Key Features

HP 3000-based DTC management

- End-user access to single HP 3000/900
- ASCII user interface
- Configuration and fault management

HP 9000-based DTC management

- End-user access to Telnet-TCP/IP systems
- ASCII user interface
- Configuration and fault management

HP OpenView DTC Manager

- End-user access to multiple HP or non-HP systems
- Easy-to-use, intuitive, graphical user interface based on HP OpenView Windows
- Configuration, fault, performance, and security management
- Integration with other HP OpenView/DOS applications
- Remote DTC management through modems, X.25 PADs and extended LANs

Note that when DTCs operate in extended LAN environment based on IP routers, a management platform is required per LAN segment. However, the bridging capability of routers can be used if preventing the above situation is critical.

DTC SNMP agent

Besides the services provided by the DTC management platforms, the DTC-based SNMP agent allows customers to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager (HP-UX) or other HP SNMP manager applications.

The following features are available with Node Manager:

- Automatic discovery of DTCs.
- Status/Colors management. The DTCs are automatically polled on a regular basis and the status color is reflected on the map.
- MIB loader/browser. It provides display of MIB values in text or graphical form and the capability to modify them if permitted by the DTC.
- MIB application builder. It enables users to build applications dealing with DTC MIB objects
- Historical data reporting for troubleshooting and network planning.

The DTC SNMP agent will be supported on all DTC hardware and is configurable from all the DTC management platforms.

HP 3000-based Management

For terminal and printer connections to a single HP 3000/900 or where X.25 communication (PAD support and system-to-system) to a single HP 3000/900 is needed, the DTC can operate under HP 3000/900 based management (NMMGR and TermDSM utilities).

DTC management functions are available to ease the configuration, maximize network uptime, and reduce operating costs. Please refer to the table attached at the end of this document for detailed information.

PC-based management may also be used in this configuration to take advantage of the more sophisticated management tools.

The HP 3000/900 DTC management software is part of the MPE/iX Fundamental Operating System.

HP 9000-based management

For terminal and printer connections to a single HP 9000/800 host or multiple HP or non-HP TCP/IP hosts, the DTC can operate under HP 9000/800 based management (HP DTC Manager/UX).

The HP DTC Manager/UX product supports access to multiple UNIX® systems (switching capability) multisession, symbolic system addressing using ARPA DNS and provides a routable TCP/IP implementation that guarantees access through IP routers.

DTC Management functions are available to configure the majority of DTC parameters without resetting the DTC, maximize network uptime, and reduce operating costs.

The HP DTC Manager/UX software runs on HP 9000/800 systems with HP-UX release 9.0 or later, and ARPA Services/9000.

* Most of the management tools are available from a command line interface

PC-based management

The DTC must operate under HP OpenView Workstation (PC) management in the following cases:

- When local access is required to multiple HP and non-HP systems
- When remote access to multiple HP 3000 systems through X.25 is required
- When remote access to HP 9000 or other TCP/IP systems through X.25 is required
- When Telnet-TCP/IP Access to HP 3000/900 systems is needed

Using the HP OpenView DTC Manager, the network administrator can easily and quickly configure up to 150 DTCs in a flexible manner, centrally isolate and resolve problems occurring on DTCs, and secure access to information. These features help the network administrator to greatly increase the network uptime. In addition, the HP OpenView DTC Manager reduces learning time of users by providing an easy-to-use graphical interface based on HP OpenView Windows.

Easy-to-use OpenView standard menus allow quick access to extensive DTC management functions, including configuration and problem isolation, as well as problem resolution of HP DTCs. Please refer to the table attached at the end of this document for detailed information.

The HP OpenView DTC manager is supported on all Hewlett-Packard 386/486 PCs, IBM PS/2-55 and model 50, and Compaq DeskPro 386/20 PCs.

HP OpenView DTC Manager is currently supported with the following software stack:

- HP OpenView Windows B.01.01
- MS-DOS® version 6.0
- Microsoft® Windows 3.1
- HP ARPA and Network Services/DOS B.00.00

* For a complete software matrix refer to the "HP OpenView DTC Manager Installation and Upgrade Guide"

Application Integration

HP OpenView DTC Manager uses MS-Windows 3.1 protected mode which allows many HP OpenView applications to run concurrently on the same HP OpenView workstation. DTC Manager has been tested running the following applications concurrently:

- HP OpenView Switch/PAD manager (HP J2107A)
- HP OpenView System manager (HP 36936A)

Running the above applications concurrently is only supported on a 386-based PC or above, and it should be noted that the PC memory should be increased by approximately 2 MB per application.

Various permutations of applications have been tested, for a complete list of tested configurations and note on how to install them, you can order the following HP documentation: D1825-90093

HP AdvanceLink for Windows (Part of the bundle HP 32054E) may be used to access an HP 3000/900 system console port from the HP OpenView workstation.

Ordering Information

DTC manager running on an HP 3000/900:

Nothing to order.
Integrated with the MPE/iX operating system (FOS).

DTC manager running on an HP 9000/800:

HP J2120A HP DTC Manager/UX

AA0 ¼-inch cartridge tape
AA1 ½-inch magnetic tape (1600 bpi)
AAH Software on DAT cartridge tape
AA4 QIC
AAU CD-ROM certificate only
0CC Update to latest version

DTC manager running on the HP OpenView Windows platform:

HP 32054E opt 201
HP OpenView Windows Workstation (PC) preconfigured with the DTC Manager application software including integrated Ethertwist connection

ABA --> ABZ Localization options (must order one)
101 Network connection options ThinLAN connection
102 ThickLAN connection

HP D2355A DTC manager application software for an HP OpenView Windows (PC) workstation

D1824E #201 Update of an existing HP OpenView Windows Workstation with the latest revision of software and DTC manager application

- The HP OpenView Windows workstation (HP 32054E) is an especially configured HP Vectra, with PC software already installed. It includes 4 Mb of memory, HP portable DeskJet printer, and MS-DOS, MS-Windows, HP ARPA and Network Services/DOS, HP OpenView Windows, HP AdvanceLink for Windows

Network Management Table

Network Management	HP DTC Manager/UX	NMMGR and TermDSM	HP OpenView DTC Manager
Platform	HP-UX systems	MPE/iX systems	PCs
Connectivity Access to	TCP/IP systems	Single HP 3000	Multiple systems
User interface	ASCII	ASCII (VPlus)	Graphical (OpenView)
Management tools:			
Integration of other OpenView/DOS applications	n/a	n/a	yes
Powerfail recovery	n/a	n/a	yes
Remote Access through PAD 233Xs modems* or IP routers	yes	yes	
Backup/restore function	yes	yes	yes
Centralized support of multiple DTC versions	no	no	yes
Retrieval of and identification of a physical port by its name	no	no	yes
• Contact your local Response Center for list of recommended modems			
DTC Functions:			
Support of DTC16, DTC48 and DTC72MX	yes	yes	yes
Support of DTC16TN	yes	no	yes
Support of DTC16iX	no	yes	yes
Support of DTC16MX	yes	yes	yes
Access to HP 3000 S900	no	yes	yes
Access to TCP/IP systems	yes	no	yes
Access to non-HP systems via extended switching	no	no	yes
Access to multiple systems	yes	no	yes
DTC/X.25 support	no	yes	yes
Telnet/iX support	no	no	yes
Maximum number of DTCs	150	24	150
Maximum numb. of X.25 cards	n/a	60	60
Configuration management:			
Automatic default configuration	yes	yes	yes
Serial ports	yes*	yes	yes*
System switching	yes*	no	yes*
DTC nodename, LAN and IP address	yes	yes	yes
User welcome message	no	no	yes*
Inactivity timer	no	no	yes*
Domain Name Server (DNS) addressing for DTC traffic	yes*	no	yes*
IP router addressing for DTC traffic.	yes*	no	yes*

X.25 levels 2 and 3	n/a	yes	yes
X.25 system switching	n/a	no	yes*
X.25 PAD access	n/a	yes	yes*
Start/Stop on X.25 card & upload databases)	n/a	yes	yes
X.25/Padsup autorestart	n/a	yes	yes
Padsup profiles	n/a	yes	yes
Telnet Access configuration	n/a	n/a	yes
Start/Stop on Telnet Card	n/a	n/a	yes
SNMP agent configuration	yes	yes	yes
Copy/Paste function	yes	no	yes
Large configurations tools	no	no	yes

• Indicates parameters can be modified online

Fault Management:			
Reset DTC, ports, serial cards	yes	yes	yes
Reset LDEV	n/a	yes	yes
Reset systems connections (when DTC/card/port reset)	no	yes	yes
Reset X.25 card and LCI	n/a	yes	yes
Reset Telnet Access board	n/a	n/a	yes
Upload DTC and ports data	yes	yes	yes
Upload X.25	n/a	yes	yes
Upload LDEV	n/a	yes	yes
Upload Telnet Access board	n/a	n/a	yes
Self tests			
Port Loop Back	yes	yes	yes
CPU	yes	yes	yes
X.25 card and Loop Back	n/a	yes	yes
Status monitoring	yes	yes	yes
Event monitoring & logging	no	no	yes
Show connections	no	no	yes
IP address checking (Extended ping)	no	no	yes
Automatic alarm reporting	no	no	yes
DTC polling	no	no	yes
Color management	no	no	yes
X.25 tracing & logging	n/a	yes	yes
X.25 site management	n/a	no	yes
Retransmission timers	no	no	yes
Management packet length	no	no	yes
Security Management:			
Password to DTC Manager	no	no	yes
Operator security levels	no	no	yes
Configuration of terminal switching and multisession per DTC port	n/a	yes	yes
PAD security access lists	no	yes	yes

Printing:			
DTC configuration (card and port)	yes	yes	yes
Status	yes	no	yes
Event log	yes	no	yes
Trace	no	no	yes

HEWLETT® PACKARD

HP 3000 Telnet Access (Telnet/iX)

Technical Data

Product Numbers
HP J2080A, J2070A, 2347A

Introduction

HP 3000 Telnet Access (Telnet/iX) allows any ARPA Telnet client to access HP 3000/900 applications on single or multiple HP 3000/900 systems attached to a LAN. These clients can be either connected to terminal servers, systems, or they can be PC based. HP 3000 Telnet Access (Telnet/iX) is based on the standard TELNET-TCP/IP protocols.

Product highlights

The HP 3000 Telnet Access (Telnet/iX) is based on a Telnet Access Card installed in the HP DTC communication server.

Two cards exist, one for the DTC48 and one for DTC 72MX.

The DTC HP 3000 Telnet Access (Telnet/iX) is:

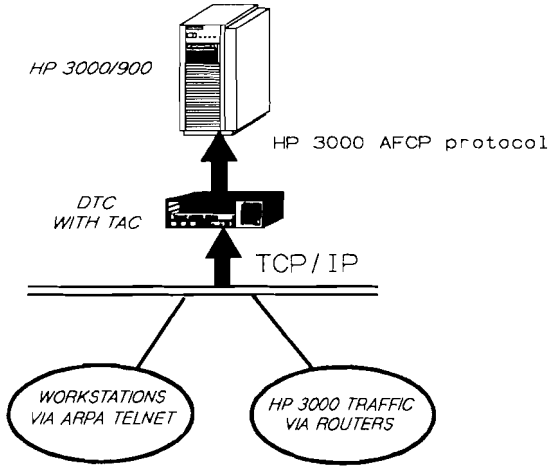
- Sharable between multiple HP 3000/900s
- Performant: no extra HP 3000/900 CPU resources are required to run Telnet
- Routable due to the standard TCP/IP implementation

To use the HP 3000 Telnet Access (Telnet/iX) the DTC Manager running on the OpenView Windows workstation (PC based) is required.

For information on other DTC products, refer to the DTC family data sheet and to the individual product data sheets:

DTC 72MX:	HP J2070A
DTC16:	HP 2340A
DTC48:	HP 2345A
DTC Management:	HP D2355A
	HP J2120A
DTC16MX:	HP J2063A

HP 3000 Telnet Access



Performance

Telnet protocol has **no** effect on the HP 3000/900. The Telnet Access Card offloads the HP 3000/900 by converting the TELNET-TCP/IP protocols to HP OLTP optimized protocols.

The HP 3000 Telnet access performance is influenced by the type of user and also by the HP 3000 application's type.

We class users as heavy, medium, or light. Commercial OLTP applications users are typically medium users.

The HP 3000 application's types are:

- VPLUS: MM3000, PM3000
- Line Mode
- User block mode: HPDesk
- Character mode

VPLUS applications are not affected by the user's type.

The other applications are affected. The attached table shows recommended number of Telnet sessions per Telnet Access Card (TAC) for medium users.

A detailed modeling of the HP 3000 Telnet Access solution is available in the Product Sales Support guide. For any specific environment, a detailed evaluation of the performance can be done depending on application, transaction, and user's types.

	Telnet Access Card	
	DTC 72MX version 14.0 or later	DTC 48 version 14.0 or later
Applications		
VPLUS	80 active users	40 active users
User Block Mode (Medium users)	65 active users	30 active users
Line Mode (Medium users)	50 active users	20 active users
Character mode (Medium users)	25 active users	10 active users
HP Block mode	NO	NO
Features		
Type ahead	YES	YES
Binary	YES	YES

Medium users: enter 4 transactions per minute with a think time of about 10-15 seconds

Specific product features

- **Simple Type-ahead**
  This feature can be enabled programmatically only. For more information see programmatic manuals.
- **Binary mode**
  This mode allows the transfer of binary files or the binary transfer of binary files. This feature is used for example, by applications such as: HP AdvanceLink, HPToday. For more information see technical manual.

Note: Printer support and multisession are not available through HP 3000 Telnet Access.

Note: Only one Telnet Access Card is supported by either DTC 48 or DTC 72MX.

Note: The Telnet Access Card (TAC) cannot coexist with an X.25 card in a DTC48.

Ordering Information

Ordering the Telnet/iX product

Telnet Access Card for DTC 72MX

J2080A Add-on
J2070A opt. 004 DTC Option

Telnet Access Card for DTC 48

2347A Add-on
2347A opt. 001 If DTC date code <3110, must order

Ordering the OpenView DTC Manager

D2355A OpenView DTC Manager only
32054D OpenView Windows Workstation
201 DTC Manager Application

Ordering the Bundle ARPA Telnet + FTP

See ARPA Services/iX data sheet

Product requirements

- Free slot in the DTC
- MPE iX version 4.0 or later (an upgrade tape is available for systems running MPE iX 4.0)

Standard Conformance

HP 3000 Telnet Access (Telnet/iX) is based on the following standards:

- Telnet: MIL-STD 1782, RFC 854, 855, 856, 857, 859, 860, 1123
- TCP: MIL-STD 1777, RFC 793 ,813, 879, 964, 1122
- IP: MIL-STD 1777, RFC 791, 815, 816, 879, 950, 963, 1122
- ICMP:RFC-792, 1122
- ARP: RFC-826
- DNS: RFC-1034, 1035, 1123

HEWLETT® PACKARD

X.25 iX Network Link For HP 3000 Series 900

Technical Data

Product Numbers
HP J2070A, J2079A, 36939A, D2355A, 2340A, 2343A

Introduction

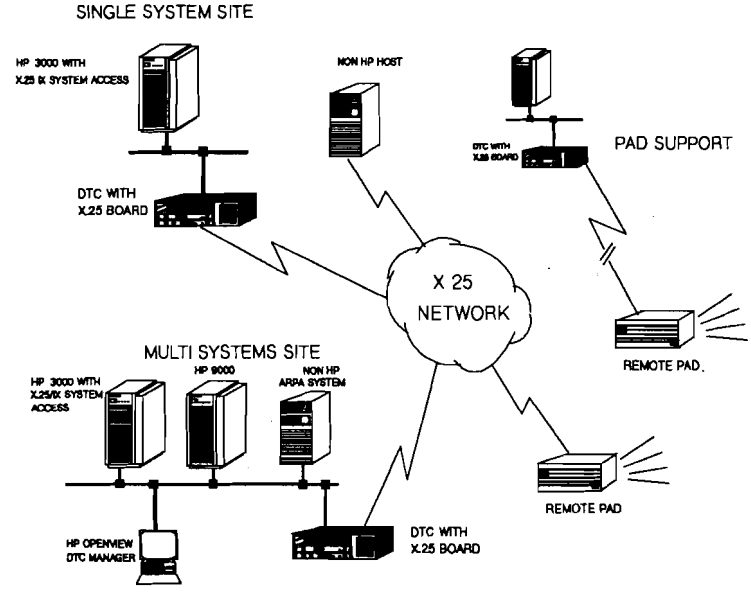
The X.25 iX network link is a high performance networking solution that provides connectivity to public and private X.25 packet switching networks for HP 3000/900 computers.

Based on the modular architecture of the Datacommunications and Terminal Controller (DTC) product, X.25 iX network link offers an integrated, flexible, and scalable X.25 solution for HP 3000/900 computers in multisystems, multivendors, and PAD terminal access environments.

For information on other DTC products, refer to the DTC family data sheet (which presents the complete DTC family, the target environments, and supported devices) and to the individual product data sheets:

DTC 16TN:	HP J2060A
DTC 72MX:	HP J2070A
DTC 16iX:	HP J2062A
DTC16:	HP 2340A
DTC 16MX:	HP J2063A
DTC48:	HP 2345A
DTC Management:	HP D2355A
	HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).



Product highlights

The X.25 iX network link for HP 3000/900 computers is a X.25 connectivity solution based on the DTC hardware and software architecture, consisting of 3 separate components:

- DTC/X.25 network access card
- X.25 /iX system access
- DTC/X.25 management.

The X.25 iX network link achieves high performance networking by offloading protocol processing from the HP 3000/900 host to an optimized Network Access card in the DTC. The LAN-based architecture of the DTC allows multiple HP 3000/900 hosts to

share the same X.25 line, making cost-effective use of the X.25 network subscription.

DTC/X.25 network access card
This product is available for DTC 16 and DTC 72MX. The product is based on a high performance VLSI card residing in the DTC, used to process the X.25 protocols. The necessary software is downloaded to the DTC by the DTC management platform (HP 3000/900 or DTC management Openview Windows workstation).

The DTC/X.25 Network Access card features:

- X.25 protocol handling.
- Support of remote PAD access function (CCITT X3, X28, and X29) allowing access to multivendor hosts (HP 3000/900 and Telnet-TCP/IP hosts) for terminals, PCs, and printers attached to remote X.25 PADs. PAD access can be either direct to a single host, or user-selectable to any host on the LAN, through the DTC user interface.

Connectivity of remote PAD terminals can be secured and restricted using PAD access lists, based on calling X.25 addresses and configured by the DTC/X.25 management product. Security on remote X.25 host access is implemented with Local User Group utility, which filters incoming and outgoing calls based on calling and called X.25 addresses respectively.

X.25/iX System Access
This software product resides on the HP 3000/900 computer. It provides interconnection of Defense Advanced Research Projects Agency (DARPA) TCP/IP protocols (layers 3 and 4 of the OSI reference model) with X.25 layer 3 of the DTC/X.25 Network Access software across the IEEE 802.3 LAN. Note that X.25 iX System Access is not an X.25 protocol implementation, but provides an X.25 addressing and facility interface between the HP 3000/900 computer and the DTC.

This product allows system-to-system communication with remote computers, either using NS3000/iX Network services (HP 36920A), ARPA FTP service (HP 36957A), or OSI FTAM service (HP 36971A and HP 36972A).

SNA connectivity for HP 3000/900 to IBM communication over X.25 is provided by the SNA/X.25 Link/iX product (HP 30298A), which allows HP SNA services to be supported over an X.25 network. (Refer to the SNA/X.25 Link/iX data sheet for more information).

Programmatic access to X.25 level 3 is included, to allow users to develop their own protocols and services for communication with remote HP or non-HP computers over X.25 link.

DTC/X.25 management
This product is part of the DTC Manager application. It performs the X.25 iX network link configuration and management operations. Depending on customer network topology and requirements, the DTC/X.25 management product can be installed on two different platforms:

- On a HP 3000/900: in this case, the product can only manage DTC/X.25 network links dedicated to this HP 3000/900 computer.
- On an HP Openview Windows workstation. In this case, up to 60 X.25 iX network links can be simultaneously managed by a single HP Openview Windows workstation.

HP Openview (PC-based) DTC Manager software provides an easy to use graphical user interface and the possibility of integrating management applications for other network elements (Switch/Pad Manager for HP 2335 and Model 45 Plus, Openview Sysman) on the same Openview Windows workstation.

Product Specifications

DTC 72MX/X.25 Network Access card specifications

- Up to 32 local HP 3000/900 hosts supported per DTC 72MX/X.25 Network Access card.
- Up to three DTC 72MX/X.25 Network Access cards supported per DTC 72MX.
- Each X.25 Network Access card able to support up to 256 Switched or Permanent Virtual Circuits (VC):
  - 256 VCs (packet size up to 512 bytes)
  - 150 VCs (packet size up to 1024 bytes)
  - 100 VCs (packet size up to 2048 bytes)
  - 54 VCs (packet size up to 4096 bytes).
- CCITT 1980 and 1984 compliance for X.25, X.3, X.28, and X.29 protocols.
- Compliance with standard Defense Data Network (DDN) specifications.
- Acceptance of all CCITT 1984 X.25 user and DTE facilities for host-to-host connections for processing at the X.25/iX level.
- Closed User Groups (CCITT 1980) supported with PAD access.
- X.25 physical interfaces:
  - RS232C (line speed up to 19.2 kb/s)
  - V.35 (line speed up to 64 kb/s)
- X.25 LAP-B level 2 parameters:
  - Modulo 8 or 128 frame sequence numbering.
  - Window sizes: 1–7.
  - Frame sizes: as required by Level 3.
- X.25 level 3 parameters:
  - Modulo 8 sequence numbering.
  - Window sizes: 1–7.
  - Throughput classes: 7–12 (speed up to 64kb/s).
  - D-bit and Q-bit.
  - Switched Virtual Circuit.
  - Permanent Virtual Circuit. PVC is only supported for customer-designed applications using direct X.25 packet level 3 programmatic access. (Remote PAD to Host connection is not supported over PVC)
  - Packet sizes: 32–4096.
- PAD functionalities:
  - Supported packet sizes: 128, 256, and 512.
  - PAD support for HP 3000/900 connected to the same LAN as the DTC.
  - PAD support for HP 3000 MPE V, HP 9000, and non-HP systems through DTC extended switching and Telnet-TCP/IP protocol.
  - PAD printers are only supported for system access via a LAN (no back-to-back)
  - Only character mode and VPlus block mode applications are supported with PAD functionality.
  - Multisession is not available for remote PAD users.

DTC 16/X.25 Network Access Card Specifications

- Up to 32 local HP 3000/900 hosts supported per DTC 16/X.25 Network Access card.
- One DTC 16/X.25 Network Access card supported per DTC 16.
- Each X.25 Network Access card able to support up to 32 Switched or Permanent Virtual Circuits (PVC).
- CCITT 1980 and 1984 compliance for X.25, X.3, X.28, and X.29 protocols.
- Compliance with standard Defense Data Network (DDN) specifications.
- Acceptance of all CCITT 1984 X.25 user and DTE facilities for host-to-host connections for processing at the NSX.25/iX level.
- Closed User Groups (CCITT 1980) supported with PAD access.
- X.25 physical interface:
  - RS-232C (line speed up to 19.2 kb/s)
- X.25 LAP-B level 2 parameters:
  - Modulo 8 or 128 frame sequence numbering.
  - Window sizes: 1–7.
  - Frame sizes: as required by Level 3.
- X.25 level 3 parameters:
  - Modulo 8 sequence numbering.
  - Window sizes: 1–7.
  - Throughput classes: 7–10 (speed up to 19.2 kb/s).
  - D-bit and Q-bit.
  - Switched Virtual Circuit.
  - Permanent Virtual Circuit. PVC is only supported for customer.

- Designed applications using direct X.25 packet level 3 programmatic access. (Remote PAD to Host connection is not supported over PVC.)
- Packet sizes: 32–4096.

- PAD functionalities:
  - Supported packet sizes: 128, 256, and 512.
  - PAD support for HP 3000/900 connected to the same LAN as the DTC.
  - PAD support for HP 3000 MPE V, HP 9000, and non-HP systems through DTC extended switching and Telnet-TCP/IP protocol.
  - PAD printers are only supported for system access via a LAN (no back-to-back).
  - Only character mode and VPlus block mode applications are supported with PAD functionality.
  - Multisession is not available for remote PAD users.

X.25/iX System Access Specifications

- Supports Defense Advanced Research Projects Agency (DARPA) standard Transmission Control Protocol/Internet Protocol (TCP/IP).
- Supports up to 11 Network Interfaces per HP 3000/900 host.
- Supports up to 11 DTC/X.25 Network Access cards per NI.
- Can reach up to 1024 remote HP or non-HP computers.
- Implements NetIPC and Berkeley Sockets for TCP and X.25 programmatic access.
- Multiplexes TCP/IP traffic over one X.25 virtual circuit.

DTC X.25 management specifications

X.25 management product	NMMGR utility	HP Openview DTC Manager
Platform	HP 3000/900 systems	PCs
User Interface	ASCII (VPlus)	Graphical (OpenView (and MS-Windows)
Configuration management		
Configuration X.25 levels 2–3	yes	yes
Configuration X.25 system switching	no	yes*
Configuration X.25 PAD access and security	yes	yes*
Start/Stop X.25 card (and upload databases)	yes	yes
X.25/Padsup autorestart	yes	yes
X.25/Padsup profiles	yes	yes
Fault management		
Reset X.25 card and X.25 LCI	yes	yes
Upload X.25	yes	yes
Self Test X.25 card and Loopback	yes	yes
X.25 tracing & logging	yes	yes
X.25 site management	no	yes

* Indicates parameters can be modified online

Supported Essential Facilities

	1984 CCITT X.25 Reference
- Extended packet sequence numbering	6.2
- Incoming calls barred	6.5
- Outgoing calls barred	6.6
- Non-standard default packet size	6.9
- Non-standard default window size	6.10
- Flow control parameternegociation	6.12
- Throughput class negociation	6.13
- Closed User Group selection (1980 CCITT)	6.14
- Fast select request and acceptance	6.16/6.17
- Reverse-charging and acceptance	6.18/6.19
- Local charging prevention	6.20
- Hunt group	6.25
Support Facilities with X.25 Level 3 Programmatic Access	
- Closed User Group related facilities	6.14
- Bilateral closed user groups	6.15
- Network user identification	6.21
- Chargin information	6.22
- Called line modified address notification	6.26
- Call redirection and notification	6.25/6.27
- Transit delay selection and indication	6.28

Note: X.25 protocol implementation is provided by DTC/X.25 Network Access.

- Supports NS3000/iX Network Services (HP 36920A) for HP 3000-to-HP 3000 communication.
- Supports ARPA FTP service (HP 36957A) for HP 3000/900 to HP or non-HP system communication.
- Supports OTS transport and FTAM service (HP 36971A and HP 36972A) for HP 3000/900 to HP or non-HP system communication.
- Supports SNA/X.25 link/iX (HP 30298A) for SNA connectivity between HP 3000/900 to IBM systems over X.25 link.
- Includes NetTool, a set of tools to monitor, analyse, and diagnose the transport layer software.

Ordering Information

Ordering the DTC X.25 Network Access Card

For DTC 16

2340A opt. 310 When ordered with a DTC 16

2343D When ordered as add-on card

For DTC 72MX

J2070A opt. 1CW X.25 Network Access with RS232C interface when ordered with a DTC 72MX

J2079A opt. 1CW X.25 Network Access with RS232C interface when ordered as add-on card

J2070A opt. 1CX X.25 Network Access with V.35 interface when ordered with a DTC 72MX

J2079A opt. 1CX X.25 Network Access with V.35 interface when ordered as add-on card

Ordering the DTC X.25 Management

DTC manager running on an HP 3000/900

Nothing to order

Integrated with the MPE/iX operating system (FOS)

DTC manager running on the HP OpenView Windows platform

HP 32054D opt. 201 HP OpenView Windows Workstation (PC) preconfigured with the DTC Manager application software, including integrated EtherTwist connectivity

#ABA --> #ABZ Localization options (must order one)

Network connection options (must order one)

101 ThinLAN connection
102 ThickLAN connection
103 Ethertwist connection

D2355A DTC manager application software for an HP OpenView Windows (PC) workstation

D1824D opt. 201 Update of an existing HP OpenView Windows Workstation with the latest revision of software and DTC manager application

- The HP OpenView Windows workstation (HP 32054E) is an especially configured HP Vectra, with PC software already installed. It includes 4Mb of additional memory, HP portable DeskJet printer, and MS-DOS, MS Windows, HP ARPA and Network Services/DOS, HP OpenView Windows, HP AdvanceLink for Windows.

Ordering the X.25/iX System Access

HP 36939A X.25/iX System Access

Right to use license option (must order one)

0AF 20 Users License
UCY 40 Users License
UA9 64 Users License
UBD 100 Users License
UCN 160 Users License
UAT Unlimited Users License

Upgrade Credit options

Use one of the following options when HP 36939A has been initially ordered with Users License option:

UD8 Credit for 20 Users license
UCZ Credit for 40 Users license
UB9 Credit for 64 Users license
UDV Credit for 100 Users license
UBP Credit for 160 Users license

For installed base, use one of the following options when HP 36939A has been initially ordered with Processor option:

0CD Credit for processor option 310
0GJ Credit for processor option 315
0CE Credit for processor option 320
0CF Credit for processor option 330
0GL Credit for processor option 335
0GM Credit for processor option 340
UEK Credit for processor option 350

Note 1: For system-to-system communication, this product must be ordered in addition to X.25 Network Access card. HP 36939A is not required if only X.25 PAD support functionality is needed.

Note 2: In order to receive the upgrade credit, customers must select, on the same order, the upgrade credit option that pertains to their current user license option in addition to the new user license option.

Certified X.25 Packet Switched Networks

The following public Packet Switched Networks (PSNs) have certified the X.25 iX Network Link. This list is current as of February 1993. Please consult your HP sales representative for an updated list of certified PSNs.

Country	Network
Austria	Datex-P
Belgium	DCS
Brazil	Renpac*
Finland	Datapak
France	Transpac
Germany	Datex-P
Hong Kong	Intelpak
Italy	Itapac
Luxembourg	Luxpac
Netherlands	Datanet1
Norway	Datapak
Spain	Iberpac*
Sweden	Datapak
Switzerland	Telepac
United Kingdom	PSS*
U.S.A	Telenet
U.S.A	Tymnet
U.S.A	DDN

* in process

Recommended Networking devices

The following devices are fully certified and tested for operation with the X.25/iX Network link. Both devices can also be managed from the DTC management Openview workstation with the HP Openview SwitchPad Manager application.

- HP Model 45 Plus: X.25 Multiprotocol switch. This product features traffic concentration in multilinks and multiprotocol environments (SNA, X.25 and Async).
- HP 2335A: X.25 PAD/Statistical multiplexer. This product allows connection of remote asynchronous terminals and printers to a central computer via an X.25 link.

For detailed information on these products, refer to the individual product dat asheets.

X.25/iX Network Link Documentation

Included with X.25 iX System Access product (36939A):

36939-90001 X.25 iX System Access Configuration Guide
5958-8600 NetIPC 3000/iX Programmer's Guide Reference Manual

Additional orderable manuals:
36923-61001 Guide to NS3000/iX documentation
36922-90007 NS3000/iX Configuration, Planning, and Design Guide
36922-90010 NS3000/iX Operations and Maintenance reference manuals
32022-61005 Using the Node Management Services Utilities
36922-90008 NS3000/iX Screen Reference Manual
5959-2836 NS3000/iX Error Message Reference Manual

Installation and Configuration Support Policy

The customer is responsible for loading the X.25 iX Network Link onto the system. Hewlett-Packard will provide installation of the Datacommunications and Terminal Controller (DTC), the DTC/X.25 Network Access cards and the HP OpenView DTC Manager (if PC-based Network Management) and will perform minimum configuration of X.25 iX Network Link in order to verify minimum functionality. These activities are included in the product purchase price. For product configuration tailored

to the customer's specific needs, or for a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets for more information on these services.

Pre-Installation Customer Responsability

The customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including: system configurations, logical network map identifying relevant traffic flow and physical network map identifying relevant network hardware components.
- Installing and verifying the communications line between the DTC and the X.25 network.
- Completing all tasks related to the DTC TIO installation.
- When necessary, subscribing to the appropriate administration for access to the public PSN.
- Updating the HP 3000 system to the proper release level and installing the X.25 iX Network Link system software using AUTOINST, if HP 36939A X.25 iX System Access is purchased. Refer to the HP 3000 MPE/iX Installation and Update Manual.
- Verifying that all of the necessary software modules have been successfully installed.
- Performing a full system backups.

HP Responsability

Following the installation of the X.25 iX System Access (HP 36939A) software, if purchased, HP is responsible for performing the following tasks for the various components of the X.25 iX Network Link. To install the DTC, HP is responsible for the following:

- Attaching the communication line from the X.25 network to the DTC/X.25 Network Access card.
- Configuring the DTC/X.25 Network Access card via the OpenView DTC Manager or NMMGR.
- Verifying that the DTC/Network Access card properly operates.

To install Add-on DTC/X.25 Network Access cards, HP is responsible for the following:

- Inserting the Add-on card in the DTC and performing the self-test.
- Attaching the communication line from the X.25 network to the Add-on card.
- Configuring the DTC/X.25 Network Access card via the OpenView DTC Manager or NMMGR.
- Verifying that the DTC/Network Access card properly operates.

To install the HP 36939A X.25 iX System Access for system-to-system communication, HP is responsible for the following:

- Confirming that all the necessary software modules for the X.25 iX System Access software have been installed and are at the correct version level.
- Configuring the X.25 link on the HP 3000 using the customer supplied values and cross-validating the DTC-related configuration with the system configuration.
- Verifying the X.25 Link between the HP 3000 and the X.25 network properly operates.

Post-Installation Customer Responsability

After HP has completed its installation responsibilities, the customer is responsible for fully integrating the new installation to the existing customer network.

Product requirements

Refer to HPSL database for the supported DTC and Operating System releases.

HEWLETT® PACKARD

Communications Server (DTC 72MX)

Technical Data

Product Numbers
HP J2070A, J2076A, J2077A J2079A, J2080A

Introduction

The DTC 72MX is part of HP's family of LAN-based Datacommunication and Terminal Servers, HP's solution to connect asynchronous devices (terminals, printers, modems) over Local and Wide Area networks to single or multiple HP 3000/900, HP 9000 and other platforms running the standard Telnet-TCP/IP protocols.

The DTC 72MX is the high-end of the DTC family and is optimal for environments with the following requirements:

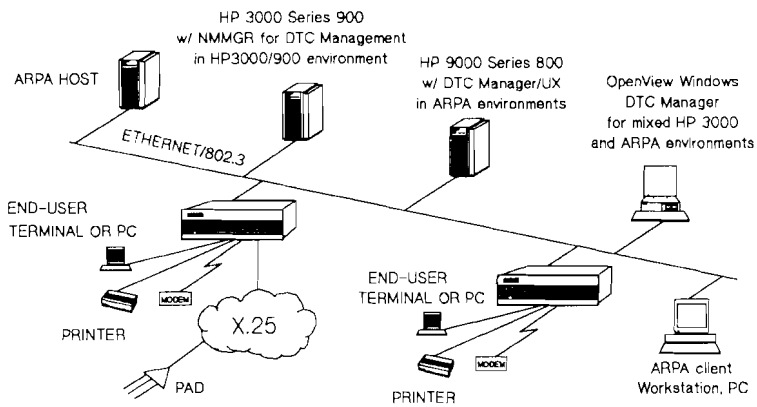
- high port count centralized connectivity to HP 3000/900 systems
- high port count centralized connectivity to multiple HP systems (HP 3000/900, HP 9000, HP 1000) and non-HP systems running Telnet-TCP/IP.
- HP 3000/900 X.25 system to system communication.
- Remote PAD access to HP 3000/900, HP 9000 and other systems running Telnet-TCP/IP (PAD support).
- HP 3000/900 environments requiring end-user access via the standard Telnet-TCP/IP protocol.

For information on other DTC products, refer to the DTC family data sheet (which presents the complete DTC family, the target environments, and supported devices) and to the individual product data sheets:

DTC 16TN:	HP J2060A
DTC 16iX:	HP J2062A
DTC16MX:	HPJ2063A
DTC16:	HP 2340A
DTC48:	HP 2345A
DTC Management:	HP D2355A
	HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).

DTC 72MX Communications Server



DTC 72MX
AFCP
TCP/IP-Telnet
X.25
Telnet for HP3000

DTC 72MX
AFCP
TCP/IP-Telnet

DTC 72MX Key Features

- LAN-based communication server supporting the standard Telnet-TCP/IP protocols.
- Systems are accessed directly through system LAN links or through system asynchronous ports (via the extended switching configuration or back-to-back) for systems which do not implement Telnet-TCP/IP or the HP 3000/900 protocol.
- Modular chassis compliant with the industry-standard EIA 19-inch form factor.
- Supports a mix of Asynchronous, X.25, and HP 3000 Telnet Access interfaces.
- Provides up to 72 RS-232 direct or modem ports or RS-423 direct ports.
- Provides compatible API with HP 9000 system asynchronous multiplexers.
- Provides printer sharing and multisessions per port.
- Up to three X.25 links (line speed up to 64 kbps) and 256 virtual circuits per card.
- Supports remote X.25-PAD access to HP 3000/900 systems and other systems running Telnet-TCP/IP.
- Supports X.25 communications for HP 3000/900 systems (HP-NS services, ARPA-FTP, OSI-FTAM, SNA).
- Supports Telnet Access for HP 3000/900 systems (up to 80 concurrent sessions).
- Managed under HP OpenView Windows environment, or from an HP system (HP 3000/900 or HP 9000/800).
- Supports an SNMP agent.
- Provides comprehensive support tools for increased supportability and uptime.

Product highlights

High Performance

Built upon a powerful architecture, the DTC 72MX delivers a high throughput to the end-users.

Extended direct connect plus full modem support
The DTC 72MX provides either direct connect or Modem ports. The direct connect ports support RTS/CTS signals for hardware flow-control eliminating the need for Modem ports when printer connectivity is required.

The Modem connect ports provide full modem control for operation over leased lines or the telephone network.

Compact, flexible package
The DTC 72MX uses a standard 19-inch chassis. It can be located on a tabletop or in rack-mounted configurations such as HP systems cabinets. It comes with 19-inch RJ-45 distribution panels for use with simple and low-cost cabling.

The RJ-45 pin-out is ATT356 compliant to allow future migration from asynchronous devices to 10BaseT LAN devices without change of cabling.

Application interface compatible with HP 9000 system multiplexers.

The DTC products use standard systems calls to access and control the DTC ports. This presents HP-UX applications with a programmatic interface that is almost identical to the interface to asynchronous systems MUX ports, thus allowing an easy migration from MUX to network environment.

This includes:
- DTC port identification
- Host initiated sessions (printing, programmatic access) to DTC ports via standard device files

Location-independent access
The DTC 72MX provides location-independent access for end-users. This means that most of the services provided to local users connected on a DTC ports are also available to remote users accessing the DTC via the X.25 network. (See details in the "X.25 Services" below.)

HP 3000 Telnet Access
The DTC 72MX supports a protocol converter, the HP 3000 Telnet Access Board, which allows end-users connected on Telnet Terminal Servers, PC workstations, and systems running Telnet-TCP/IP to access the HP 3000/900 applications (including VPlus, user block mode) over the same LAN or over bridged or routed LAN networks.

DTC 72MX Management

The DTC 72MX is configured and managed with the use of a DTC Manager application that can run on three different platforms: HP 3000/900, HP 9000/800, or PC OpenView Windows.

- With the DTC host-based management, a simple terminal connected locally or remotely to the HP 3000/900 or HP 9000/800 system is used to manage DTCs. It provides a user interface similar to other system administration tools.
  - The HP 3000/900-based DTC management software provides a means to configure DTCs for use in HP 3000/900 standalone environments.
  - The HP 9000/800-based DTC management software provides a means to configure DTCs in HP 9000 standalone or multisystem Telnet-TCP/IP environments.
- The HP OpenView (PC-based) DTC Manager software provides an easy-to-use graphical user interface, to manage DTCs. It is possible to integrate other management applications of network elements (such as HP X.25 Switches and PADs) on the same OpenView Windows workstation. HP OpenView DTC Manager provides a means to configure DTCs for use to connect to HP 3000/900 or HP 9000/800 systems and to other systems in multivendor environments. It provides powerful network management features for complex network topologies.

  In both host-based and PC-based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

DTC SNMP agent

Besides the services provided by the DTC management platforms, the DTC-based SNMP agent allows customers to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager (UX based), or the HP OpenView Interconnect Manager/Windows (PC based).

The following features are available with Node Manager:

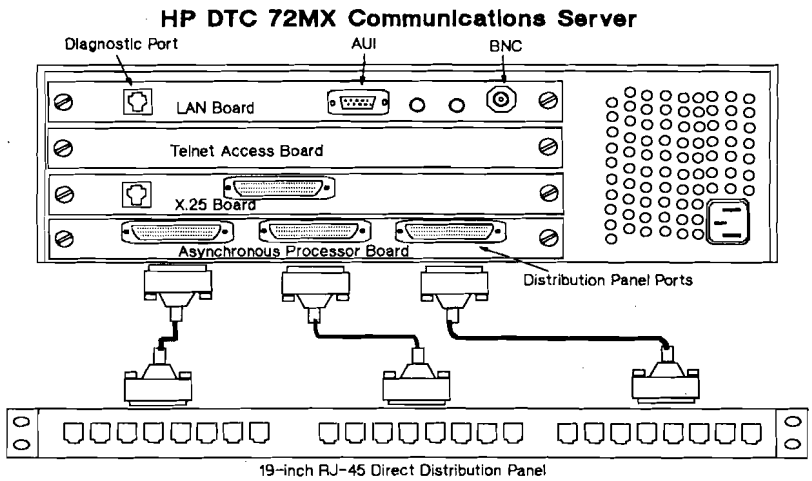
- Automatic discovery of DTCs.
- Status/Colors management. The DTCs are automatically polled on a regular basis and the status color is reflected on the map.
- MIB loader/browser. It provides display of MIB values in text or graphical form and the capability to modify them if permitted by the DTC.
- MIB application builder. It enables users to build applications dealing with DTC MIB objects.
- Historical data reporting for troubleshooting and network planning.

The DTC SNMP agent is supported on all DTC hardware and is configurable from all the DTC management platforms.

DTC 72MX Product specifications

The DTC 72MX has a 4-slot chassis compliant with the industry-standard EIA 19-inch form factor. One slot is always used for the LAN interface. The 3 other slots are available for installing a combination of asynchronous, X.25 and HP 3000 Telnet Access Boards.

The following picture shows a DTC 72MX configured with one asynchronous processor board (24-ports), one X.25 board, and the HP 3000 Telnet access card.



LAN interface
Two standard connectors are provided:

Connector:	**LAN supported**
BNC	ThinLAN (10Base2)
802.3 AUI 15-pin	ThickLAN
	EtherTwist
	10BaseT,
	Fiber Optic
	Broadband, FDDI connectivity through
	IEEE 802.3/Ethernet external adapters

The DTC 72MX automatically recognizes the type of LAN connected (ThinLAN or AUI)

LAN services

Protocols supported	AFCP: HP 3000's high performance protocol
	TCP/IP Telnet
	TCP/IP Telnet
Addressing	Symbolic addressing (DNS and HP-NS)
	IP addressing

Asynchronous Processor Boards

The DTC 72MX chassis supports up to 3 Asynchronous Processor Boards. Two types of boards are available, with 24 ports each:

24-port RS-232-C (Direct or Modem or mixed, with a modularity of 8 ports)

- Direct connect with hardware flow-control
  - Signals: RD, TD, ground, RTS, CTS
  - Connectors: female RJ-45 (or optional female DB-25)
  - Line speed: from 300 to 38,400 bps
  - Cable length 15 to 70m
- Modem connect with FULL-MODEM control
  - Signals: RD, TD, DCD, DTR, RTS, RI, DSR, CTS, DRS, shield and signal ground
  - Connectors: female DB-25
  - Line speed: from 300 to 19,200 bps

24-port RS-423 Direct connect with hardware flow-control

- Signals: RXa, RXb, TXa, TXb
- Connectors: female RJ-45 (or optional female DB-25)
- Line speed: from 300 to 38,400 bps
- Cable length: 200m

Common characteristics

- Flow control: Xon/Xoff, HP Enq/Ack, RTS/CTS
- Speed sensing : yes
- Parity sensing : yes
- Sessions/port : up to 5 sessions
- Sessions/DTC : up to 192 sessions
- Printer sharing : yes

X.25 boards

The DTC 72MX chassis supports up to 3 X.25 boards.

Two types of boards are available:

Interface/maximum line speed RS-232-C/19.2 kbps
Interface/maximum line speed V.35/64 kbps
- Number of Virtual Circuits (VCs) per interface: up to 256

X.25 services

- System-to-system communications for HP 3000/900 systems (HP-NS services, ARPA-FTP, OSI-FTAM, SNA)
- Remote PAD access (incoming calls) to HP 3000/900, HP 9000, and systems running TCP/IP Telnet through one single X.25 interface
- Selectable PAD support profiles
- Closed User Group Utility
- Restricted access to predefined systems based on calling address for PAD users
- Support of character mode applications through VideoPAD (tested in France through Minitel 3613)

Limitations applying to remote X.25 users compared to DTC local users are:

- PAD printers are only supported for system access via a LAN (no back-to-back)
- Only character mode and VPlus Block mode applications are supported with PAD functionality
- Multisession is not available for remote PAD users
- X.25 characteristics cannot be reconfigured online.

X.25 specific characteristics are described in the "X.25/iX Network link" data sheet.

HP 3000 Telnet Access

The DTC 72MX can support one board which supports up to 80 concurrent Telnet sessions accessing one or multiple HP 3000/900 applications.

(For detailed specifications, see the HP 3000 Telnet Access data sheet)

HP 3000 specific capabilities

Powerfail recovery
Typeahead facility
Field-mode support
Device type managed by the system

System release requirement

HP 3000/900: MPE/iX 5.0 or later
(an update tape is available for systems running MPE/iX 4.0 or 4.5)
HP 9000: HP-UX 7.0 or later (for Telnet access)
HP-UX 8.0 or later to run DTC Manager/UX or Telnet/OLTP

Standards supported

TCP/IP standards supported

Ethernet/IEEE 802.3, ping	
Subnet Addressing	RFC-950
ARP	RFC-826
ICMP	RFC-792
IP and options	RFC-791, MIL-STD 1777
TCP and options	RFC-793, MIL-STD 1778
UDP	RFC-768
Domain Name Services	RFC-1034-1035
SNMP agent	RFC-1157
Standard MIB services	RFC-1156
Structure of Management Information	RFC-1155
Telnet and options	RFC-854,MIL-STD 1782

X.25 standards supported

X.25 CCITT 1980, 1984
X.3/X.28/X.29 1980, 1984
Closed User Group (CUG) CCITT 1980
Defense Data Network (DDN) specifications

* For more details and configuration examples, refer to the DTC Racking and Cabling Guide available with the DTC 72MX Installation Guide (P/N 52070-90001).

DTC 72MX Rack installation

The DTC 72MX can be easily installed in industry-standard 19-inch EIA racks. When racked in an HP computer cabinet such as the C2785A and C2786A, the DTC 72MX should be ordered with the "system front panel" (option 1AC of the J2070A). An optional rail kit (C2788A) can be used to facilitate the installation of the DTC 72MX chassis.

The DTC 72MX chassis (delivered with mounting brackets) is racked at the front of the rack and takes 3 EIA height units. Racking of the asynchronous distribution panels:

- 24-port RJ-45 distribution panels:
  - standard 19-inch EIA compliant
  - takes 1 EIA height unit
  - no rack-mount kit required
  - attached to the rear columns of the rack
- 8-port direct connect DB-25 distribution panels (DDP):
  - standard 19-inch EIA compliant
  - takes 1 EIA height unit
  - no rack-mount kit required
  - attached to the rear or front columns of the rack
  - (use filler panel C2791A = 6 * 1 EIA unit if front side installation)
- 8-port Modem connect DB-25 distribution panels (MDP):
  - **not** 19-inch EIA compliant
  - requires a rack-mount kit for rear side installation:
  - use the C2792A kit to install up to 5 MDPs

- takes 5 EIA units of height

For front side installation:
- use the J2084A kit to install up to 5 MDPs (includes the filler panels)
- takes 7 EIA height units

Hardware platform

Physical specs.
Physical specifications
Height: 123 mm (5.12 in) = 3 EIA Units
Depth: 273 mm (11.37 in)
Width: 425 mm (16.8 in) = 19 inch compliant
Weight: 6.5 kg (15 lbs)

Operating Environment
Temperature: 0° to 55° C
Relative humidity: 5% to 95% at 40° C
Altitude: 4600m
Static discharge: 15kV - no data loss

Electrical Specifications
Current consumption:
Typical: 1.8A/0.9A(115/220V)
Maximum: 2.2A/1.1A(115/220V)
Line frequency: 50/60Hz
Typical AC Input Voltage: 115V/230V (autorange power supply)

Regulatory Classifications
Emissions:
- FTZ 1046/84,
- FCC part 15 class A
- EN55022 Class A
- VCCI Class 1
- SABS

Safety: UL, CSA, EN60950, SASO, BS6301

Ordering Information

Ordering the DTC 72MX products

HP J2070A Main product: DTC 72MX includes:

- The DTC 72MX with racking hardware
- One "table-top" front panel
- One LAN interface
- A LAN accessories kit
- Installation manuals
- A software tape for HP 3000/900 systems

Front panel option
1AC Replaces the table-top front panel with an HP system cabinet front-panel

Interface options
(no asynchronous option is mandatory)
RS-232-C Asynchronous Processor Boards: (comes standard with 19-inch RJ-45 distribution panel(s), 1 EIA unit/24 ports)
001 24 RS-232-C direct connect ports (one board) (consumes one slot)
002 48 RS-232-C direct connect ports (two boards) (consumes two slots)
003 72 RS-232-C direct connect ports (three boards) (consumes three slots)

For each RS-232-C board, MODEM ports can be substituted for direct ports (8, 16 or 24 on one board) with the following options:

UG5 Replace 8 direct ports with 8 MODEM (DB-25) ports (it comes then with 8-port female DB-25 distribution panels) (it comes then with 8-port female DB-25 distribution panels)
UG4 RS-423 Asynchronous Processor Board: 24 RS-423 direct connect ports (consumes one slot) (comes standard with 19-inch RJ-45 distribution panel, 1 EIA unit)

X.25 boards
1CW X.25 board with RS-232 interface (consumes one slot)
1CX X.25 board with V.35 interface (consumes one slot)

HP 3000 Telnet Access
004 TCP/IP-Telnet Access card (consumes one slot)

Ordering the DTC 72MX add-on products

HP J2076A 24 RS-232 direct connect ports for DTC 72MX (consumes one slot)

UG5 replaces 8 direct ports with 8 modem ports

HP J2077A 24 RS-423 direct connect ports for DTC 72MX (consumes one slot)

HP J2079A X.25 board for DTC 72MX (consumes one slot)
1CW RS-232 interface
1CX V.35 interface

HP J2080A HP 3000 Telnet Access (consumes one slot)

Ordering the Connection accessory products

HP J2085A The DTC 72MX comes standard with RJ-45 distribution panels (for direct connect) but connection accessories are available for upgrades or to accommodate existing cabling.

101 8-port MODEM distribution panel: DB-25. Used to upgrade RS-232 direct connect ports to Modem ports. Includes one panel (MDP) with DB-25 connectors and a link cable for DTC connection.

102 8-port Direct connect distribution panel:DB-25. Used for DB-25 cabling, compatible with DTC16 (HP 2340A) connectors. Includes one 19" (1EIA - rack-mountable) panel with DB-25 connectors and a link cable for DTC connection.

103 24-port Direct Connect Distribution panel: RJ-45. Used for rack installation. This accessory is the default distribution panel of a 24-port asynchronous processor board. Includes one 19" (1EIA - rack-mountable) panel with RJ-45 connectors and 3 link cables for DTC connection.

104 8-port multiport cable (3-pin connectors). Used for compatibility with existing DTC48 (HP 2345A) and ATPs connectors.

105 16-port Direct connect distribution panel: RJ-45- used for rack installation- this accessory is the default distribution panel of a 16-port asynchronous processor board includes one 19" (1 EIA-rack-mountable) panel with RJ-45 connectors and 2 link cables for DTC connection

Ordering the DTC manager application

DTC manager running on an HP 3000/900
Nothing to order. Integrated with the MPE/iX operating system (FOS).

DTC manager running on an HP 9000/800

HP J2120A HP DTC Manager/UX

AA0 Software on ¼-inch cartridge
AA1 Software on ½-inch mag tape 1600 bpi
AAH Software on DAT cartridge tape
AA4 Software on QIC cartridge tape
AAU Software on CD-ROM
0CC Update to latest version

DTC manager running on the HP OpenView Windows platform

HP 32054D opt. 201
HP OpenView Windows Workstation (PC) preconfigured with the DTC Manager application software, including integrated EtherTwist connectivity

ABA -> ABZ Localization options (must order one)

Network connection options (must order one)

101 ThinLAN connection
102 ThickLAN connection
103 EtherTwist connection

HP D2355A DTC manager application software for an HP OpenView Windows (PC) workstation

HP D1824D opt. 201 Update of an existing HP OpenView Windows Workstation with the latest revision of software and DTC manager application

- The HP OpenView Windows workstation (HP 32054E) is an especially configured HP Vectra, with PC software already installed. It includes 4Mb of memory, HP portable DeskJet printer, and MS-DOS®, MS Windows®, HP ARPA and Network Services/DOS, HP OpenView Windows, HP AdvanceLink for Windows.

HEWLETT® PACKARD

Communications Server (DTC 16MX)

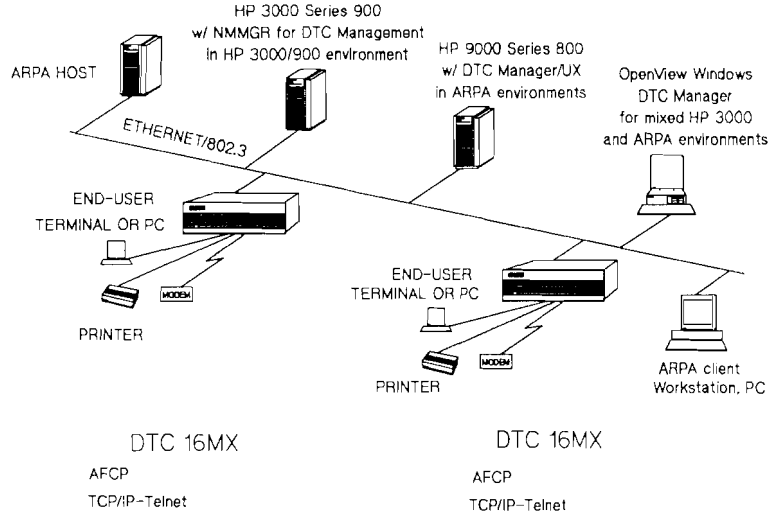
Technical Data

Product Number
HP J2063A

Introduction

The DTC 16MX is part of HP's family of LAN-based Datacommunication and Terminal Servers, HP's solution for connecting asynchronous devices (terminals, printers, modems) to single or multiple HP 3000/900 or HP 9000 and platforms running the standard Telnet-TCP/IP protocols. The DTC 16MX is targeted at environments requiring distributed connectivity to single or multiple HP 9000, HP 3000/900, or non-HP system running the standard Telnet-TCP/IP protocol.

DTC 16MX Communications Server



For information on other DTC products, refer to the DTC family data sheet (which presents the complete DTC family, the target environments, and supported devices) and to the individual product data sheets:

DTC 16TN:	HP J2060A
DTC 16iX:	HP J2062A
DTC72MX:	HP J2070A
DTC Management:	HP D2355A
	HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).

DTC 16MX Key Features

- LAN-based communication server supporting the standard Telnet-TCP/IP protocols plus HP optimized high performance protocols for demanding OLTP applications in HP 3000/900 and HP 9000 environments.
- Systems are accessed directly through system LAN links or through system asynchronous ports (via the extended switching configuration or back-to-back) for systems which do not implement Telnet-

TCP/IP or the HP 3000/900 protocol.
- Provides up to 16 RS-232 direct or modem ports, or RS-423 direct ports.
- Provides compatible API with HP 9000 system asynchronous multiplexers.
- Provides printer sharing and multisessions per port.
- Managed under HP OpenView Windows environment, or from an HP system (HP 3000/900 or HP 9000/800).
- Supports an SNMP agent.
- Provides comprehensive support tools for increased supportability and uptime.

Product highlights

High Performance
Built upon a powerful architecture, the DTC 16MX delivers a high throughput to the end-users. In addition, the DTCs support high performance protocols for demanding commercial applications:
- AFCP, an optimized protocol for OLTP applications running under the HP 3000/900.

Extended Direct Connect plus Full Modem support
The DTC 16MX provides either direct connect or modem ports.

The direct connect modem ports support RTS/CTS signals for hardware flow-control, eliminating the need for modem ports when printer connectivity is required.

The modem connect ports provide full modem control for operation over leased lines or the telephone network.

Application interface compatible with HP 9000 system multiplexers
The DTC products use standard systems calls to access and control the DTC ports. This presents HP-UX applications with a programmatic interface that is almost identical to the interface to asynchronous systems MUX ports, allowing an easy migration from MUX to network environment.

This includes:
- DTC port identification
- Host initiated sessions (printing, programmatic access) to DTC ports via standard device files

Ease of Use
The DTC 16MX has been designed to be a "plug and play" product and is customer installable. This includes a very easy installation process, auto-sensing of LAN attachment, complete self tests at boot time, auto-range power supply, default configurations of the DTC ports, self explanatory DTC user interface.

Compact, flexible package
The DTC 16MX uses a standard 19-inch chassis. It can be located on a tabletop or in rack-mounted configurations such as HP systems cabinets. It comes with 19-inch RJ-45 distribution panels for use with simple and low-cost cabling. The RJ-45 pin-out is ATT356 compliant to allow future migration from asynchronous devices to 10BaseT LAN devices without cabling change.

DTC 16MX management

The DTC 16MX is configured and managed with the use of a DTC Manager application that can run on three different platforms: HP 3000/900, HP 9000/800, or PC OpenView Windows.

- With the DTC host-based management, a simple terminal connected locally or remotely to the HP 3000/900 or HP 9000/800 system is used to manage the DTCs. It provides a user interface similar to other system administration tools.
  - The HP 3000/900-based DTC management software provides a means of configuring DTCs for use in HP 3000/900 standalone environments.
  - The HP 9000/800-based DTC management software provides a means of configuring DTCs in HP 9000 standalone or multisystem Telnet-TCP/IP environments.
- The HP OpenView (PC-based) DTC Manager software provides an easy-to-use graphical user interface, to manage DTCs. It is possible to manage other HP elements (such as HP X.25 Switches and PADs) on the same OpenView Windows workstation. HP OpenView DTC Manager provides a means of configuring DTCs for use to connect to HP 3000/900 or HP 9000/800 systems and to other systems in Multivendor environments. It provides powerful network management features for complex network topologies.

In both host-based and PC-based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

DTC SNMP agent
Besides the services provided by the DTC management platforms, the DTC-based SNMP agent allows customers to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager (UX based).

The following features are available with Node Manager:

- Automatic discovery of DTCs.
- Status/Colors management which automatically polls DTCs on a regular basis and indicates their status by their color on the network map.
- A MIB loader/browser which provides display of MIB values in text or graphical form and the ability to modify them if permitted by the DTC.
- A MIB application builder which enables users to build applications dealing with DTC MIB objects.
- Historical data reporting for troubleshooting and network planning.

The DTC SNMP agent is supported on all DTC hardware and is configurable from all the DTC management platforms.

DTC 16MX Rack installation

The DTC 16MX can be easily installed in industry-standard 19-inch EIA racks. The DTC 16MX chassis (delivered with mounting brackets) is racked at the front of the EIA rack and takes 1 EIA height unit. An optional rail kit (E3664A) can be used.

Racking the asynchronous distribution panels:

- 8-port RJ-45 breakout box (attached to the DTC 16MX chassis): doesn't require any additional rack installation.
- 8-port direct connect DB-25 distribution panels (DDP):
  - standard 19-inch EIA compliant
  - takes 1 EIA height unit
  - no rack-mount kit required
  - attached to the rear or front columns of the rack
  - (uses filler panel C2791A = 6 * 1 EIA unit if front side installation)
- 8-port Modem connect DB-25 distribution panels (MDP):
  - **not** 19-inch EIA compliant requires a rack-mount kit for rear side installation:
  - use the C2792A kit to install up to 5 MDPs
  - takes 5 EIA units of height

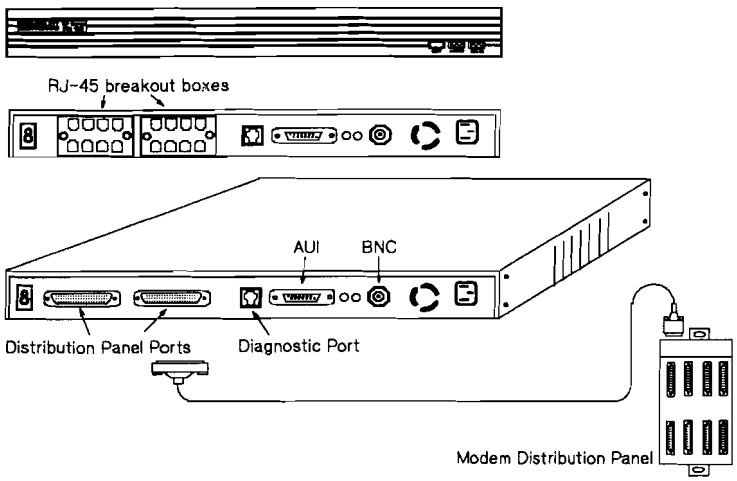
  For front side installation:
  - use the J2084A kit to install up to 5 MDPs (including the filler panels) + J2087A for 10 MDPs
  - takes 7 EIA height units

For more details and configuration examples, refer to the DTC Racking and Cabling Guide available with the DTC 16MX installation guide (P/N 5959-4986).

DTC 16MX Product Specifications

The DTC 16MX has a compact chassis compliant with the industry-standard EIA 19-inch size. It provides a built-in LAN interface and 16 asynchronous ports.

HP DTC 16MX TERMINAL SERVER



LAN interface

Two standard connectors are provided:

Connector:

BNC
802.3 AUI 15-pin

LAN supported:

ThinLAN (10Base2), ThickLAN, EtherTwist
10BaseT, Fiber Optic, Broadband,
FDDI connectivity through IEEE 802.3/Ethernet external adapters

The DTC 16MX automatically recognizes the type of LAN it is connected to (ThinLAN or AUI)

Asynchronous interfaces

The DTC 16MX chassis supports one of the following interfaces :

16-port RS-232-C (Direct or Modem or mixed with a modularity of 8 ports)

- Direct connect with hardware flow-control

Signals	RD, TD, ground, RTS, CTS
Connectors	female RJ-45 (or optional female DB-25)
Line speed	from 300 to 38,400 bps

- Modem connect with FULL-Modem control

Signals	RD, TD, DCD, DTR, RTS, RI, DSR, CTS, DRS, shield and signal ground
Connectors	female DB-25
Line speed	from 300 to 19,200 bps

16-port RS-423 Direct connect with hardware flow-control

Signals	RXa, RXb, TXa, TXb
Connectors	female RJ-45 (or optional female DB-25)
Line speed	from 300 to 38,400 bps
Cable length	200 m

Common characteristics

Flow control	Xon/Xoff, HP Enq/Ack, RTS/CTS
Speed sensing	yes
Parity sensing	yes
Sessions/port	1
Printer sharing	yes

Specific capabilities

Powerfail recovery
Typeahead facility
Field-mode support
Device type managed by the system

System release requirement

MPE/iX release 4.0 + Power Patch # 6 or 5.0.

Hardware platform

Physical specifications

Height: 43.7 mm (1.7 in) = 1 EIA Units
Depth: 235 mm (9.3 in)
Width: 425 mm (16.8 in) = 19 inch rack compliant
Weight: 2.6 kg (6 lbs)

Operating Environment

Temperature: 0°C to 55°C
Relative humidity: 5% to 95% at 40°C
Altitude: 4600m
Static discharge: 15kV - no data loss

Electrical specifications

Current consumption:
Typical: 0.4A/0.2A (115V/220V)
Maximum 0.5A/0.25A (115V/220V)
Line frequency: 50/60Hz
Typical AC Input Voltage:115V/230V

Regulatory classifications

Emissions:
- FTZ 1046/84, FCC part 15 class A
- EN55022 Class A
- VCCI Class 1
- SABS

Safety:
- UL
- CSA
- EN60950
- SASO
- BS6301

Ordering Information

Ordering the DTC 16MX products

HP 2063A DTC 16MX Main product
Includes

- The DTC 16MX with racking hardware
- LAN access with BNC connector and standard 15-pin AUI
- 16 RS-232-C direct connect ports and RJ-45 connectors
- Installation manuals
- A software tape for HP 3000/900 systems

Interface options

UG5 Replaces 8 DIRECT ports with 8 MODEM ports (can order one or two)

UG4 Replaces 16 RS-232-C ports with 16 RS-423 ports (can order one)

IAC Rack kit

Ordering the Connection accessory products

HP J2085A The DTC 16MX comes standard with RJ-45 distribution panels (for direct connect) but connection accessories are available for upgrades or to accommodate existing cabling.

101 8-port MODEM distribution panel: DB-25- used to upgrade RS-232 direct connect ports to Modem ports. Includes one panel (MDP) with DB-25 connectors and a link cable for DTC connection.

102 8-port Direct connect distribution panel:DB-25 - used for DB-25 cabling, compatible with DTC16 (HP 2340A) connectors. Includes one 19" (1EIA - rack-mountable) panel with DB-25 connectors and a link cable for DTC connection.

104 8-port multiport cable (3-pin connectors) - used for compatibility with existing DTC48 (HP 2345A) and ATPs connectors.

105 16-port Direct connect distribution panel: RJ-45 - used for rack installation this accessory is the default distribution panel of a 16-port asynchronous processor board. Includes one 19" (1 EIA-rack-mountable) panel with RJ-45 connectors and 2 link cables for DTC connection

Ordering the DTC manager application

DTC manager running on an HP 3000/900
Nothing to order
Integrated with the MPE/iX operating system (FOS)

DTC manager running on the HP OpenView Windows platform

HP 32054E #201 HP OpenView Windows Workstation (PC) preconfigured with the DTC Manager application software, including integrated EtherTwist connectivity

ABA --> #ABZ Localization options (must order one)

Network connection options (must order one)

101 ThinLAN connection

102 ThickLAN connection

HP D2355A DTC Manager application software for an HP OpenView Windows (PC) workstation

HP D1842E #201 Update of an existing HP OpenView Windows Workstation with the latest revision of software and DTC Manager application

- The HP OpenView Windows workstation (HP 32054E) is an especially configured HP Vectra, with PC software already installed. It includes 4Mb of memory, HP portable DeskJet printer, and MS-DOS, MS-Windows, HP ARPA and Network Services/DOS, HP OpenView Windows, and HP AdvanceLink for Windows

HEWLETT® PACKARD

HP 3000 LAN Multiplexer (DTC 16iX)

Technical Data

Product Number
HP J2062A

Introduction

The DTC 16iX is part of HP's family of LAN-based Communication and Terminal Server family, HP's solution to connect local or remote asynchronous devices (terminals, printers, modems) to single or multiple HP 3000.

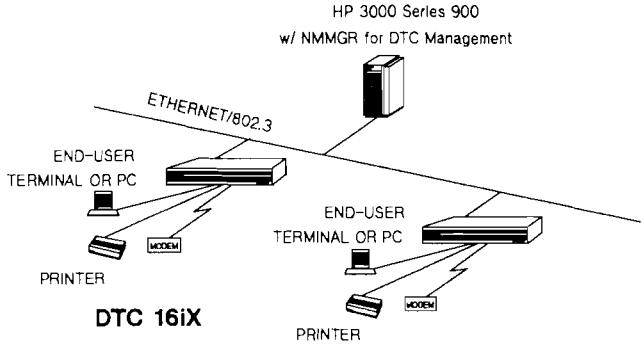
The DTC 16iX can be considered as a LAN-attached asynchronous multiplexer for the HP 3000/900 systems which require low port count or distributed connectivity.

For information on other DTC products, refer to the DTC family data sheet (which presents the complete DTC family, the target environments, and supported devices) and to the individual product data sheets:

DTC 16TN:	HP J2060A
DTC 72MX:	HP J2070A
DTC 16iX:	HP J2062A
DTC 16MX:	HP J2063A
DTC16:	HP 2340A
DTC48:	HP 2345A
DTC Management:	HP D2355A
	HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).

DTC 16iX HP 3000 LAN Multiplexer



DTC 16iX Key Features

- LAN-attached asynchronous multiplexer supporting connectivity to a dedicated HP 3000/900 system in centralized or distributed environments.
- Delivers 16 RS-232 direct or modem ports, or RS-423 ports in the same package as the HP Ethertwist hubs, bridges, routers.
- Managed from the HP 3000/900 system
- Supports an SNMP agent
- Designed for ease-of-use and simple system and network integration

Product highlights

High performance
Built upon a powerful architecture, the DTC 16iX delivers a high-throughput to the end-users and supports AFCP, the HP 3000/900 high transaction protocol for OLTP applications running under the HP 3000/900 systems.

Compact, flexible package
The DTC 16iX uses a compact standard 19-inch chassis identical to some other HP products such as HP Ethertwist products very easy to install in tabletop, wall-mounted, or in rack-mounted configurations. It comes with a compact RJ-45 breakout box for use with simple and low-cost cabling. The RJ-45 pin-out is ATT356 compliant which allows future migration from asynchronous devices to 10BaseT LAN devices without cabling change.

Ease of use
The DTC 16iX has been designed to be a "plug and play" product. This includes a very easy installation process, auto-sensing of LAN attachment, complete self tests at boot time, default configurations of the DTC ports.

Extended Direct connect plus Full Modem support
The DTC 16iX provides either direct or Modem ports. The direct connect ports support RTS/CTS signals for hardware flow-control eliminating the need for Modem ports when printer connectivity is required. The Modem connect ports provide a full modem control for operation over leased lines or telephone network.

DTC 16iX Management

The DTC 16iX is configured and managed with the use of a DTC Manager application.

- At first release, the DTC 16iX is managed from the HP 3000/900. A simple terminal connected to the HP 3000/900 system is used. It provides a user interface similar to the other system administration tools.
- The DTC 16iX is also managed from the HP OpenView (PC-based) DTC Manager software which provides an easy to use graphical user interface, and the possibility of integrating management applications for other network elements (such as other DTCs, HP X.25 switches, and PADs) and the SYSMAN application on the same OpenView Windows workstation.

In both the host-based and PC-based environment, the DTC software is downloaded from the management platform, thus allowing easy distribution and control of the DTC software. .

DTC SNMP agent
Besides the services provided by the DTC management platforms, the DTC-based SNMP agent provides customers with a way to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager (UX based) or the HP OpenView Interconnect Manager (Windows—PC based). The DTC SNMP agent is configurable from all the DTC management platforms.

DTC 16iX Rack installation

The DTC 16iX can be easily installed in industry-standard 19-inch EIA racks. The DTC 16iX chassis (delivered with mounting brackets) is racked at the front of the EIA rack and takes 1 EIA height unit. An optional rail kit (HP E3664A) can be used.

Racking the asynchronous distribution panels:

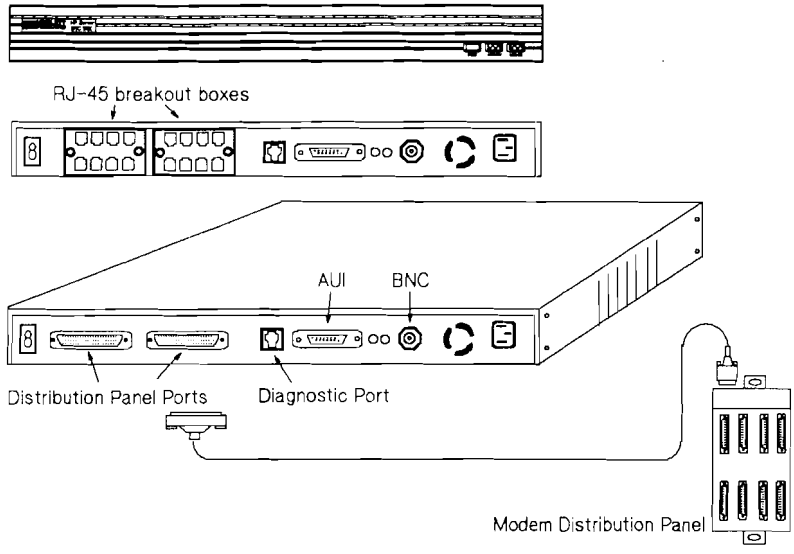
- 8-port RJ-45 breakout box (attached to the DTC 16iX chassis): doesn't require any additional rack installation.
- 8-port direct connect DB-25 distribution panels (DDP):
  - standard 19-inch EIA compliant
  - takes 1 EIA height unit
  - no rack-mount kit required
  - attached to the rear or front columns of the rack
  - (use filler panel C2791A = 6 * 1 EIA unit if front side installation)
- 8-port Modem connect DB-25 distribution panels (MDP):
  - **not** 19-inch EIA compliant
  - **requires** a rack-mount kit
  - for rear side installation: use the HP C2792A kit to install up to 5 MDPs takes 5 EIA units of height
  - for front side installation: use the HP J2084A kit to install up to 5 MDPs (including the filler panels) takes 7 EIA height units

For more details and configuration examples, refer to the DTC Racking and Cabling Guide available with the DTC 16iX Installation Guide (P/N 5959-4986).

DTC 16iX Product specifications

The DTC 16iX has a compact chassis compliant with the industry-standard EIA 19-inch form factor. It provides a built-in LAN interface and 16 asynchronous ports.

HP DTC 16iX LAN Multiplexer



LAN interface

Two standard connectors are provided:

Connector:	LAN supported
BNC	ThinLAN (10Base2)
802.3 AUI 15-pin	ThickLAN, EtherTwist, 10BaseT, Fiber-optic, Broadband, FDDI connectivity through, IEEE 802.3/Ethernet external adapters

The DTC 16iX automatically recognizes the type of LAN connected (ThinLAN or AUI)

Asynchronous interfaces

The DTC 16iX chassis supports one of the following interfaces:

16-port RS-232-C (Direct or Modem or mixed with a modularity of 8 ports)

- Direct connect with hardware flow-control
  - Signals: RX, TX, ground, RTS, CTS
  - Connectors: female RJ-45 (or optional female DB-25)
  - Line speed: from 300 to 38,400 bps
  - Cable length: 15 to 70 m
- Modem connect with FULL-Modem control
  - Signals: RD, TD, DCD, DTR, RTS, RI, DSR, CTS, DRS, shield and signal ground
  - Connectors: female DB-25
  - Line speed: from 300 to 19,200 bps

Hardware platform

Physical specifications

Height: 43.7 mm (1.7 in) = 1 EIA Units
Depth: 235 mm (9.3 in)
Width: 425 mm (16.8 in) = 19 inch rack compliant
Weight: 2.6 kg (6 lbs)

Operating environment

Temperature: 0° to 55°C
Relative humidity: 5% to 95% at 40°C
Altitude: 4600m
Static discharge: 15kV—no data loss

Electrical specifications

Current consumption: typical 0.4A/0.2A (115V/220V) maximum 0.5A/0.25A (115V/220V)
Line frequency: 50/60Hz
Typical AC Input Voltage: 115V/230V

Regulatory classifications

Emissions

- FTZ 1046/84, FCC part 15 class A
- EN55022 Class A
- VCCI Class 1
- SABS

Safety: UL, CSA, EN60950, SASO, BS6301

16-port RS-423 Direct connect with hardware flow-control

Signals	RXa, TXa, ground, RTS, CTS
Connectors	female RJ-45 (or optional female DB-25)
Line speed	from 300 to 38,400 bps
Cable length	200m

Common characteristics

Flow control	Xon/Xoff, HP Enq/Ack, RTS/CTS
Speed sensing	yes
Parity sensing	yes
Sessions/port	1
Printer sharing	yes

Specific capabilities

Powerfail recovery
Typeahead facility
Field-mode support
Device type managed by the system

System release requirement

MPE/iX release 4.0 or later (software update supplied with the DTC 16iX)

Ordering instructions

Ordering the DTC 16iX products

HP 2062A Main product—DTC 16iX includes:

- The DTC 16iX with racking hardware
- LAN access with BNC connector and standard 15-pin AUI
- 16 RS-232-C direct connect ports and RJ-45 connectors
- Installation manuals
- A software tape for HP 3000/900 systems

Interface options

UG5 Replaces 8 direct ports with 8 modem ports (can order one or two)

UG4 Replaces 16 RS-232-C ports with 16 RS-423 ports (can order one)

HP J2085A ordering the connection accessory products

The DTC 16iX comes standard with RJ-45 distribution panels (for direct connect). Connection accessories are available for upgrades or to accommodate existing cabling.

101 8-port modem distribution panel: DB-25, used to upgrade RS-232 direct connect ports to Modem ports. Includes one panel (MDP) with DB-25 connectors and a link cable for DTC connection.

102 8-port Direct connect distribution panel: DB-25, used for DB-25 cabling, compatible with DTC16 (HP 2340A) connectors. Includes one 19" (1EIA—rack-mountable) panel with DB-25 connectors and a link cable for DTC connection.

104 8-port multiport cable (3-pin connectors), used for compatibility with existing DTC48 (HP 2345A) and ATP connectors

105 16-port Direct connect distribution panel: RJ-45, used for rack installation. This accessory is the default distribution panel of a 16-port asynchronous processor board. Includes one 19" (1 EIA-rack-mountable) panel with RJ-45 connectors and 2 link cables for DTC connection

Ordering the DTC manager application

Nothing to order, the DTC manager application is integrated with the MPE/iX operating system (FOS).

HEWLETT® PACKARD

HP DTC Datacommunications and Terminal Controller Family

Technical Data

Product Numbers

HP J2060A, J2062A, J2063A, J2085A, J2070A, J2076A, J2077A, J2079A, J2080A, J2120A, D2355A, J2123A

Introduction

The DTC solution consists of a family of LAN-based Communication and Terminal Servers as well as a scalable family of network management products.

It is HP's solution for providing asynchronous connectivity to HP and non-HP systems for local and remote devices (terminals or PCs in terminal emulation mode, printers, modems).

It delivers location-independent end-user access to single or multiple HP 3000/900, HP 9000, and any system running the standard Telnet-TCP/IP protocol over several options of LANs and over X.25 networks using PAD services.

The routable implementation of CP/IP within the DTC provides the access through IP routers in extended LAN environments.

Systems are primarily accessed directly via system LAN links or secondarily through system asynchronous ports via the extended switching configuration (back-to-back) for systems that do not implement the Telnet-TCP/IP or HP 3000/900 protocols.

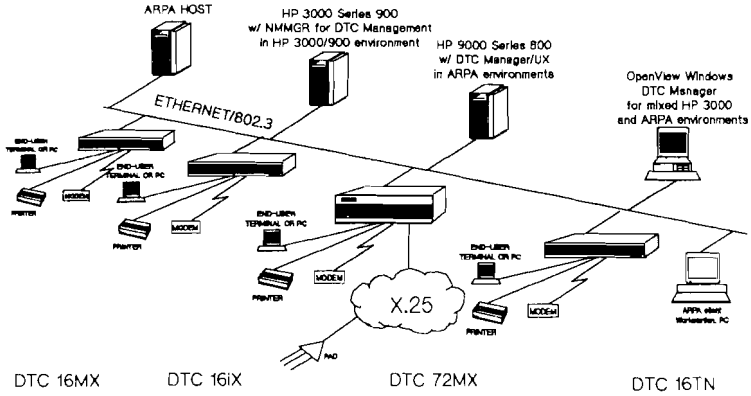
The DTC also supports Telnet-TCP/IP Access and X.25 system-to-system networking for the HP 3000/900 systems.

Key Features

- Scalable family of terminal servers and network management services.
- Support of standard Telnet-TCP/IP and high performance protocols for demanding OLTP applications on HP 3000/900 and HP 9000 systems.
- Designed for ease of use, and simple system and network integration.
- Location independent access.
- Compatible API with HP 9000 system asynchronous multiplexers.

HP DTC Family

Scalable network Management Solution



Scalable family of Communications and Terminal Servers

- Managed under HP OpenView Windows environment, or from an HP system (HP 3000/900 or HP 9000/800).
- Supports Telnet Access for HP 3000/900 systems.
- Supports X.25 communications for HP 3000/900 systems.
- Supports remote X.25 PAD access to HP 3000/900 systems and other systems running Telnet-TCP/IP.
- Supports an SNMP agent.
- Provides comprehensive support tools for increased supportability and uptime.

Content

This data sheet, provides an overview of the DTC products and management capabilities, and serves as a selection guide for the DTC products. It also includes the support and cabling information for the DTC products.

For more information on individual DTC products and on the services supported on each platform, refer to the individual product data sheets:

DTC 16TN:	HP J2060A
DTC 72MX:	HP J2070A
DTC 16iX:	HP J2062A
DTC 16MX:	HP J2063A
DTC16:	HP 2340A
DTC48:	HP 2345A
DTC Management:	HP D2355A
	HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).

Also refer to the DTC documentation table at the end of this data sheet.

The DTC Server Family

The DTC 16TN: J2060A

The DTC 16TN is a high-performance Telnet Terminal Server for HP 9000 systems and any system running the standard Telnet-TCP/IP protocols. It provides 16 RS-232 or RS-423 asynchronous ports in a "plug and play" pre-configured package. With an industry-standard width of 19-inches, it can easily be installed on a tabletop, be wall-mounted or rack-mounted.

The DTC 72MX: J2070A

The DTC 72MX is a modular high-performance communication server for HP 3000/900 systems and for multivendor environments including HP 3000/900, HP 9000/800, and any system running the Telnet-TCP/IP protocol.

In the 3 available slots of the industry-standard 19-inch chassis, the DTC 72MX can support a combination of 24-port RS-232 or RS-423 Asynchronous Processor Boards (up to 3), X.25 boards (up to 3) and one Telnet Access Card.

The DTC 16iX: J2062A

The DTC 16iX is used exclusively in HP 3000/900 standalone environments.

It is a LAN-attached multiplexer-like product and provides 16 RS-232 or RS-423 asynchronous ports in a "plug and play", pre-configured package.

With an industry-standard width of 19-inches, it can easily be installed on a tabletop, be wall-mounted or rack-mounted.

The DTC 16MX: J2063A

The DTC 16MX is a modular high-performance communication server for HP 3000/900 systems and for multivendor environments including HP 3000/900, HP 9000/800, and any system running the Telnet-TCP/IP protocol. It provides 16 RS-232 or RS-423 asynchronous ports in a "plug and play" pre-configured package. With an industry-standard width of 19-inches, it can easily be installed on a tabletop, be wall-mounted or rack-mounted.

The DTC16: 2340A

The DTC16 is a communication server for HP 3000/900 systems and for multivendor environments including HP 3000/900 systems, HP 9000/800, plus other systems running the Telnet-TCP/IP protocol. It supports up to 16 RS-232 asynchronous connections plus an optional X.25 link.

The DTC management Software

The DTC products are configured and managed with the use of a DTC Manager application that can run on three different platforms: HP 3000/900, HP 9000/800, or PC OpenView Windows.

- With the DTC host-based management, a simple terminal connected locally or remotely to the HP 3000/900 or HP 9000/800 system is used to manage DTCs. It provides a user interface similar to other system administration tools.
  - The HP 3000/900-based DTC management software provides a means to configure DTCs for use in HP 3000/900 standalone environments. The HP 9000/800-based DTC management software provides a means to configure DTCs in HP 9000 standalone or multisystem Telnet-TCP/IP environments.
- The HP OpenView (PC-based) DTC Manager software provides an easy-to-use graphical user interface, to manage DTCs. It is possible to integrate other management applications of network elements (such as HP X.25 Switches and PADs) on the same OpenView Windows workstation. HP OpenView DTC Manager provides a means to configure DTCs for use to connect to HP 3000/900 or HP 9000/800 systems and to other systems in multivendor environments. It provides powerful network management features for complex network topologies.

In both host-based and PC-based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

DTC SNMP agent
Besides the services provided by the DTC management platforms, the DTC-based SNMP agent allows customers to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager (UX based) or the HP OpenView Interconnect Manager/Windows (PC based).

The following features are available with Node Manager:

- Automatic discovery of DTCs.
- Status/Colors management. The DTCs are automatically polled on a regular basis and the status color is reflected on the map.
- MIB loader/browser. It provides display of MIB values in text or graphical form and the capability to modify them if permitted by the DTC
- MIB application builder. It enables users to build applications dealing with DTC MIB objects
- Historical data reporting for troubleshooting and network planning.

The DTC SNMP agent is supported on all DTC hardware and configurable from all the DTC management platforms.

DTC Family Highlights

High Performance
Built upon a powerful architecture, the DTC products deliver a high throughput to the end-users. In addition, the DTCs support high performance protocols for demanding commercial applications:

- an optimized High performance protocol (AFCP) for OLTP applications running on the HP 3000/900 system,

Ease of use

- The DTCs are designed to be quickly and easily installed either in standard 19-inch cabinets or on table-top, or wall-mounted. The DTC 16TN, for example, is customer installable.
- For standard connectivity and low-cost cabling, the DTC 16TN, DTC 16iX, DTC 16MX, and DTC 72MX have RJ-45 connectors.
- The DTC ease-of-use features include:
  - Auto-sensing LAN attachment
  - Automatic default configuration
  - Auto-range power supply
  - Automatic Self-tests
  - Automatic connection establishment to a predefined host, configurable per DTC port
  - Diagnostic tools
  - Self-explanatory DTC user interface

Location-independent access
The DTC family provides location-independent access for end-users.

This means that most of the services provided to local users connected on a DTC port are also available to remote users accessing the DTC16 or DTC 72MX via the X.25 network.

Application interface compatible with HP 9000 system multiplexers
The DTC products use standard systems calls to access and control the DTC ports. This presents HP-UX applications with a programmatic interface that is almost identical to the interface to asynchronous systems MUX ports, thus allowing an easy migration from MUX to network environment.

This includes:
- DTC port identification
- Host initiated sessions (printing, programmatic access) to DTC ports via standard device files

Family Connectivity

Asynchronous connectivity
- RS-232 Direct or Modem ports
- RS-423 Direct for long distance cabling
- Line speed up to 38.4kb/s with speed and parity sensing
- DB-25 and RJ-45 female connections
- Xon/Xoff and hardware flow-control on direct ports, and full modem control (CCITT V.24) on modem ports.
- Multisession per port (up to 5)
- Device/printer sharing between multiple HP systems with a queuing mechanism.

LAN Connectivity

- ThinLAN, standard 802.3 AUI 15-pin for use with ThickLAN, EtherTwist, 10BaseT, fiber-optic.
- 802.3/Ethernet
- Broadband, FDDI connectivity through external adapters
- Telnet-TCP/IP protocols
- High performance Telnet/OLTP protocol
- Symbolic addressing (DNS and HP-NS)
- IP addressing
- High performance protocol (AFCP) for HP 3000/900 systems.

X.25 connectivity
- X.25 CCITT-84
- PAD support (incoming calls) to access HP 3000/900, HP 9000, and systems running Telnet-TCP/IP
- Selectable PAD support profiles
- Closed User Group X.25 facility
- Access authorization features
- X.25/PAD support auto-restart on powerfail
- Outgoing X.25 calls via an external PAD (HP 2335A) connected to DTC port(s)
- Remote printer support

Telnet access to HP 3000/900

The Telnet/iX product based on the optional HP 3000 Telnet Access Card of the DTC 72MX or DTC48, provides end-users on Terminal Servers, PCs, workstations, and systems running Telnet-TCP/IP with access to HP 3000/900 applications.

Based on a protocol conversion between Telnet-TCP/IP and the optimized HP 3000/900 protocol, the Telnet/iX implementation is routable and allows sharing of one Telnet Access Card between multiple HP 3000/900 systems on the same LAN.
- Supported applications:
  - VPlus applications with HP 2392 compatible terminal or terminal emulation,
  - User block mode,
  - Line mode,
  - Character mode.
- Specific features:
  - Binary mode,
  - Simple type ahead.

Management services

A broad set of management services are available to increase productivity, network uptime and security. They are all available under the HP OpenView (PC-based) DTC manager application, with a subset being provided under Host-based management. Refer to the DTC Management data sheet for details.
The services available include:

Configuration management
- Automatic default configuration
- Copy and Paste function to duplicate configurations
- Dynamic reconfiguration of ports
- DTC download from the management server allowing centralized software updates

Fault management
- Reset of DTC, boards, port
- Status monitoring
- Event monitoring and logging
- Automatic Alarm reporting

Security management
- Password access to the DTC manager
- Operator security levels
- Enable/Disable switching and multisession on a per DTC port basis
- Pre-defined default host access
- Configurable access for PAD users

DTC Management platform selection

An "X" in the table indicates that the DTC Management platform can be chosen for the environment listed.	HP 3000 HP 9000 (in the FOS)	HP 9000 Series 800 J2120A	HP OpenView (PC based) 32054D #201 D2355A
Need access to system(s)			
Single HP 3000/900	X	–	X
Single HP 9000/800	–	X	X
Systems without LAN or Telnet-TCP/IP (back-to-back)	–	–	X
Multiple HP 3000/900 from one DTC	–	–	X
Multiple systems running Telnet-TCP/IP Includes HP 9000 systems (S800, 300, 400, 700) HP 1000 and non-HP systems	–	X	X
Multiple systems Includes HP 3000/900, HP systems (800, 300, 400, 700, HP 1000) and non-HP systems (running Telnet-TCP/IP)	–	X	X
X.25 for HP 3000/900 (PAD Support and system-to-system)	X*	–	X
X.25 PAD Support to multiple systems (HP or non HP running Telnet-TCP/IP)	–	–	X

* Single system only. For specific management features, refer to the DTC Management data sheet.

Documentation

Refer to the following documentation for more information on the DTC:

To plan DTC usage
D2355-95017 The DTC planning guide

To install
02340-90001 DTC16 Installation Guide
02345-90001 DTC48 Installation Guide
5959-4986 DTC 16TN Installation Guide
52070-90001 DTC 72MX Installation Guide
D2355-90013 DTC Manager Software

To use
D2355-90001 Using HP OpenView DTC Manager
J2120-6200 Using the DTC Manager/UX
32022-61005 Using the Node Management Services (HP 3000)
32022-9004 Configuring Systems for terminals, Printers and other serial devices
B1014-90012 DTC device File Access utilities reference manual
D2355-95019 The DTC Technical Reference Guide

Selecting the DTC for each system environment

The following table shows the possible choices among the different DTC products depending on the system access required or on some specific features.

Select the DTC product and the DTC management platform that support your system environment and any given functionality.

When several DTCs can be used for a particular environment the following factors can be considered in choosing the different products:

- the DTC 16TN is the primary choice for distributed connectivity in HP 9000 and Telnet-TCP/IP environments.
- the DTC 72MX is the high-end of the DTC family supporting high port count concentrations in mixed HP 3000/900 and HP 9000 environments. It is the right choice when X.25 or HP 3000 Telnet Access is required.
- the DTC 16MX is the primary choice of the DTC family in a mixed HP 3000/900, HP 9000 and Telnet - TCP/IP environment
- the DTC 16iX is the solution for low-end HP 3000/900 in single system environments

DTC Product Selection

An "X" in the table indicates that the DTC product can be chosen for the environment listed.	DTC 16TN J2060A	DTC 72MX J2070A	DTC 16MX J2063A	DTC 16iX J2062A
Need access to system(s)				
Single HP 3000/900	–	X	X	X
Single HP 9000/800	X	X	X	–
Systems without LAN or Telnet-TCP/IP (back-to-back)	X	X	X	–
Multiple HP 3000/900 from one DTC	–	X	X	–
Multiple systems running Telnet-TCP/IP Includes HP 9000 systems (/800, /300, /400, /700) HP 1000 and non-HP systems	X *	X	X–	X
Multiple systems Includes HP 3000/900, HP systems (800, 300, 400, 700, HP 1000) and non-HP systems (running Telnet-TCP/IP)	X *	X	X	–
X.25 for HP 3000/900 (PAD_Support and system-to-system)	–	X	–	–
X.25 PAD_Support to multiple systems (HP or non HP running Telnet-TCP/IP)	–	X	–	–
Specific capabilities				
Max line speed	38.4 kb/s	38.4 kb/s	38.4 kb/s	38.4 kb/s
RJ-45 connectors (direct connect only)	X	X	X	X
Hardware handshake on direct ports	X	X	X	X
Long distance cabling	RS-423	RS-423	RS-423	RS-423
Full modem support	X	X	X	X
X.25 board: # virtual circuits	–	256 VC/board	–	–
maximum line speed		19.2/64 kb/s	–	–
Binary mode transfer over asynchronous ports	X	X	X	–
Telnet Access for HP 3000/900	–	X	–	–
SNMP agent	X	X	X	X

* Requires the HP 3000 Telnet Access Card in one DTC 48 or DTC 72 MX for the HP 3000/900 access

**DTC48 with date code less than 3110 requires a DTC upgrade kit (2348A) to be supported from an HP 9000/800 system or to benefit from advanced features of DTC releases after 6.0 of OpenView DTC manager

Support Policy and Installation Responsibilities

DTC products

The J2060A (DTC 16TN) is customer installable, however HP can install it at HP time-and-materials rates.

Hewlett-Packard will install the HP 2340A (DTC16), J2070A (DTC 72MX), J2063A (DTC 16MX), J2063A (DTC 16iX), and any add-on boards. Hewlett-Packard will verify the DTC operation by running the selftest, configuring any add on board to the minimum default configuration necessary to verify software and hardware functionality and verifying that the DTC can be used to establish a system connection. Before HP installs the DTC the customer should install all cabling leading to the DTC.

The customer should install all the necessary system software, configure it and run it prior to the DTC installation.

HP 3000/900 DTC Management

Host-based DTC management on HP 3000/900 systems is part of the fundamental operating system, and is installed and supported as such.

HP DTC Manager/UX

HP DTC Manager/UX (J2120A) is customer installable. It is the customers responsibility to install updates to J2120A. The HP DTC Manager/UX runs on HP 9000/800 computer systems with HP-UX Release 8.0 or later.

HP D2355A OpenView DTC Manager

HP D2355A and product updates are customer installable. It is also the customers responsibility to install the HP OpenView Windows Workstation (HP 32054D) or equivalent (see below). HP can perform these services at HP time-and-materials rates.

The following PCs are supported for HP OpenView DTC Manager installations: any HP Vectra 286,386,486; IBM PS/2 model 55 and model 50; COMPAQ DeskPro 386/20.

Support Services

DTC managed by the HP OpenView DTC Manager

HP offers a number of support services. With the purchase of these support services, customers are entitled to free updates of HP OpenView DTC Manager software and therefore automatic updating of the code for their entire DTC installed base (PC based management). In addition to support for the HP OpenView DTC Manager itself, each support service is also valid for any amount of terminal switching or X.25 or Telnet iX access in up to 150 DTCs managed by the HP OpenView DTC Manager.

The recommended support services for the HP OpenView DTC Manager are:

H5355A + 000 hardware support, network support, software assistance, software licence update.
H5356A + 000 hardware support, network support, software assistance, consulting services, software licence update.
H2026A + L00 #0JT
HP BasicLine Vectra
H2027A + S00 #0JT
HP Software Materials Vectra

Order H2027A + S00 #0JT (specifying D2355A and any amount of other PC applications eg, AdvanceLink for Windows, etc) plus one of the other three services for the level of support you require. We recommend you buy either ResponseLine or TeamLine.

Note: ResponseLine and TeamLine services require a remote support modem

Remote Support

Remote support of the HP OpenView DTC Manager is provided over Modem lines, X.25 PADs or IP networks. The following devices have been tested :

- HP 2335A
- HP 92205A/B
- Hayes Smartmodem - (1200/2400)
- Multitech 224
- Siemens 2425B DX

DTC managed by the HP DTC Manager/UX

The HP DTC Manager/UX is supported under the HP 9000 support services.

Supported Configurations

HP 3000/900 Systems Access
The DTC is supported on the currently supported versions of MPE/iX (starting with 4.0 Release -plus software kit for the DTC 72MX).

HP 3000/900 Systems Telnet iX Access
Telnet/iX access are supported from HP 9000 System, HP 1000 with RTE and ARPA services. Also the following non HP systems have been tested:
- DEC VAX (VMS 5.4 and WIN/VMS 5.1)
- SUN SparcServer OS 4.1
- IBM OS2 with TCP and Reflection 1
- APPLE with MACTCP 1.01

Refer to the HP 3000 Computer System Configuration Guide for more information.

HP 9000 System and ARPA System Access

The DTC supports all HP applications and asynchronous devices supported by the Telnet link on the HP 9000 system. The access through DTC is supported on HP-UX 7.0 and later.

Refer to the HP 9000/800 Systems and Workstations Configuration Guide for detailed information. The DTC conforms to the multivendor standards protocols and has been tested with the following ARPA computers.
- DEC VAX (VMS 5.4 and WIN/VMS 5.1)
- SUN SparcServer OS 4.1
- HP 1000 with ARPA and RTE-A 5.2 or later
- HP 9000/1500 with UXTI 3.3.1

HP also offers a comprehensive program of testing of non HP systems, please contact your local HP representative.

Extended switching (back to back configuration)
The DTC has been tested and is supported with the following HP and non HP systems:

- HP 3000 MPE V System with:
- HP ATP (Pass 3, 5, or 6) or ATP/M
- MPE V, release V-delta-7 or later
- HP 9000 Series 800 system with a Channel I/O asynchronous multiplexer
- DEC VAX system with:
- DMF-32, DZV11 multiplexers, or
- DECServer 200 terminal server (DSRVB-M)
- VMS, release 5.2 or later-Cable: DEC BC22E 25-pin/25-pin m/f

Supported devices

Modems
The DTC supports a wide range of asynchronous modems based on the V22bis standard. The following modems have been tested.

- HP 37212A, HP 35016A, HP 35141A, HP 92205A, HP 92205B, HP 92205J
- BELL 212A
- Hayes Smartmodem 1200
- Hayes Smartmodem 2400
- Racal-Milgo MPS 1222
- AJ 1212 AD1
- Multitech V32 MT932EF
- Alcatel MD9633 T110

End user Access with statistical multiplexers

The DTC (with X.25 Board) has been tested with the following HP statistical multiplexer:

- HP 2335A and HP 2334A Plus X.25 Multiplexer, version 4.0 or later

Supported LAN Devices

All HP LAN devices such as Repeaters, Hubs, bridges, and routers are supported for transfer of data across LAN.

Notes:

* The DTC does not support transfer via level 2 bridges losing more than 1% of large (1500-byte) packets.
* One DTC manager is needed per LAN segment when using routers.

HP has tested the following non HP devices:

- VITALINK TransLAN III and 350
- Siecor EOT-322 Fiber Optic Transceiver
- CISCO Gateway Server
- Proteon P9100+ Router

Data switches and PBXs

The following data switches and PBXs have been tested with the DTC:

- MICOM INSTANET
- EQUINOX DS15
- GANDALF PACX 2000
- AT&T System 85
- NTI Meridian SL-1

DTC Supported devices

The DTC has been tested with the following devices and cables

	DTC16TN, 16iX, 16MX, 72MX		
	RS232/ DB25 Modem	RS232/ DB25 Direct	RS232/ DB25 Modem
DEVICE	CABLE		
HP2392A/93A/94A/97A	40234A		40242Y
HP700/22/32/43/45	40234A		40242Y
HP700/92/94/96/98	40234A		40242Y
HP150X	40234A		40242Y
HP 3081A,3082A/B	40234A		40242Y
HP2622A/23A/24B/27A	N/A		13222Y
HP2625A/24B (port2)	40234A		40242Y
Portable +	92221M		92221M
HP Vectra (9pins)			
24540B /ptA	24542M		24542M
24541B/ptA	24542M		24542M
C2401A	40234A		40242Y
C2402A	40234A		40242Y
C1010J	40234A		40242Y
C1010T	40234A		40242Y
Printers and Plotters			
P7550A	17355D		17355D
HP2227A,28A,76A,77A	40234A		40242Y
HP2562A,63A/B/C,64A/B/C	40234A		40242Y
HP2932A,33A,34A	40234A		40242Y
HP2684A/P,86A/D	40234A		40242Y
HP 33440A/F,47A/F,49A,59A	40234A		40242Y
41063A	40234A		40242Y
C1200A	40234A		40242Y
C1202A	40234A		40242Y
Modems			
40233A	N/A		
40233A	N/A		N/A
Extended switching			
HP2334A,35 PADs to - terminal	40221A		40221A
- printer	40220A		40220A
HP2342A HP TS8	30062B		30062B
HP 3000 ATP,ATPM (25pin)	40233A		40233A
HP 9000 Mux	40233A		40233A
HP 3000 ATP,ATPM (3pin)	40230A		40230A

The DTC16TN/16iX/16MX and DTC72MX also provide RJ-45 connections compliant with ATT 356A. The DTC16TN/16iX/16MX and DTC72MX RS423 connections are available on DB25 and RJ-45. Other RS232C devices may be attached to the DTC. HP does not guarantee proper operation of the device, however you may contact your local HP representative for special support agreement. You may refer to the *"HP DTC Cabling and Racking Guide"* for more details.

HEWLETT® PACKARD

Telnet Terminal Server (DTC 16TN)

Technical Data

Product Number
HP J2060A

Introduction

The DTC 16TN is part of HP's family of LAN-based Communication and Terminal Server family, HP's solution to connect local or remote asynchronous devices (terminals, printers, modems) to single or multiple HP 9000 and other platforms running the standard Telnet-TCP/IP protocols.

The DTC 16TN is targeted at environments requiring distributed connectivity to single or multiple HP 9000 systems or non-HP system running Telnet-TCP/IP.

For information on other DTC products, refer to the DTC Family data sheet (which presents the complete DTC family, the target environments, and supported devices) and to the individual product data sheets:

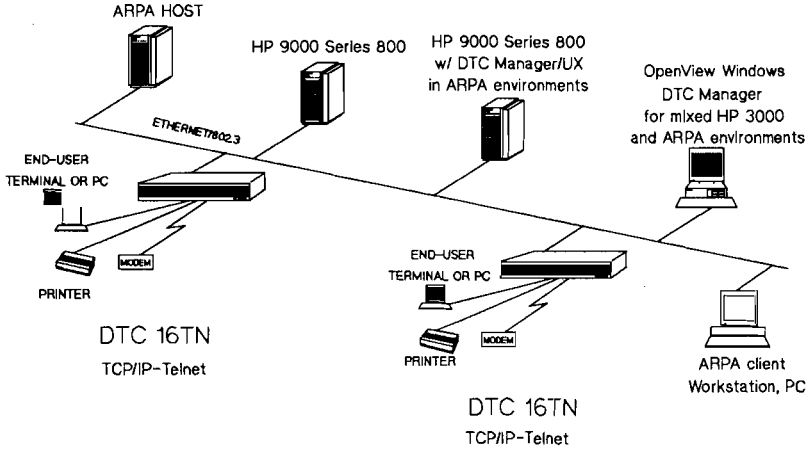
DTC 16TN:	HP J2060A
DTC 72MX:	HP J2070A
DTC 16MX:	HP J2063A
DTC16:	HP 2340A
DTC48:	HP 2345A
DTC Management:	HP D2355A
	HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).

DTC 16TN Key Features

- LAN-based terminal server supporting the standard Telnet-TCP/IP protocols for operation in multivendor environments.
- Systems are accessed directly via system LAN links or through system asynchronous ports via the extended switching configuration (back-to-back) for systems which do not implement Telnet-TCP/IP.
- Delivers 16 RS-232 direct or modem ports, or RS-423 ports in the same package as the HP EtherTwist hubs, bridges, routers.
- Compatible API with HP 9000 system asynchronous multiplexers.

DTC 16TN Telnet Terminal Server



- Managed under HP OpenView Windows environment, or from an HP 9000/800 system.
- Supports an SNMP agent.
- Designed for ease of use, and simple system and network integration.
- Customer installable.
- Comprehensive support tools for increased supportability and uptime.

Product highlights

High Performance
Built upon a powerful architecture, the DTC 16TN delivers a high throughput to the end-users.

Application interface compatible with HP 9000 system multiplexers
The DTC products use standard systems calls to access and control the DTC ports. This presents HP-UX applications with a programmatic interface that is almost identical to the interface to asynchronous systems MUX ports, thus allowing an easy migration from MUX to network environment.

This includes:
- DTC port identification
- Host initiated sessions (printing, programmatic access) to DTC ports via standard device files

Extended Direct Connect plus Full Modem support
The DTC 16TN provides either direct connect or Modem ports. The direct connect ports support RTS/CTS signals for hardware flow-control eliminating the need for Modem ports when printer connectivity is required. The Modem connect ports provides full Modem control for operation over leased lines or the telephone network.

Compact, flexible package
The DTC 16TN uses a compact standard 19-inch chassis identical to some other HP products such as HP EtherTwist products very easy to install in tabletop, wall-mounted, or in rack-mounted configurations. It comes with a compact RJ-45 breakout box for use with simple and low-cost cabling. The RJ-45 pin-out is ATT356 compliant to allow future migration from asynchronous devices to 10BaseT LAN devices without change of cabling.

Ease of use
The DTC 16TN has been designed to be a "plug and play" product and is customer installable. This includes a very easy installation process, auto-sensing of LAN attachment, complete selftests at boot time, auto-range power supply, default configurations of the DTC ports, self explanatory DTC user interface.

DTC 16TN management

The DTC 16TN is configured and managed with the use of a DTC Manager application which can run on two different platforms: an HP 9000/800 system or a PC OpenView Windows workstation.

- With the DTC host-based management, a simple terminal connected locally or remotely to the HP 3000/900 or HP 9000/800 system is used to manage DTCs. It provides a user interface similar to other system administration tools.

  The HP 9000/800-based DTC management software provides a means to configure DTCs in HP 9000 standalone or multisystem Telnet-TCP/IP environments.

- The HP OpenView (PC-based) DTC Manager software provides an easy-to-use graphical user interface, to manage DTCs. It is possible to integrate other management applications of network elements (such as HP X.25 Switches and PADs) on the same OpenView Windows workstation.

  In both host-based and PC-based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

DTC SNMP agent

Besides the services provided by the DTC management platforms, the DTC-based SNMP agent allows customers to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager.

The following features are available with Node Manager:

- Automatic discovery of DTCs.
- Status/Colors management. The DTCs are automatically polled on a regular basis and the status color is reflected on the map.
- MIB loader/browser. It provides display of MIB values in text or graphical form and the capability to modify them if permitted by the DTC.
- MIB application builder. It enables users to build applications dealing with DTC MIB objects.
- Historical data reporting for troubleshooting and network planning.

The DTC SNMP agent will be supported on all DTC hardware and configurable from all the DTC management platforms.

DTC 16TN Rack installation

The DTC 16TN can be easily installed in industry-standard 19-inch EIA racks.

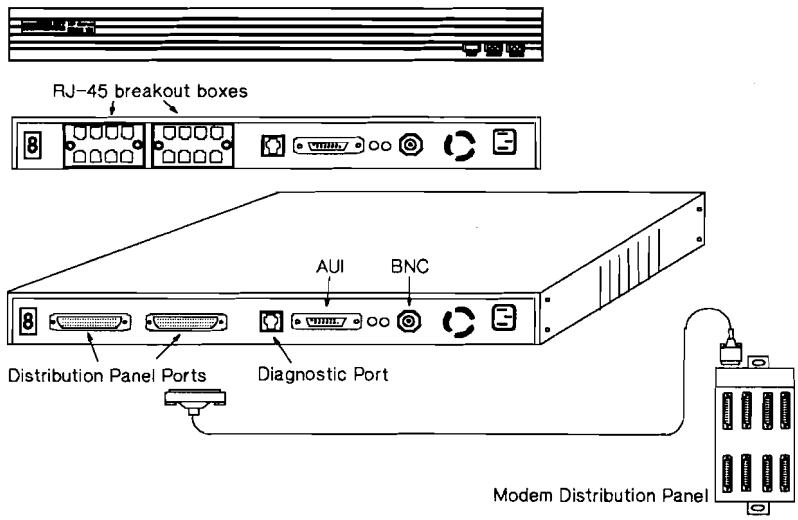
The DTC 16TN chassis (delivered with mounting brackets) is racked at the front of the rack and takes 1 EIA height unit. An optional rail kit (E3664A) can be used.

Standards supported

TCP/IP standards supported

Ethernet/IEE802.3, ping	
Subnet Addressing	RFC-950
ARP	RFC-826
ICMP	RFC-792
IP and options	RFC-791,MIL-STD 1777
TCP and options	RFC-793,MIL-STD 1778
UDP	RFC-768
Domain Name Services	RFC-1034-1035
SNMP agent	RFC-1157
Standard MIB services	RFC-1156
Structure of Mgnt Information	RFC-1155
Telnet and options	RFC-854,MIL-STD 1782

HP DTC 16TN Telnet Terminal Server



Racking the asynchronous distribution panels:

- 8-port RJ-45 breakout box (attached to the DTC 16TN chassis): doesn't require any additional rack installation.
- 8-port direct connect DB-25 distribution panels (DDP):
  - standard 19-inch EIA compliant
  - takes 1 EIA height unit
  - no rack-mount kit required
  - attached to the rear or front columns of the rack
  - (use filler panel C2791A = 6 * 1 EIA unit if front side installation)
- 8-port Modem connect DB-25 distribution panels (MDP):
  - NOT 19-inch EIA compliant
  - requires a rack-mount kit
  - for rear side installation: use the C2792A kit to install up to 5 MDPs takes 5 EIA units of height
  - for front side installation: use the J2084A kit to install up to 5 MDPs (includes the filler panels) takes 7 EIA height units

DTC 16TN Product specifications

The DTC 16TN has a compact chassis compliant with the industry-standard EIA 19-inch form factor. It provides a built-on LAN interface and 16 asynchronous ports.

LAN interface

Two standard connectors are provided:

Connector:	LAN supported
BNC	ThinLAN (10Base2)
802.3 AUI 15-pin	ThickLAN
	EtherTwist
	10BaseT,
	Fiber-Optic
	Broadband, FDDI connectivity through IEEE 802.3/Ethernet external adapters

The DTC 16TN automatically recognizes the type of LAN connected (ThinLAN or AUI)

LAN services

Protocols supported	TCP/IP Telnet
Addressing	IP addressing

Asynchronous interfaces

The DTC 16TN chassis supports one of the following interfaces:

16-port RS-232-C (Direct or Modem or mixed with a modularity of 8 ports)

- Direct connect with hardware flow-control

Signals	RD, TD, ground, RTS, CTS
Connectors	female RJ-45 (or optional female DB-25)
Line speed	from 300 to 38,400 bps
Cable length	from 15m to 70m

- Modem connect with FULL-Modem control

Signals	RD, TD, DCD, DTR, RTS, RI, DSR, CTS, DRS, shield and signal ground
Connectors	female DB-25
Line speed	from 300 to 19,200 bps

16-port RS-423 Direct connect with hardware flow-control

Signals	RXa, RXb, TXa, TXb
Connectors	female RJ-45 (or optional female DB-25)
Line speed	from 300 to 38,400 bps
Cable length	200m

Common characteristics

Flow control	Xon/Xoff, HP Enq/Ack, RTS/CTS
Speed sensing	yes
Parity sensing	yes
Sessions/port	up to 5 sessions
Sessions/DTC	up to 80 sessions
Printer sharing	yes

System release requirement

HP-UX 7.0 or later (for Telnet Access)
HP-UX 8.0 or later (to run DTC Manager/UX)

For more details and configuration examples, refer to the DTC Racking and Cabling Guide available with the DTC 16TN installation guide (P/N 5959-4986).

Hardware platform

Physical specifications

Height: 43.7 mm (1.7 in) = 1 EIA Units
Depth: 235 mm (9.3 in)
Width: 425 mm (16.8 in) = 19 inch rack compliant
Weight: 2.6 kg (6 lbs)

Operating environment

Temperature: 0° to 55° C
Relative humidity: 5% to 95% at 40° C
Altitude: 4600m
Static discharge: 15kV - no data loss

Electrical specifications

Current consumption:
Typical 0.4A/0.2A (115V/220V)
Maximum 0.5A/0.25A (115V/220V)
Line frequency: 50/60Hz
Typical AC Input Voltage: 115V/230V

Regulatory classifications

- Emissions
  - FTZ 1046/84,
  - FCC part 15 class A
  - EN55022 Class A
  - VCCI Class 1
  - SABS
- Safety
  - UL, CSA, EN60950, SASO, BS6301

Ordering Information

Ordering the DTC 16TN products

HP J2060A Main product - DTC 16TN includes :

- The DTC 16TN with racking hardware
- LAN access with BNC connector and standard 15-pin AUI
- 16 RS-232-C direct connect ports and RJ-45 connectors
- Installation manuals

Interface options

UG5 Replace 8 DIRECT ports with 8 MODEM ports (can order one or two)

UG4 Replace 16 RS-232-C ports with 16 RS-423 ports (can order one)

HP J2085A ordering the Connection accessory products:

The DTC 72MX comes standard with RJ-45 distribution panels (for direct connect) but connection accessories are available for upgrades or to accommodate existing cabling.

101 8-port MODEM distribution panel: DB-25 - used to upgrade RS-232 direct connect ports to Modem ports. Includes one panel (MDP) with DB-25 connectors and a link cable for DTC connection.

102 8-port Direct connect distribution panel: DB-25 - used for DB-25 cabling, compatible with DTC16 (HP 2340A) connectors. Includes one 19" (1EIA - rack-mountable) panel with DB-25 connectors and a link cable for DTC connection.

105 16-port Direct connect distribution panel: DB-45 - used for rack installation. This accessory is the default distribution panel of a 16-port asynchronous processor board. Includes one 19" (1 EIA-rack-mountable) panel with RJ-45 connectors and 2 link cables for DTC connection.

Ordering the DTC manager application

DTC manager running on an HP 3000/900

Nothing to order. Integrated with the MPE/iX operating system (FOS)

DTC manager running on an HP 9000/800

HP J2120A HP DTC Manager/UX

AA0 Software on ¼-inch cartridge

AA1 Software on ½-inch mag tape 1600 BPI

AAH Software on DAT cartridge tape

AA4 Software on QIC cartridge tape

AAU Software on CD-ROM

0CC Update to latest version

DTC manager running on the HP OpenView Windows platform

HP 32054E opt. 201
HP OpenView Windows Workstation (PC) preconfigured with the DTC Manager application software, including EtherTwist connectivity.

ABA --> ABZ Localization options (must order one)

Network connection options (must order one)

101 ThinLAN connection

102 ThickLAN connection

- The HP OpenView Windows workstation (HP 32054E) is an especially configured HP Vectra, with PC software already installed. It includes 4Mb of additional memory, HP portable DeskJet printer, and MS-DOS, MS-Windows, HP ARPA and Network Services/DOS, HP OpenView Windows, HP AdvanceLink for Windows.

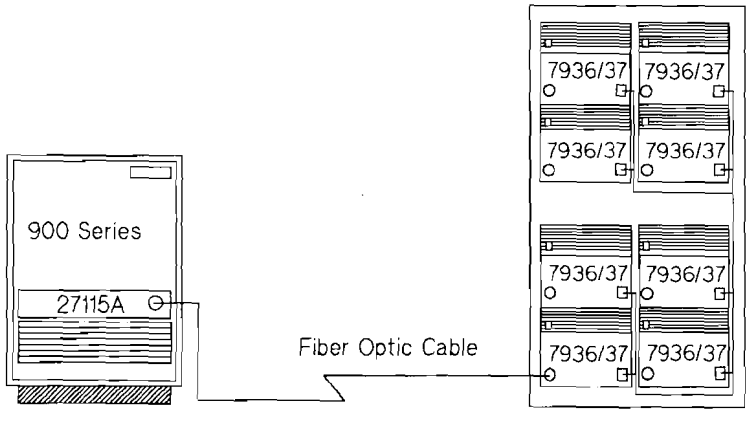
HEWLETT® PACKARD

Fiber-Optic Peripheral Interface

Technical Data

For HP3000 Series 900 Computer Systems Product Number HP 27115A

The HP 27115A is a fiber-optic interface card (HP-FL) for connecting HP 3000 Series 900 systems that use the Channel I/O (CIO) backplane to HP 7936FL and 7937FL disks. The HP 7936FL and 7937FL use a fiber-optic disk controller and, when connected to the interface card over a fiber cable, provide transfer rates up to 5 Mbytes per second. The HP 27115A comes standard with a 30-meter fiber-optic cable which may be replaced with a custom length cable of up to 500 meters. Each interface and cable can connect up to 8 disks in a daisy chain using disk-to-disk bus. The fiber-optic disk controller and disk-to-disk bus are products from HP Disk Memory Division (DMD).



Features

- High-speed data throughput of 5 Mbytes/second
  - Command queuing and seek reordering for high performance in multiuser applications
  - 32-byte buffer for full-speed CIO transfers
  - Rapid logical channel switching
  - 64 virtual circuits (CIO logical channels)
- Onboard microprocessor to unload I/O processing from the SPU
- Remote capability of up to 500 meters with a custom length cable
- No EMI or RFI emissions
- Immunity from EMI and RFI
- Electromagnetic compatibility
- Reliable data transfer achieved through:
  - Cyclical redundancy checking
  - Redundant coding
  - Noise immunity
- Thin, light-weight, flexible cable
- Cable rate Class A environmental
- Electrical isolation

- Minimal performance degradation even when fully configured with 8 disk drives

Functional Description

The HP 27115A adapter consists of an improved HP-CIO backplane interface circuit, a Protocol Controller, a high-speed parallel/serial/parallel converter and coder/decoder, a high-performance microprocessor (80186) and fiber-optic links.

Compared to existing interfaces, the VLSI backplane circuitry improves CIO performance through increased data buffering and support for log-channels. The microprocessor handles the circuit layer and device layer protocols.

Onboard firmware and proprietary protocol perform command pipelining to enhance channel usage and card performance. Cyclical redundancy and parity checks ensure data integrity and high reliability across the link.

Functional Specifications

Data Rate: 5 Mbyte per second maximum burst rate. This may be compared to HP-IB, which is rated at 1 Mbyte per second. Actual performance, however, is extremely application dependent and will vary accordingly. Refer to the HP 27115A Performance Brief for more detail.

Overhead: Less than 1 millisecond per disk transaction. This includes HP 27115A overhead only. Additional overhead accrues from software, channel, and disk controller. In a multiprogramming/multiuser application, most overhead is masked by pipelining within the fiber-optic disk controller.

Devices per adapter: The HP 27115A can connect up to 8 disks by daisy chaining them with a disk-to-disk bus. Length restrictions do apply when chaining more than 2 disks. Since each disk/disk controller has a fiber-optic port, 8 SPUs using 8 HP 27115As can connect to the 8 disks in the cabinet. Although the hardware allows an 8-SPU by 8-disk configuration, additional software is required to allow multiprocessor disk sharing. Consult HP for software availability.

Cable: The 30-meter fiber-optic cable (standard duplex cable of 100/140 mm glass fiber) uses four SMA style connectors. The 30-meter cable may be replaced with a custom length cable up to 500 meters. These may be ordered from HP Optical Communications Division (OCD) using part number HFBR-AWQxxx, where xxx specifies the length desired. Lengths are available in increments of 5 meters from 5 to 50 meters, increments of 25 meters from 50 to 200 meters, and increments of 50 meters from 200 to 500 meters.

Supported Configurations: Configurations are system dependent; refer to system specifications for more information.

MTBF: Estimated at 70,000 hours.

MTTR: Estimated at 30 minutes for failure isolation and card replacement.

Ordering Information

The HP 27115A includes:

27115-60001 interface card for Series 900
27115-56000 installation manual for MPE/iX systems
1005-0078 30-meter fiber-optic cable
5061-3151 disk-to-disk bus terminator (2)

HP 27115A Options:

001 Deletes 30-meter cable. HP recommends ordering alternate cable in advance
002 Adds 30.5 cm (12 in) loopback cable, P/N HFBR-3020

Related products

From HP Finance and Remarketing Division (FRD):

HP 27113AN Return credit for HP 27113A, Series 900 HP-IB

from HP Disk Memory Division (DMD):

HP 7936FL 307 Mbyte disk with fiber-optic controller (comes with disk-to-disk bus cabling)
HP 7937FL 571 Mbyte disk with fiber-optic controller (comes with disk-to-disk bus cabling)
HP 9522FL HP-IB to fiber-optic controller field installable upgrade kit
HP 19514A Eight pack disk cabinet

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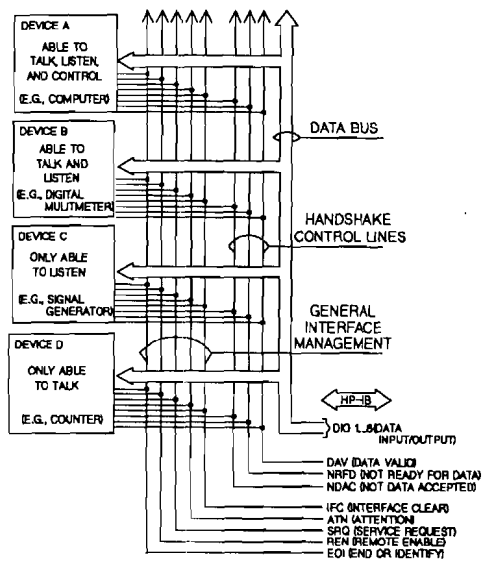
HP-IB Interface for HP 3000 Series 900 Computer Systems

Technical Data

For HP 3000 Series 900 Computer Systems
Product Number
HP 27113A

The HP 27113A HP-IB* Interface allows connection of up to 14 HP-IB-compatible devices to HP 3000 Series 900 systems that use the Channel I/O (CIO) backplane. HP-IB compatible devices include flexible and hard disks, printers, plotters, magnetic tape devices, graphics digitizers, and an extensive list of instruments.

Figure 1



Features

- 980 KB/s high-speed**, 500 KB/s standard-speed
- Fully IEEE-488-1978 compatible
- Onboard intelligence off-loads the host computer, leaving more CPU resources for application-oriented tasks
- Support of up to 14 standard devices, 8 high-speed devices
- Support of Command Set 80 protocol for CS/80-based disks and tapes
- Parity check and Cyclic Redundancy Check-16 for error detection
- Simple implementation of computer-controlled instrumentation and peripheral systems
- Selectable HP-IB controller or slave capabilities
- Programmatically-enabled or -disabled parallel poll mode
- Firmware-based self-test to help ensure interface integrity

* The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable Instrumentation" and identical ANSI Standard MC 1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

** Standard-speed devices cannot be mixed on a high-speed bus. High-speed devices can be mixed on a standard-speed bus if high-speed cabling rules are observed.

HP-IB Capabilities

The HP 27113A HP-IB Interface connects to the signal lines shown in Figure 1, acting as DEVICE A. Eight bidirectional data bus lines carry coded messages in bit-parallel, byte-serial form to/from other devices on the bus, with each byte transferred from one "talker" to one or more "listeners." Data is exchanged asynchronously using interface messages to setup, maintain, and terminate an orderly flow of device-dependent messages. Three handshake control lines control the transfer of each byte of coded data on the eight data lines. The five general interface management lines ensure an orderly flow of information within the HP-IB.

Functional Specifications

Capacity

High-speed Devices per HP 27110B Interface: Up to 8 with load resistors installed. Up to 14 without.

Standard-speed HP-IB devices per interface: Up to 14.

Operating Modes

High-speed Mode: Operation at data rates to 980 KB/s.

Standard-speed Mode: Operation at data rates to 500 KB/s.

Note: Attainable speed for a particular system is dependent on such factors as cabling length, type of external device, system level software, and number of devices. Higher transfer rates can be achieved when using less than maximum cable lengths and devices. Consult system documentation for further information or the HP-IB tutorial, P/N 5952-0156.

System Controller Mode: A two-position switch enables HP 27113A operation as system controller or disables such operation.

Bus Characteristics

HP-IB Signal Lines:

DIO1	Data Input/Output 1
DIO2	Data Input/Output 2
DIO3	Data Input/Output 3
DIO4	Data Input/Output 4
DIO5	Data Input/Output 5
DIO6	Data Input/Output 6
DIO7	Data Input/Output 7
DIO8	Data Input/Output 8
DAV	Data Valid
NRFD	Not Ready for Data
NDAC	Not Data Accepted
IFC	Interface Clear
ATN	Attention
SRQ	Service Request
REN	Remote Enable
EOI	End or Identify

Logic Levels: High >2.4 V; Low <0.5 V; all signals are low true.

Supported HP-IB Functions: C1-C5, SR1, RL2, PP1, DC1, SH1, AH1, T1, TE1, L1, LE1, DT1, E2. TE1 and LE1 require host system support.

Logic Levels, Line Drivers, Line Terminations, and Line Receivers: All characteristics conform to IEEE Standard 488-1978.

Maximum Cable Length for Standard Operation: 2 meters (6.5 ft) per device connected, with a 20-meter (65 ft) total length. The maximum number of devices is accommodated by interconnections using shorter than maximum cable length.

Maximum cable length for high-speed operation: Interconnecting cable links should be as short as possible, with a maximum of 15 meters total length per system, and should have at least one equivalent resistive load per meter of cable (the high-speed resistor pack adds seven equivalent resistive loads).

Number of Devices	Maximum Total Cable Length (meters)
1	6
2	9
3	10
4	11
5	12
6	13
7	14
8 (maximum)	15

No more than eight devices are allowed in the system. A maximum system would be composed of a System Controller, with its high-speed resistor pack, and eight peripherals. Load resistors may need to be repositioned on the interface card for high-speed operation. Refer to the installation manual.

Note: For high- and low-speed cable length operation, refer to the installation manual (P/N 27113-90001).

Error Detection

Data errors can be detected using Cyclic Redundancy Check-16 on all data messages sent or received. CRC-16 can be used if the other participating device supports CRC-16. CRC-16 is invoked by the system for each transaction. See system documentation for details. Interface message errors are detected using odd byte parity.

Diagnostic Support

An interface resident self-test, initiated on reset, is provided in the firmware of the HP 27113A.

Electrical Specifications

Voltage	Current	Power Dissipation
+5V	1.8A	9.0 watts
+12V	35 mA	0.42

Physical Characteristics

Size: 172.7 mm (6.80 in long by 172 mm (6.75 in) wide

Weight: 234 g (8.2 oz); 679 g (23.8 oz) with HP-IB cable

I/O Channel Interconnects: 80-pin connector, J1

Device Interconnects: 26-pin connector, J2

Environmental Characteristics

Operating Temperature: 0°C to 55°C (32°F to 131°F)

Operating Relative Humidity: 5% to 95% RH at 40°C (104°F)

Operating Altitude: 4600 m (15,000 ft) maximum

Ordering Information

The HP 27113A includes:

27113-60301 HP-IB Interface Card for HP 3000 Series 900
27113-63001 4-meter HP-IB Cable
27113-90001 Installation Manual for MPE/iX Systems
30070-00043 HP-IB Backplate

HP 27113A Option

001 Deletes manual
002 Firmware upgrade
003 Sliverspan adapter

HEWLETT® PACKARD

Datacommunication and Terminal Controller (DTC48)

Technical Data

Product Numbers
HP 2345A,
2346A/B/C/D/E/F/G,
2348A

Introduction

The DTC48 is part of HP's family of LAN-based Communication and Terminal Server family, HP's solution to connect local or remote asynchronous devices (terminals, printers, modems) to single or multiple HP 3000, HP 9000, and other platforms running the standard Telnet-TCP/IP protocol.

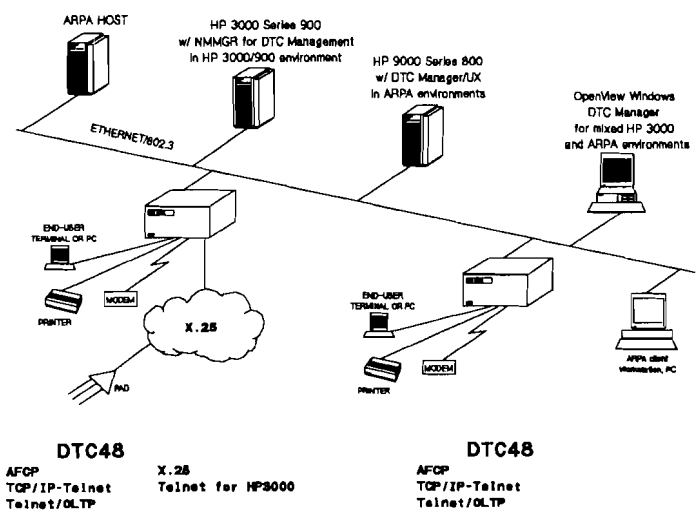
As the DTC48 is replaced by the DTC 72MX, the second generation of HP's high-end communication server, the DTC48 (and its add-on cards) is mostly aimed at environments with existing DTC48. For example, single or multiple HP 3000/900 systems with the need to increase the number of asynchronous ports, or to add X.25 connectivity.

For information on other DTC products, refer to the DTC family data sheet (which presents the complete DTC family, the target environments, and supported devices) and to the individual product data sheets:

DTC 16TN:	HP J2060A
DTC 72MX:	HP J2070A
DTC 16iX:	HP J2062A
DTC 16MX:	HP J2063A
DTC16:	HP 2340A
DTC48:	HP 2345A
DTC Management:	HP D2355A
	HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).

DTC48 Datacommunication and Terminal Controller



DTC48 Key Features

- LAN-based communication server supporting the standard Telnet-TCP/IP protocols.
- Systems are accessed directly through system LAN links or through system asynchronous ports (via the extended switching configuration or back-to-back) for systems which do not implement Telnet-TCP/IP or the HP 3000/900 protocol.

- Modular chassis (6-slot) supporting a mix of asynchronous, X.25, and HP 3000 Telnet Access interfaces.
- Provides up to 48 RS-232-C direct ports or 36 RS-232-C modem ports, or 48 RS-422 direct ports.
- Compatible API with HP 9000 system asynchronous multiplexers.
- Provides printer sharing and multisessions per port.
- Provides up to three X.25 links (line speed up to 64 kbps) and 256 virtual circuits per card.
- Supports remote X.25-PAD access to HP 3000/900 and systems running Telnet-TCP/IP.
- Supports X.25 communications for HP 3000/900 systems (HP-NS services, ARPA-FTP, OSI-FTAM, SNA).
- Supports Telnet Access for HP 3000/900 systems (up to 40 concurrent VPlus sessions).
- Managed under HP OpenView Windows environment, or from an HP system (HP 3000/900 or HP 9000/800).
- Supports an SNMP agent.
- Comprehensive support tools for increased supportability and uptime.

Product highlights

High Performance protocols
The DTC48 support high performance protocols for demanding commercial applications: an optimized protocol for OLTP applications running under the HP 3000/900.

Application interface compatible with HP 9000 system multiplexers
The DTC products use standard systems calls to access and control the DTC ports. This presents HP-UX applications with a programmatic interface that is almost identical to the interface to asynchronous systems MUX ports, thus allowing an easy migration from MUX to network environment.

This includes:
- DTC port identification
- Host initiated sessions (printing, programmatic access) to DTC ports via standard device files

Location-independent access
The DTC48 provides location-independent access for its end-users.

As such, most of the services provided to local users connected on a DTC ports are also available to remote users accessing the DTC via the X.25 network. (See details in the "X.25 services" below.)

HP 3000 Telnet Access
The DTC48 supports a protocol converter, the HP 3000 Telnet Access Card which allow end-users connected on Telnet Terminal Servers, PC workstations, and systems running Telnet-TCP/IP to access the HP 3000/900 applications (including VPlus, user block mode) over the same LAN or over bridged or routed LAN networks.

Note: DTC48s with date code less than 3110 (approximately March 1991) must be upgraded with the DTC48 Memory Upgrade kit (2348A) to get access to the current DTC functionalities. DTC48s without the Upgrade kit can continue to be used only for single HP 3000/900 access with limited functionalities.

The DTC 48 management

The DTC 48 is configured and managed with the use of a DTC Manager application that can run on three different platforms: HP 3000/900, HP 9000/800, or PC OpenView Windows.

- With the DTC host-based management, a simple terminal connected locally or remotely to the HP 3000/900 or HP 9000/800 system is used to manage DTCs. It provides a user interface similar to other system administration tools.
  - The HP 3000/900-based DTC management software provides a means to configure DTCs for use in HP 3000/900 standalone environments.
  - The HP 9000/800-based DTC management software provides a means to configure DTCs in HP 9000 standalone or multisystem Telnet-TCP/IP environments.
- The HP OpenView (PC-based) DTC Manager software provides an easy-to-use graphical user interface, to manage DTCs. It is possible to integrate other management applications of network elements (such as HP X.25 Switches and PADs) on the same OpenView Windows workstation. HP OpenView DTC Manager provides a means to configure DTCs for use to connect to HP 3000/900 or HP 9000/800 systems and to other systems in multivendor environments. It provides powerful network management features for complex network topologies.

In both host-based and PC-based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

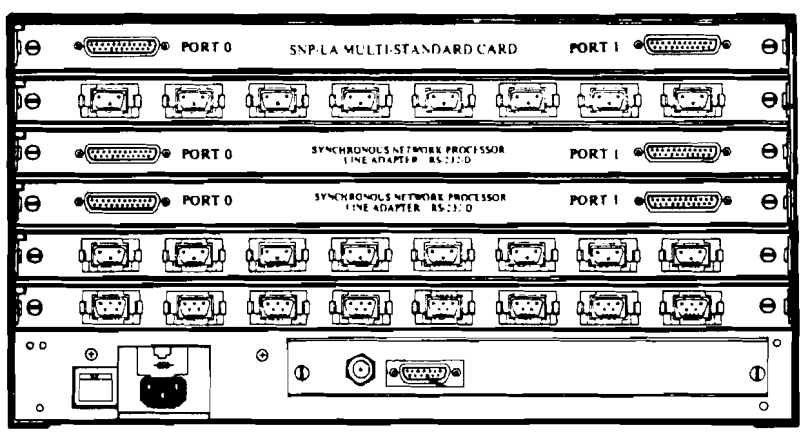
DTC SNMP agent

Besides the services provided by the DTC management platforms, the DTC-based SNMP agent (delivery Mid 93) will allow customers to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager.

The following features are available with Node Manager:

- Automatic discovery of DTCs.
- Status/Colors management. The DTCs are automatically polled on a regular basis and the status color is reflected on the map.
- MIB loader/browser. It provides display of MIB values in text or graphical form and the capability to modify them if permitted by the DTC
- MIB application builder. It enables users to build applications dealing with DTC MIB objects
- Historical data reporting for troubleshooting and network planning.

The DTC SNMP agent will be supported on all DTC hardware and configurable from all the DTC management platforms.



DTC 48 Product specifications

The DTC 48 chassis has 6 slots available for installing a combination of asynchronous (up to 6), X.25 (up to 3) and one Telnet Access Card.

LAN interface

One standard connector is provided:

Connector:	LAN supported
BNC	ThinLAN (10Base2)
or:	
802.3 AUI 15-pin	ThickLAN EtherTwist 10BaseT, Fiber-Optic Broadband, FDDI connectivity through IEEE 802.3/Ethernet external adapters

LAN services

Protocols supported	AFCP: HP 3000's high performance protocol TCP/IP Telnet
Addressing	Symbolic addressing (DNS and HP-NS) IP addressing

Asynchronous processor boards

Interfaces available

8-port RS-232-C direct connect
- signals — RD,TD, ground
- 3-pin connectors

8-port RS-422 direct connect
- signals
- 5-pin connectors

6-port RS-232-C modem connect
- signals — RD, TD, DCD, DTR, RTS, RI, DSR, CTS, DRS, shield and signal ground
- DB-25 connectors

Common characteristics

Line speed	from 300 to 19,200 bps
Speed sensing	yes
Parity sensing	yes
Flow control	Xon/Xoff, HP Enq/Ack
Sessions/port	up to 5 sessions
Sessions/DTC	up to 128 sessions
Printer sharing	yes

X.25 boards

The DTC48 chassis supports up to 3 X.25 boards

Interfaces available

Interface/maximum line speed	RS-232-C/19.2 kbps
Interface/maximum line speed	V.35/64 kbps
Interface/maximum line speed	V.36/64 kbps
Interface/maximum line speed	RS-422/64 kbps
# of Virtual Circuits (VCs) per interface	up to 256

X.25 services

- System-to-system comunications for HP 3000/900 systems (HP-NS services, ARPA-FTP, OSI-FTAM, SNA)
- Remote PAD access (incoming calls) to HP 3000/900, HP 9000 and systems running TCP/IP Telnet through one single X.25 interface
- Selectable PAD support profiles
- Closed User Group Utility
- Restricted access to predefined systems based on calling address for PAD users
- Support of character mode applications through VideoPAD (tested in France through Minitel 3613)

Limitations applying to remote X.25 users compared to DTC local users are:

- PAD printers are only supported for system access via a LAN (no back-to-back)
- Only character mode and VPlus Block mode applications are supported with PAD functionality
- Multisession is not available for remote PAD users
- X.25 characteristics cannot be reconfigured online.

X.25 specific characteristics are described in the "X.25/iX Network link" datasheet.

HP 3000 Telnet Access Board

The DTC48 can support one board (using one slot) which supports up to 40 concurrent Telnet sessions accessing one or multiple HP 3000/900 applications. (For detailled specifications, see the HP 3000 Telnet Access datasheet)

HP 3000 specific capabilities

Powerfail recovery
Typeahead facility
Field-mode support
Device type managed by the system

HP 9000 specific capabilities

The DTC products use standard systems calls to access and control the DTC ports. This presents HP-UX applications with a programmatic interface that is almost identical to the interface to asynchronous systems MUX ports, thus allowing an easy migration from MUX to network environment.

This includes:

- DTC port identification,
- Host initiated sessions (printing, programmatic access) to DTC ports via standard.

System release requirement

HP 3000/900	MPE/iX 2.2 or later
HP 9000	HP-UX 7.0 or later (for Telnet access)

HP-UX 8.0 or later (to run DTC Manager/UX)

DTC48 rack installation

The DTC48 can be installed in industry-standard EIA 19-inch rack such as the HP computer system cabinets C2785A, C2786A, and uses 6 EIA height units.

Rack mount kit required for HP Racks: P/N A1052A

Hardware platform

Physical specifications

Height: 222 mm (8.9 in)
Depth: 440 mm (17.6 in)
Width: 425 mm (17 in)
Weight: 22 kg (48.5 lbs) max.

Operating environment

Temperature: 0° to 55° C
Relative humidity: 5% to 95% at 40° C
Altitude: 4000m
Static discharge: 15kV - no data loss

Electrical specifications

Current consumption:
Typical 1.21A/0.7A (115V/220V)
Maximum 1.8A/0.9A (115V/220V)
Line frequency: 50/60Hz
Typical AC Input Voltage: 115V/230V

Regulatory classifications

Emissions

- FTZ 1046/84, FCC part 15 class A
- EN55022

Safety: UL, CSA, IEC380, IEC435, FEI, SASO, BS6301

Standards supported

TCP/IP standards supported:

Ethernet/IEE802.3, ping	
Subnet Addressing	RFC-950
ARP	RFC-826
ICMP	RFC-792
IP and options	RFC-791,MIL-STD 1777
TCP and options	RFC-793,MIL-STD 1778
UDP	RFC-768
Domain Name Services	RFC-1034-1035
SNMP agent	RFC-1157
Standard MIB services	RFC-1156
Structure of Management Information	RFC-1155
Telnet and options	RFC-854,MIL-STD 1782

X.25 standards supported:

X.25 CCITT 1980,1984
X.3/X.28/X.29 1980,1984
Closed User group (CUG) CCITT 1980
Defense Data Network (DDN) specifications

Ordering Information

Ordering the DTC 48 products

HP 2345A Main product: DTC 48

LAN interface option (MUST order one)

240 ThickLAN (includes MAU and 6m AUI cable)
241 AUI (no MAU provided) (to connect to an EtherTwist network, order the EtherTwist MAU P/N 28685A)
242 ThinLAN (includes BNC-T connector) (a ThinLAN terminator pair P/N 92227P must be ordered for new installations)

Asynchronous interfaces (MUST order one, can order up to six)

803 8 RS-232 direct connect with 3-pin connections
805 8 RS-422 direct connect with 5-pin connections
625 6 RS-232 modem ports with DB-25 connections

X.25 interfaces (can order one to three)

310 RS-232 interface
320 V.35 interface
330 V.36 interface
335 RS-422 interface

Ordering the DTC 48 add-on products

Asynchronous interfaces
HP 2346A 8 RS-232 direct connect with 3-pin connections
2346B 8 RS-422 direct connect with 5-pin connections
2346C 6 RS-232 modem ports with DB-25 connections

X.25 interfaces
2346D RS-232 interface
2346E V.35 interface
2346F V.36 interface
2346G RS-422 interface

Note: Option #001 (DTC hardware upgrade kit) MUST be ordered if the card is to be installed in a DTC48 with a date code less than 2851

Power supply option (can order one)

015 220V power for Europe and some Asia-Pacific countries
2348A DTC Memory Upgrade kit. Required for DTC48 with date code less than 3110 to get access to the complete feature set of the DTC48

Ordering the DTC manager application

DTC manager running on an HP 3000/90:
Nothing to order.
Integrated with the MPE/iX operating system (FOS).

DTC manager running on an HP 9000/800

J2120A HP DTC Manager/UX

AA0 Software on ¼-inch cartridge
AA1 Software on ½-inch mag tape 1600 bpi

AAH Software on DAT cartridge tape
AA4 Software on QIC cartridge tape
AAU Software on CD-ROM
0CC Update to latest version

DTC manager running on the HP OpenView Windows platform

HP 32054D opt. 201
HP OpenView Windows Workstation (PC) preconfigured with the DTC Manager application software

ABA --> ABZ Localization options (must order one)

Network connection options
(must order one)
101 ThinLAN connection
102 ThickLAN connection
D2355A DTC manager application software for an HP OpenView Windows (PC) workstation
D1824E opt. 201 Update of an existing HP OpenView Windows Workstation with the latest revision of software and DTC manager application

- The HP OpenView Windows workstation (HP 32054D) is an especially configured HP Vectra, with PC software already installed. It includes 4Mb of additional memory, HP portable DeskJet printer, and MS-DOS®, MS-Windows®, HP ARPA and Network Services/DOS, HP OpenView Windows, and HP AdvanceLink for Windows

HEWLETT® PACKARD

Datacommunication and Terminal Controller (DTC16)

Technical Data

Product Numbers
HP 2340A, 2343A/C/D

Introduction

The DTC16 is part of HP's family of LAN-based Communication and Terminal Servers, HP's solution to connect local or remote asynchronous devices (terminals, printers, modems) to single or multiple HP 3000, HP 9000, and other platforms running the standard Telnet-TCP/IP protocols. The DTC16 is optimal for environments with the following requirements:

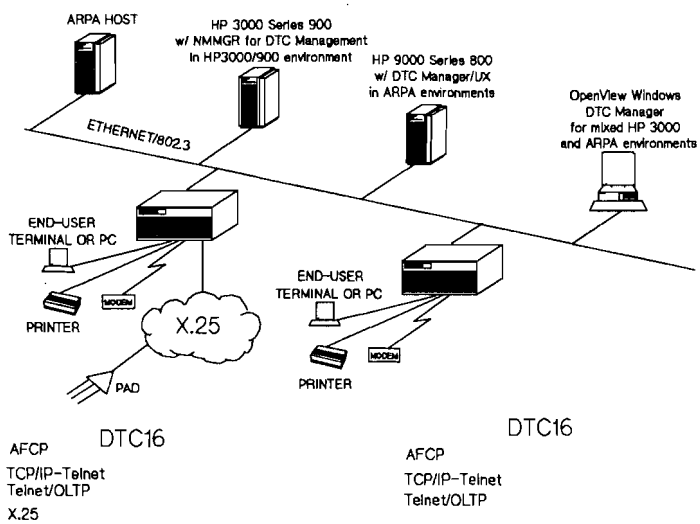
- Low port count or distributed connectivity to multiple systems including HP 3000/900 systems and systems running Telnet-TCP/IP.
- HP 3000/900 X.25 system to system communication.
- Remote X.25 PAD access to HP 3000/900, HP 9000, and other systems running Telnet-TCP/IP (PAD support).

For information on other DTC products, refer to the DTC family data sheet (which presents the complete DTC family, the target environments, and supported devices) and to the individual product data sheets:

DTC 16TN:	HP J2060A
DTC 72MX:	HP J2070A
DTC 16iX:	HP J2062A
DTC 16MX:	HP J2063A
DTC16:	HP 2340A
DTC48:	HP 2345A
DTC Management:	HP D2355A HP J2120A
X.25 iX Network Link:	HP J2079A
HP 3000 Telnet Access:	HP J2080A

(also included in the Networking Communications Specification Guide).

DTC16 Datacommunication and Terminal Controller



DTC16 Key Features

- LAN-based communication server supporting the standard Telnet-TCP/IP protocols plus HP optimized high performance protocols for demanding OLTP applications in HP 3000/900.
- Systems are accessed directly through system LAN links or through system asynchronous ports (via the extended switching configuration or back-to-back) for systems which do not implement Telnet-TCP/IP or the HP 3000/900 protocol.
- Modular chassis supporting a mix of Asynchronous and X.25 interfaces
- Supports up to 16 RS-232 direct connect ports (12 modem ports)
- Provides compatible API with HP 9000 system asynchronous multiplexers.
- Provides printer sharing and multisessions per port.
- Supports one X.25 link (line speed up to 19.2 kbps) and 32 virtual circuits.
- Supports remote X.25-PAD access to HP 3000/900 systems and other systems running Telnet-TCP/IP.
- Supports X.25 communications for HP 3000/900 systems (HP-NS services, ARPA-FTP, OSI-FTAM, SNA).
- Managed under HP OpenView Windows environment, or from an HP system (HP 3000/900 or HP 9000/800).
- Supports an SNMP agent.
- Provides comprehensive support tools for increased supportability and uptime.

Product Highlights

High Performance Protocols
The DTC16 supports high performance protocols for demanding commercial applications: AFCP, an optimized protocol for OLTP applications running under the HP 3000/900

Location-independent Access
The DTC16 provides location-independent access for end-users.

This means that most of the services provided to local users connected on a DTC port are also available to remote users

accessing the DTC via the X.25 network. (See details in the "X.25 services" below.)

DTC16 Management

The DTC 16 is configured and managed with the use of a DTC Manager application that can run on three different platforms: HP 3000/900, HP 9000/800, or PC OpenView Windows.

- With the DTC host-based management, a simple terminal connected locally or remotely to the HP 3000/900 or HP 9000/800 system is used to manage DTCs. It provides a user interface similar to other system administration tools.
  - The HP 3000/900-based DTC management software provides a means to configure DTCs for use in HP 3000/900 standalone environments.
  - The HP 9000/800-based DTC management software provides a means to configure DTCs in HP 9000 standalone or multisystem Telnet-TCP/IP environments.
- The HP OpenView (PC-based) DTC Manager software provides an easy-to-use graphical user interface, to manage DTCs. It is possible to integrate other management applications of network elements (such as HP X.25 Switches and PADs) on the same OpenView Windows workstation. HP OpenView DTC Manager provides a means to configure DTCs for use to connect to HP 3000/900 or HP 9000/800 systems and to other systems in multivendor environments. It provides powerful network management features for complex network topologies.

In both host-based and PC-based environments, the DTC software is downloaded from the management platform, allowing easy distribution and control of the DTC software.

DTC SNMP Agent

Besides the services provided by the DTC management platforms, the DTC-based SNMP agent allows customers to take advantage of SNMP-based management applications such as the HP OpenView Network Node Manager.

The following features are available with Node Manager:

- Automatic discovery of DTCs.
- Status/Colors management. The DTCs are automatically polled on a regular basis and the status color is reflected on the map.
- MIB loader/browser. It provides display of MIB values in text or graphical form and the capability to modify them if permitted by the DTC
- MIB application builder. It enables users to build applications dealing with DTC MIB objects.
- Historical data reporting for troubleshooting and network planning.

The DTC SNMP agent is supported on all DTC hardware and configurable from all the DTC management platforms.

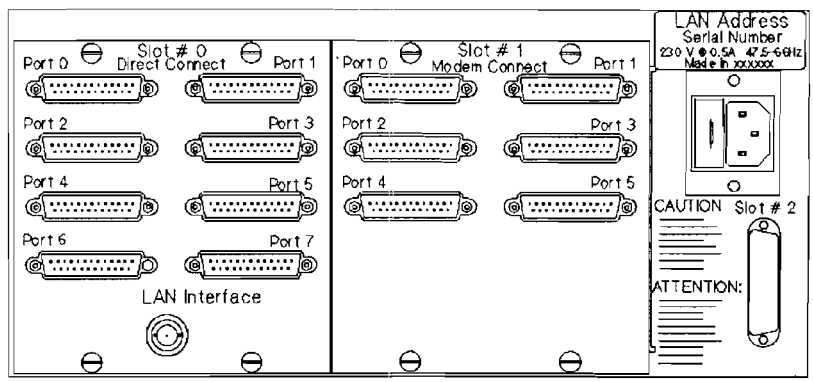
DTC16 rack installation

The DTC16 can be installed in industry-standard EIA 19-inch racks such as the HP computer system cabinets C2785A, C2786A and takes 4 EIA height units.

Rack mount kit required for HP Racks: P/N 35199E.

DTC 16 Product Specifications

The DTC 16 chassis has 2 slots that support asynchronous processor boards. In addition, an X.25 board can be supported in the DTC16.



LAN interface
One standard connector is provided:

Connector:	**LAN supported**
BNC	ThinLAN (10Base-2)
or:	
802.3 AUI 15-pin	ThickLAN EtherTwist 10Base-T, Fiber Optic Broadband, FDDI connectivity through IEEE 802.3/Ethernet external adapters

LAN services

Protocols supported	AFCP: HP 3000's high performance protocol TCP/IP Telnet
Addressing	Symbolic addressing (DNS and HP-NS) IP addressing

Asynchronous processor boards

Interfaces available

8-port RS-232-C direct connect signals	RD, TD, ground
6-port RS-232-C modem connect signals	RD, TD, DCD, DTR, RTS, RI, DSR, CTS, DRS, shield and signal ground

Common characteristics

Connectors	female DB-25
Line speed	from 300 to 19,200 bps
Speed sensing	yes
Parity sensing	yes
Flow control	Xon/Xoff, HP Enq/Ack
Sessions/port	up to 5 sessions
Sessions/DTC	up to 80 sessions
Printer sharing	yes

X.25 Board

Interface/maximum line speed	RS-232-C/19.2 kbps
Number of Virtual Circuits (VCs)	up to 32

X.25 services
- System-to-system communications for HP 3000/900 systems (HP-NS services, ARPA-FTP, OSI-FTAM, SNA)
- Remote PAD access (incoming calls) to HP 3000/900, HP 9000, and systems running TCP/IP Telnet through one single X.25 interface
- Selectable PAD support profiles
- Closed User Group Utility
- Restricted access to predefined systems based on calling address for PAD users
- Support of character mode applications through VideoPAD (tested in France through Minitel 3613)

Limitations applying to remote X.25 users compared to DTC local users are:
- PAD printers are only supported for system access via a LAN (no back-to-back)
- Only character mode and VPlus Block mode applications are supported with PAD functionality
- Multisession is not available for remote PAD users
- X.25 characteristics cannot be reconfigured online.

X.25 specific characteristics are described in the *"X.25/iX Network link"* data sheet.

HP 3000 specific capabilities
Powerfail recovery
Typeahead facility
Field-mode support
Device type managed by the system

HP 9000 specific capabilities
The DTC products use standard systems calls to access and control the DTC ports. This presents HP-UX applications with a programmatic interface that is almost identical to the interface to asynchronous systems MUX ports, thus allowing an easy migration from MUX to network environment.

This includes:
- DTC port identification,
- Host initiated sessions (printing, programmatic access) to DTC ports via standard.

System release requirement

HP 3000/900	MPE iX 2.2 or later
HP 9000	HP-UX 7.0 or later (for Telnet Access)
	HP-UX 8.0 or later (to run DTC Manager/UX or Telnet/OLTP)

Hardware Platform

Physical specifications

Height: 152 mm (5.98 in) = 4 EIA Units
Depth: 467 mm (18.39 in)
Width: 325 mm (12.3 in)
Weight: 8.8 kg (19.4 lbs) 14 kg (30.8 lbs)

Operating environment

Temperature: 0° to 55° C
Relative humidity: 5% to 95% at 40° C
Altitude: 4600m
Static discharge: 15kV - no data loss

Electrical specifications

Current consumption:
Typical 0.27A/0.15A (115V/220V)
Maximum 1.0A/0.5A (115V/220V)
Line frequency: 50/60Hz

Typical AC Input Voltage: 115V/230V

Regulatory classifications

Emissions:
- FTZ 1046/84, FCC part 15 Class A
- EN55022 Class A
- VCCI Class 1
- SABS

Safety: UL, CSA, EN60950, SASO, B6301

Ordering Information

Ordering the DTC 16 products

2340A Main product: DTC 16

LAN and Asynchronous option (must order one)

ThinLAN (includes BNC-T connector)
642 6 RS-232-C modem
842 8 RS-232-C direct

ThickLAN (includes MAU and 6m AUI cable)
640 6 RS-232-C modem
840 8 RS-232-C direct

AUI (no MAU provided)
641 6 RS-232-C modem
841 8 RS-232-C direct

Second asynchronous processor board (can order one)

650 6 RS-232-C modem
850 8 RS-232-C direct
310 X.25 board (can order one)

TCP/IP standards supported

Ethernet/IEE802.3, ping	
Subnet Addressing	RFC-950
ARP	RFC-826
ICMP	RFC-792
IP and options	RFC-791,MIL-STD 1777
TCP and options	RFC-793,MIL-STD 1778
UDP	RFC-768
Domain Name Services	RFC-1034-1035
SNMP agent	RFC-1157
Standard MIB services	RFC-1156
Structure of Management Information	RFC-1155
Telnet and options	RFC-854,MIL-STD 1782

X.25 standards supported

X.25 CCITT 1980,1984
X.3/X.28/X.29 1980,1984
Closed User group (CUG) CCITT 1980
Defense Data Network (DDN) specifications

Power supply option (can order one)

015 220V power for Europe and some Asia-Pacific countries

Ordering the DTC 16 add-on products:

2343C 6 RS-232-C Modem
2343A 8 RS-232-C direct connect
2343D X.25 board

Ordering the DTC manager application:

DTC manager running on an HP 3000/900: Nothing to order. Integrated with the MPE iX operating system (FOS)

DTC manager running on an HP 9000/800:
J2120A HP DTC Manager/UX
AA0 Software on ¼-inch cartridge
AA1 Software on ½-inch MAGTAPE 1600 BPI
AAH Software on DAT cartridge tape
AA4 Software on QIC cartridge tape
AAU Software on CD-ROM
0CC Update to latest version

DTC manager running on the HP OpenView Windows platform:
HP 32054E #201 HP OpenView Windows Workstation (PC) preconfigured with the DTC Manager application software
ABA --> #ABZ Localization options (must order one)

Network connection options (must order one)

101 ThinLAN connection
102 ThickLAN connection
D2355A DTC manager application software for an HP OpenView Windows (PC) workstation
D1824E #201 Update of an existing HP OpenView Windows Workstation with the latest revision of software and DTC manager application

- The HP OpenView Windows workstation (HP 32054D) is an especially configured HP Vectra, with PC software already installed. It includes 4Mb of additional memory, HP portable DeskJet printer, MS-DOS®, MS-Windows®, HP ARPA, and Network Services/DOS, HP OpenView Windows, HP AdvanceLink for Windows

HEWLETT® PACKARD

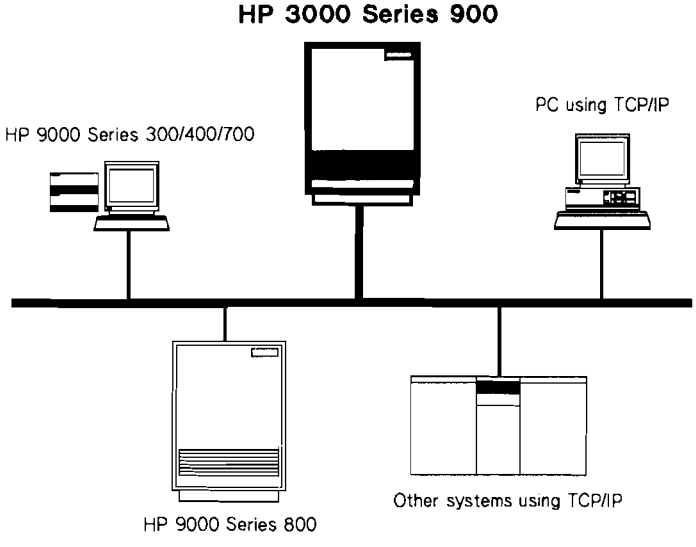
ThinLAN 3000/iX Network Link

Technical Data

For HP 3000 Series 900 Computer Systems
Product Number
HP 36923A

The ThinLAN 3000/iX Network Link provides the hardware and software to connect an HP 3000 Series 900 computer to a multivendor LAN. The ThinLAN/3000 Link includes the hardware interface card and the device driver, network transport, and network management agent software. The ThinLAN/3000 Link connects to either Ethernet LANs, IEEE 802.3 LANs, or both.

The network transport software includes the industry standard TCP, UDP, and IP protocols, along with both the BSD sockets and HP NetIPC APIs. Users may write their own software to access the network via an API, or they may purchase one of the higher level networking services (ARPA, NS) provided by HP and supported over the ThinLAN/3000 Link.



Features

- Network transport software provides the ARPA TCP, UDP, and IP protocols.
- BSD sockets API provides access to TCP and UDP.
- HP NetIPC API provides access to TCP.
- Supports Ethernet and IEEE 802.3 protocols.
- Supports 10 Mb/s burst transfer rate.
- Uses a microprocessor-driven interface controller to minimize the HP 3000 overhead associated with data communications processing.
- Supports connections to thin coaxial cable, thick coaxial cable, and unshielded twisted-pair wiring.
- Any node may be attached or removed while the network is active.
- Integrated node management software provides online configuration and logging.
- Integrated network management agent software supports SNMP.

Functional Specifications

Cable Type:	ThinLAN (Thin coaxial)	ThickLAN (Thick coaxial)	EtherTwist (Unshielded twisted-pair)
IEEE cable specification	Type 10Base2	Type 10Base5	Type 10BaseT
Maximum segment length	185 meters	500 meters	100 meters hub to node
Maximum number of nodes per segment	30	100	N/A
Minimum distance between nodes	0.5 meters	2.5 meters	N/A
Maximum AUI cable length	50 meters	50 meters	50 meters

Functional Description

The ThinLAN/3000 Link provides the hardware and software to connect an HP 3000 Series 900 computer system to a multivendor Local Area Network (LAN). The ThinLAN/3000 Link supports system-to-system communications to other HP 3000s; HP 1000s, HP 9000s, and PCs; as well as other systems supporting TCP/UDP/IP over Ethernet/802.3 wiring. The hardware components of the link include the Local Area Network Interface Controller card (LANIC), the Medium Attachment Unit (MAU), and in some cases, an Attachment Unit Interface (AUI) cable. The software components of the link include the LANIC device driver, the TCP/UDP/IP network transport, and the BSD sockets and HP NetIPC APIs.

Some of the components in the ThinLAN/3000 Link are bundled with selected HP 3000 systems. The components may also differ, depending on the specific system. Please see the ordering instructions below for more details.

Hardware Components

Note: The standard ThinLAN/3000 Link connects to a thin coaxial cable (IEEE Type 10Base2); connections to thick coaxial cable (IEEE 10Base5) or unshielded twisted-pair wiring (IEEE Type 10BaseT) are also available but optional.

Local Area Network Interface Controller (LANIC)

The LANIC is a microprocessor-based communication controller that plugs into the HP 3000 Series 900 backplane. It handles buffering, the IEEE 802.2 and 802.3 protocols, error checking, and keeps track of network statistics. When addressed by another node on the network, the LANIC receives frames of information and checks the accuracy of the data before passing the frames to the host. To transmit data, an addressed frame is sent from the host to the LANIC, which adds error checking information. The LANIC then tests to see if the cable is busy and, if not, transmits the frame.

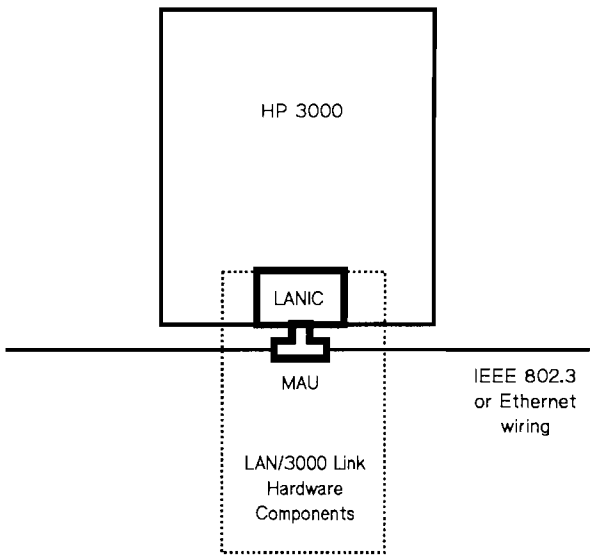
Features

- On-board microprocessor capable of receiving multiple back-to-back packets.
- IEEE 802.2 link-level protocol handling.
- IEEE 802.3 Carrier-Sense Multiple Access with Collision Detection (CMSA/CD) access method handling.
- Supports multicast, broadcast, and individual addressing.
- Frame length up to 1500 bytes.
- Built in self-test
- Online diagnostics run under MPE.
- Collects LAN statistics (collided packets, bad packets, etc.).
- HP Precision Bus (HP-PB) card comes with ThinLAN transceiver and AUI port.

IEEE 802.3 and Ethernet Coexistence

There are some similarities and some differences between IEEE 802.3 and Ethernet LANs. Since both types utilize the same coaxial cable media, Ethernet nodes may coexist on the same LAN segment with IEEE 802.3 nodes. The most significant differences are in the data packet format and the electrical grounding of the hardware. All HP 3000

Figure 2.



LANICs can transmit either IEEE 802.3 or Ethernet-type packets.

Medium Attachment Unit (MAU)

The Medium Attachment Unit (MAU) provides the physical and electrical connection to the LAN wiring. It receives signals from, and sends signals to the cable, and detects collisions resulting from two nodes starting to transmit simultaneously. The MAU also provides electrical isolation from the coaxial cable and performs several other functions to ensure network reliability. For example, if a MAU fails by continuously transmitting, a circuit will detect the failure and shut down the MAU.

The ThinLAN/3000 Link can be connected to thin coaxial cable (ThinMAU), thick coaxial cable (ThickMAU), or unshielded twisted-pair wiring (EtherTwist MAU). A ThinMAU is provided with the ThinLAN/3000 Link; the other MAUs are ordered separately. The ThinMAU is powered by the LANIC.

Note: The specific MAU and cabling supplied with the ThinLAN/3000 Link differs, depending on the specific HP 3000 system. Please see the ordering instructions for more details.

Software Components

The ThinLAN/3000 Link includes software corresponding to layers 2 through 4 of the Open Systems Interconnection (OSI) Reference Model (see Figure 3). It also includes node management and network management agent software (SNMP).

The Data Link Layer, corresponding to OSI layer 2, consists of the IEEE 802.2 and 802.3 protocols. The 802.3 implementation supports Carrier Sense Multiple Access/Collision Detection (CSMA/CD), which gives every node on the coaxial cable equal access to the network. A sending node monitors the network to ensure that no other node is transmitting before it attempts transmission. If, while transmitting, the sending node detects a collision, the sending node initiates a jam signal and waits before retransmitting. Transmission consists of sending addressed frames of data to the wiring at a signaling rate of 10 megabits/s. The 802.2 implementation supports Logical Link Control (LLC). Both the IEEE 802.2 and the Ethernet service are Type 1 (unacknowledged datagrams).

The Network Layer, corresponding to OSI layer 3, is based on the ARPA Internet Protocol (IP). IP provides packet fragmentation/ reassembly and internetting capability.

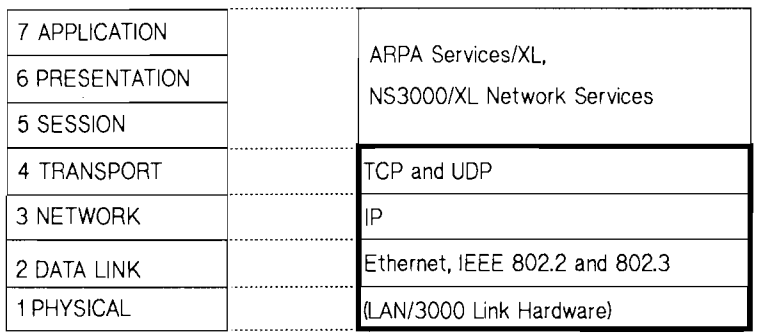


Figure 3.

The Transport Layer, corresponding to OSI layer 4, is based on the ARPA Transmission Control Protocol (TCP) and User Datagram Protocol (UDP).

TCP provides end-to-end reliable, connection-oriented services over IP with flow control and multiplexing. TCP also has mechanisms for detecting duplicate, lost, or out-of-sequence packets.

UDP provides an unacknowledged connectionless delivery service over IP.

The ThinLAN/3000 Link provides two application programmatic interfaces (APIs) to the network transport, Berkeley (BSD) sockets and HP's Network Inter-Process Communication (NetIPC). Both APIs support the rapid exchange of data using peer-to-peer communications between processes. The processes may be on a single system or on different systems on the network.

BSD sockets provides a C language interface to TCP and UDP. BSD sockets is available on HP 1000s, 9000s, and PCs and on a wide range of computers from other vendors.

BSD sockets is part of the MPE/iX FOS beginning with release 4.0 and is supported over the ThinLAN/3000 Link. The following sockets calls are supported:

- accept()
- bind()
- close()
- connect()
- fcntl()
- gethostby xxxx
- getnetby xxxx
- getpeername()
- getprotoby xxxx
- getservby xxxx
- getsockname()
- listen()
- recv()
- recvfrom()
- select()
- send()
- sendto()
- shutdown()
- socket()
- socketpair()

Additional sockets calls are planned for later releases.

NetIPC is a set of 18 programmatic calls, appropriate for implementing efficient distributed applications over TCP only. NetIPC supports communications to various HP systems, including the HP 1000, 3000, and 9000 computer systems, as well as HP PC networking. Applications written to NetIPC can also interoperate with other applications written to BSD sockets.

Node management software is included in the ThinLAN/3000 Link and provides a user interface for configuration, tracing, and logging. An online user configurator supports easy initial configuration and reconfiguration of the ThinLAN/3000 Link software without bringing down the HP 3000. The node management software also delivers flexible event logging and the ability to selectively trace several levels of network software. Also included is NetTool, a set of tools to monitor, analyze, and diagnose the network transport software.

Online diagnostics provide the ability to test the system's LANIC, AUI cable, and MAU, as well as send test frames to and receive test responses from other nodes.

The ThinLAN/3000 Link also includes a network management agent. The agent supports the Simple Network Management Protocol (SNMP) and collects information regarding the state of the link and transport. This information is used and displayed by remote management stations, such as the HP OpenView Network Node Manager (see related products below).

Standards

The protocols underlying the ThinLAN/3000 Link software closely adhere to the following standards:

RFC 768	UDP
RFC 791	IP
RFC 792	ICMP
RFC 793	TCP
RFC 826	ARP
RFC 919	IP Broadcast Datagrams
RFC 922	IP Broadcast Datagrams with Subnets
RFC 950	IP Subnet Extension
RFC 1155	Management Information (SNMP)
RFC 1157	SNMP
RFC 1213	MIB II (SNMP)

Support for Networking Services

The ThinLAN/3000 Link supports the multivendor ARPA network services and HP's proprietary NS network services The products provide interactive and programmatic facilities, such as virtual terminal access, file transfer, and remote database, file, and peripheral access. (See related products below.)

Network Capacity and Performance

Although the signaling rate of the line may be 10 megabits/s, the throughput achieved at a node may be lower. This is primarily due to the overhead of the software providing network services and the user's applications programs. Among the factors affecting user throughput are the type of software being used, the main memory and speed of each processor (and its peripherals) involved in the transfer and the load on each system from non-network applications.

Because of the number and complexity of these factors, it is difficult to make useful generalizations about the performance or capacity of the network in a particular application. Hewlett-Packard network specialists are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

Installation and Configuration Policy

The customer is responsible for loading the ThinLAN/3000 Link software onto the system. HP will install the LANIC card and perform minimum configuration of the ThinLAN/3000 Link to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel onsite to verify the installation and perform minimum configuration of ThinLAN/3000 Link, the customer is responsible for the following:

- Installing the appropriate wiring. For thin coaxial cable, this includes terminators, BNC "T" connectors, taps, and (where necessary) the MAUs and the routing of the AUI cable from the MAU to the LANIC.
- Complying with all applicable building codes in the installation of the LAN cabling and components.
- Obtaining a valid IP address prior to the configuration of the ThinLAN/3000 Link.
- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations.
  - Logical network map identifying relevant traffic flow.
  - Physical network map identifying relevant network hardware components.

- Updating the HP 3000 system to the proper release level and installing the ThinLAN/3000 Link software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management experience and LAN management experience are available when HP is onsite to complete the installation and minimum configuration of the ThinLAN/3000 Link.

  After HP has completed the minimum configuration of the ThinLAN/3000 Link, the customer is also responsible for completing the configuration in order to fully integrate the ThinLAN/3000 Link into the existing customer network.

HP Responsibility

Following the installation of the ThinLAN/3000 Link software, HP is responsible for the following:

- Installing and verifying the operation of the LANIC card.
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Connecting the LANIC to the customer's MAU (only if the MAU is accessible).
- Configuring the ThinLAN/3000 Link product to the minimum default configuration necessary to verify software and hardware functionality. This default configuration includes configuring the link and network interface in the network configuration file (NMCONFIG) using the NMMGR Utility.
- Cross validating the network configuration against the system I/O configuration.
- Verifying that with the minimum configuration, the ThinLAN/3000 Link product accesses the customer's MAU (if connected), after the product is started by the NETCONTROL command.

These steps complete HP's portion of the installation and minimum configuration of the ThinLAN/3000 Link.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP Precision Bus (HP-PB) systems

All HP 3000 Series 9x7LX and 9x7 systems come with a HP-PB multifunction I/O card, which includes a built in 802.3 LANIC and ThinLAN MAU. All HP 3000 Series 990 and 992 systems come with a HP-PB LAN/Console card, which also includes a built in 802.3 LANIC and ThinLAN MAU. These integrated LANICs support terminal, printer, and X.25 communications, all of which are provided by the Data communications and Terminal Controller DTC/3000 product. For system-to-system communications via a LAN, the customer may either use the 802.3 LANIC supplied with the system or order a second HP-PB 802.3 LANIC card.

The LANIC supplied with the system should be sufficient to meet the performance requirements of both DTC and system-to-system LAN communications. There are circumstances, however, where a second HP-PB LANIC should be considered. If the system-to-system traffic is high, the customer may want the additional performance of a second HP-PB LANIC card. Another possibility is that the customer wants to put DTC traffic and LAN traffic on separate wiring.

Customers who use the 802.3 LANIC supplied with the system only need to order the software component of the ThinLAN/3000 Link (the network transport and the device driver). Customers who want a second HP-PB card, must also order the appropriate hardware option. *MPE/iX release 4.0 or later is required to use a second HP-PB LANIC card.*

The HP-PB 802.3 LANIC supplied with the system, and the optional second HP-PB LANIC, both come with a ThinLAN MAU. The LANIC cards also include an Attachment Unit Interface (AUI) port, for customers who want to connect to a LAN using either a ThickMAU or an EtherTwist MAU. These MAUs must be ordered separately (see below).

Channel I/O (CIO) Bus Systems

All HP 3000 Series 900 systems with the CIO bus include a CIO 802.3 LANIC card, a ThinLAN MAU, and a ThickLAN MAU. The Series 960 and 980 systems require a second LANIC card for system-to-system communications via a LAN; for all other CIO systems a second card is optional. As described above, however, there are circumstances where a second LANIC should be considered.

Customers who use the 802.3 LANIC supplied with the system only need to order the software component of the ThinLAN/3000 Link (the network transport and the device driver). Customers who want a second CIO LANIC card, or who require a second card (Series 960 & 980), must also order the appropriate hardware option.

The CIO 802.3 LANIC card supplied with the system comes with a ThinLAN MAU and a ThickLAN MAU. The second CIO 802.3 LANIC card comes with a ThinLAN MAU only. The LANIC cards also include an Attachment Unit Interface (AUI) port, for customers who want to connect to a LAN using either a ThickMAU or an EtherTwist MAU. These MAUs must be ordered separately (see below)

HP 36923A ThinLAN 3000/iX Network Link

Hardware Options

(see instructions above; may select one option)

001 802.3 CIO LANIC card. For Series 920, 922, 922LX, 922RX, 925, 925LX, 932, 935, 948, 949, 950, 955, 958, 960, 980.

002 802.3 HP-PB LANIC card (single-high). For Series 9x7LX, 9x7, 990, 992.

Documentation Option

(optional)

0B0 Delete documentation

Must order **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
0CD Credit for Processor Option 310
0GJ Credit for Processor Option 315
0CE Credit for Processor Option 320
0CF Credit for Processor Option 330
0GL Credit for Processor Option 335
0GM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select, on the same order, the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option.

Alternate MAUs

28685B EtherTwist MAU
30241A ThickMAU

Support Products

36923A+S00 Software Material Subscription (SMS) for ThinLAN/3000 Link
36923A+W00 Extended SMS for ThinLAN/3000 Link

Response Center Support and Account Management Support customers must also order Data Communications Category Support B, if it has not already been purchased.

Customers with hardware support agreements must add the appropriate level of coverage (SMMC or BMMC) for this link product to their support agreement.

For quick implementation of your network, a simplified service interface, verified network operation, and assured ongoing supportability, please refer to the HP Network Startup data sheet in this guide.

Documentation

Included with ThinLAN/3000 Link

36922-61023 HP 3000/iX Network Planning and Configuration Guide
36922-61003 NS3000/XL NMMGR Screens Reference Manual
36922-61005 NS3000/XL Operations and Maintenance Reference Manual
36922-61029 HP SNMP/XL User's Guide
36923-61000 NS3000/iX Error Messages Reference Manual

Included with HP-PB LANIC hardware (option 002):

28640-90001 LAN Hardware Installation
28640-96006 LAN Hardware Installation Quick Start

Related Documentation

36920-61000 Using NS3000/XL Network Services
32650-90363 Berkeley Sockets/iX User's Guide

Related Products

HP 2344A, 2347A, 2348A, 36955A, 36956A, 36957A, D2355A
ARPA Services/XL
HP B1009A, B1024A
HP OpenView Network Node Manager
HP 36920A
NS3000/iX Network Services

Coaxial Cable and LAN Accessories

A complete line of local area network products, including coaxial cable, installation tools, and connector products is available from Hewlett-Packard; refer to the current Computer Users Catalog. For cable planning information, refer to the LAN Cable and Accessories Installation Manual (P/N 5955-7680), available from your HP Sales Representative.

HEWLETT® PACKARD

ThinLAN 3000/V Network Link

Technical Data

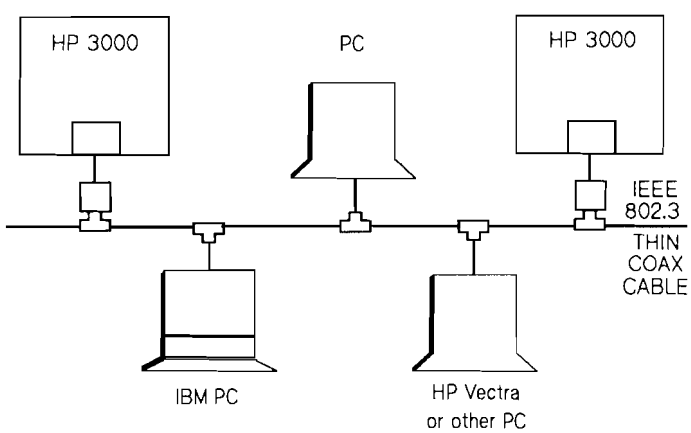
For HP 3000 Computer Systems Product Number HP 30240A

ThinLAN 3000/V Link provides the HP 3000 computer with a high-performance, reliable local communication link by connecting to an industry-standard IEEE 802.2/802.3 Type 10Base2-compatible local area network. Ethernet packet framing is also supported for host systems requiring that protocol.

The IEEE 802.2/802.3 network offers superior performance when a fully interconnected network is needed for high-speed data communications over a distance of 185 meters or less within a single building.

The bus structure of this network allows every node to directly communicate with every other node via a single connection to the network. Each node's access to the network is controlled by the Carrier-Sense Multiple Access with Collision Detection (CSMA/CD) access method which ensures efficient use of the network. HP 30240A ThinLAN 3000/V Link provides a complete connection for an HP 3000 computer to the local area network, including programmatic access between HP 3000s. (All other components for the network, including the coaxial cable, are available from Hewlett-Packard.) For full interactive and programmatic networking capabilities with other HP 3000s, HP 32344A NS3000/V is required.

Figure 1



Features

- Consists of a hardware interface card, the Local Area Network Interface Controller (LANIC), a thin-cable Medium Attachment Unit (ThinMAU), and software.
- Supports connection of an HP 3000 MICRO 3000, MICRO 3000XE/LX/GX and Series 37 through 70 computer system to a Type 10Base2 baseband coaxial cable adhering to the IEEE 802.3 local area network standard, using the IEEE 802.2 Type 1 link level.
- Supports 10-megabits-per-second link data transfer rate.

- Carrier-Sense Multiple Access (CSMA/CD) protocol controls network access. There is no centralized control; all nodes have equal access.
- Each HP 3000 connected to the network can communicate directly with all other HP 3000s, HP Vectra PCs, HP Touchscreen PCs and IBM PCs connected to the same coaxial cable.
- Any node may be attached or removed while the network is active if the BNC "T" connectors have already been installed on the coaxial cable.
- Uses a microprocessor-driven interface controller that reduces the HP 3000 overhead associated with communications line handling.
- Network transport software is based on Hewlett-Packard's full implementation of the de facto industry-standard Defense Advanced Research Project Agency (DARPA) protocols (TCP/IP), including the transport and network layer functions from the ISO Reference Model.
- Network InterProcess Communication software provides programmatic access to the network transport.
- Integrated node management software provides on-line configuration and logging.
- Network components are suitable for installation in a light industrial environment.

Functional Description

ThinLAN 3000/V Link contains the hardware and software required to connect an HP 3000 MICRO, MICRO/XE/LX/GX, Series 37 and 39 through 70 to an IEEE 802.3 Type 10Base2 thin coaxial cable. It also provides programmatic access to network communication between HP 3000s, through a set of Network InterProcess Communication calls.

Hardware Components

Figure 2 shows the two major hardware components of the HP 30240A ThinLAN 3000/V Link: the Local Area Network Interface Controller (LANIC) and the thin-cable Medium Attachment Unit (ThinMAU). The thin coax cable is not included with ThinLAN 3000/V Link.

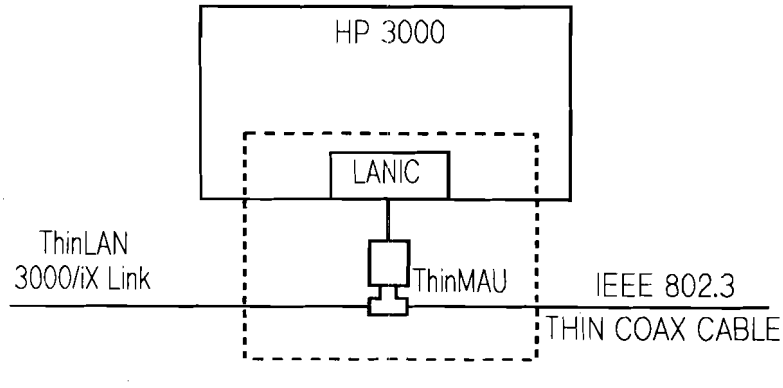
The standard product connects to a thin (IEEE Type 10Base2) coaxial cable; a thick coaxial (IEEE 10Base5) option is also available. EtherTwist using unshielded twisted-pair wire is a third option.

Note: To use the EtherTwist option, twisted- pair wiring is used in place of coaxial cable, and a connection to a EtherTwist Hub is required.

Local Area Network Interface Controller

The Local Area Network Interface Controller (LANIC) is a microprocessor-based communication controller that plugs into the HP 3000 backplane. It handles buffering, IEEE 802.2 and 802.3 protocols, error checking, and keeps track of network statistics. When addressed by another node on the network, the LANIC receives frames of information and checks for accuracy of the data before passing the frames to the host. To transmit, an addressed frame is sent from the host to the LANIC, where error checking information is added. The LANIC then tests to see if the cable is busy and if not, transmits the frame.

FIGURE 2



Features

- 8-bit microprocessor
- VLSI communication controller chip with 16-bit data path
- IEEE 802.2 link-level protocol handling
- IEEE 802.3 CSMA/CD Access Method handling
- Built-in self-test on-line diagnostics run under MPE
- ThinLAN performance statistics collection

Thin Medium Attachment Unit

The Thin Medium Attachment Unit (ThinMAU) provides the physical and electrical connection to the network coaxial cable; it is powered by the LANIC through the integral AUI cable. The ThinMAU receives signals from and sends signals to the coaxial cable, and also detects collisions resulting from two nodes starting to transmit simultaneously. The ThinMAU also provides electrical isolation from the coaxial cable and performs several other functions to ensure network reliability, that is, if a ThinMAU fails by continuously transmitting, a circuit will detect the failure and shut down the ThinMAU.

A ThinMAU is attached to the coaxial cable using a BNC "T" connector. The BNC "T" connector and connector cover are included with ThinLAN 3000/V Link or can be ordered separately for assembly with Type 10Base2 coaxial cable. Connecting a ThinMAU to the thin cable is done by simply connecting the ThinMAU BNC "T" connector to the thin-cable BNC connectors.

The ThinMAU has an integrated 1-meter Attachment Unit Interface (AUI) cable. A 2-meter internal LANIC cable connects the LANIC to the AUI cable for all Series except the MICRO, MICRO/XE and Series 37. In the Series 39 through 70, the LANIC cable and AUI cable connect at the system junction panel. No additional AUI cables are allowed.

Software Components

HP 30240 ThinLAN 3000/V Link includes software corresponding to layers 1 through 4 of the Open Systems Interconnection (OSI) Reference Model (see Figure 3). It also includes a programmatic interface to network communication and node management software.

The lowest layers, corresponding to OSI layers 1 and 2, consist of the IEEE 802.2 and 802.3 protocols. CSMA/CD gives every node on the coaxial cable equal access to the network; a sending node monitors the network to ensure that no other node is transmitting before it attempts transmission. If, while transmitting, the sending node detects a collision, the sending node initiates a jam signal and waits before retransmitting. Transmission consists of sending addressed frames of data to the coaxial cable at a data rate of 10 megabits per second. The IEEE 802.2 procedures are Type 1 (unacknowledged datagrams).

The Network Layer, corresponding to OSI layer 3, is based on the DARPA Internet Protocol (IP). IP provides fragmentation/reassembly and internetting capability.

The Transport Layer, corresponding to OSI layer 4, is based on Hewlett-Packard's full implementation of the DARPA Transmission Control Protocol (TCP). TCP provides end-to-end, reliable connection-oriented services with flow control and multiplexing. TCP also provides mechanisms for detecting and correcting for duplicated, lost, or out-of-sequence packets.

The user interface to the network is Network InterProcess Communication for HP 3000-to-HP 3000, HP 1000, and PC communications. Network InterProcess Communication is a set of eighteen programmatic calls for the rapid exchange of data between processes (the processes may be on a single system or on different systems on the LAN). Network InterProcess Communication is the ideal means for implementing efficient, distributed applications.

For higher level services, each system on the network must also have HP 32344A NS3000/V. NS3000/V provides interactive and programmatic facilities such as file transfer, remote IMAGE database access, remote file, and peripheral access and remote process management. (See the NS3000/V data sheet for more details.)

Using NS3000/V Services or Equivalent User-written Functionality

With HP 3000/V LAN Link, customers' networks can be connected in a way that is transparent to users and allows high connectivity between networks. For example, a transparent gateway can be configured between a point-to-point network and a LAN. Consequently, users on the point-to-point network would be able to transparently access resources on the LAN, and users would be able to transparently access resources on the point-to-point network.

Node management software is also included in the ThinLAN 3000/V Link and provides a friendly user interface for the network management functions of configuration, tracing, and logging. Node management provides an on-line user configurator for easy initial configuration (of the LAN and network transport software) and reconfiguration without bringing down the HP 3000. Node management also delivers flexible event logging and the ability to selectively trace several levels of network software. On-line diagnostics provide the ability to test the system's LANIC and ThinMAU, as well as send test frames to and receive test responses from other nodes.

Network Capacity and Performance

Although data may be traveling through the network at a rate of 10 megabits per second, the throughput achieved by a user at an HP 3000 node will be lower. This is primarily due to the overhead of the software providing network services and the user's application programs. Among the factors affecting user throughput are the type of software capability being used, the main memory and speed of each processor (and its peripherals) involved in the transfer and the load on each system from non-network applications.

Because of the number and complexity of these factors, it is difficult to make useful generalizations about the performance or capacity of the network in a particular application. Hewlett-Packard Systems Engineers and Data Communications Specialists are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

Product Requirements

- An HP 3000 MICRO 3000, MICRO 3000XE/LX/GX, Series 37, 39, 4x, 5x, 6x, or 70
- MPE V/E Extended microcode firmware
- At least 2 Mbytes of memory. (Generally, systems that are now memory-limited should add 1 Mbyte to maintain current performance.) See your HP System Engineer to help determine your requirements.

FIGURE 3

OSI MODEL	THINLAN LINK SOFTWARE COMPONENTS
7 APPLICATION 6 PRESENTATION	NS3000/iX (HP 32344A)
5 SESSION	(NOT USED) NETWORK IPC
4 TRANSPORT	TRANSPORT PROTOCOLS
3 NETWORK	INTERNET PROTOCOL
2 DATA LINK	IEEE 802.3 MEDIA ACCESS CONTROL IEEE 802.2 LOGICAL LINK CONTROL
1 PHYSICAL	(LAN LINK HARDWARE)

System Environment

ThinLAN 3000/V Link is supported on the HP 3000 MICRO 3000, MICRO 3000XE/LX/GX, Series 37, 39, 4x, 5x, 6x, or 70 executing the MPE V/E operating system, "U" MIT, or later versions. Ethernet is supported on MPE V operating system, V Delta5 MIT or later versions. One ThinLAN 3000/V Link is supported per system.

The ThinMAU provided with the HP 30240A ThinLAN 3000/V Link can be connected to any coaxial cable which fully complies with the IEEE 802.3 specification for Type 10Base2 baseband coaxial cable. Use of Hewlett-Packard coaxial cable is recommended.

Installation and Configuration Policy

The customer is responsible for loading the ThinLAN 3000/V Link software onto the system.

Hewlett-Packard will install the LAN Interface Controller (LANIC) and perform minimum configuration of the ThinLAN 3000/V Link in order to verify minimum product functionality. These activities are included in the product purchase price.

Customer Responsibility

Prior to having HP personnel onsite to verify the installation and perform minimum configuration of ThinLAN 3000/V Link, the customer is responsible for the following:

- Installing the thin coaxial cable, including terminators and BNC "T" connectors, and connecting the ThinMAU to the BNC "T" connector within one meter of the system's junction panel.
- Complying with all applicable building codes in the installation of the LAN cabling and components.
- Obtaining a valid IP address prior to the configuration of the ThinLAN 3000/Link.
- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Updating the HP 3000 system to the proper release level and installing the ThinLAN 3000/V Link software using AUTOINST. Refer to the HP Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management experience and LAN management experience are available when HP is on-site to complete installation and minimum configuration of the ThinLAN 3000/V Link.

Functional Specifications

Signalling Rate: Data is transmitted in bursts at 10 megabits per second in accordance with the IEEE 802.3/802.2 standard.

Frame Length: Up to 1514 bytes (including header)

Cable Alternatives:

	ThinLAN Standard	ThickLAN (Optional)	EtherTwist (Optional)
IEEE Cable specification	Type 10Base2	Type 10Base5	Twisted-pair*
Maximum segment length	185 meters	500 meters	100 meters Hub to Node
Maximum number of nodes per segment	30 meters	100 meters	12 Nodes per Hub
Minimum distance between nodes	0.5 meters	2.5 meters	No Min.
Maximum AUI cable length	1 meter	48 meters	1 meter

* For more complete wiring information, refer to the HP EtherTwist wiring specification note.

After HP has completed the minimum configuration of the ThinLAN 3000/V Link, the customer is also responsible for completing the configuration in order to fully integrate the ThinLAN 3000/V Link into the existing customer network.

HP Responsibility
Following the installation of the ThinLAN 3000/V Link software, HP is responsible for the following:

- Installing and verifying the operation of the LAN Interface Controller (LANIC).
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Connecting the LANIC to the customer's ThinMAU (only if the ThinMAU is accessible).
- Configuring the ThinLAN 3000/V Link product to the minimum default configuration necessary to verify software and hardware functionality. This default configuration includes configuring the LANIC for the ThinLAN 3000/V Link into the system I/O configuration via SYSDUMP and configuring the link and Network Interface in the network configuration file (NMCONFIG) using the NMMGR utility.
- Verifying that with the minimum configuration, the ThinLAN 3000/V Link product accesses the customer's ThinMAU (if connected), after the product is started by the NETCONTROL command.

These steps complete HP's portion of the installation and minimum configuration of the ThinLAN 3000/V Link.

Additional Implementation Assistance
For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP 30240A ThinLAN 3000/V Link. Includes everything needed to connect an HP 3000 system to an IEEE 802.3 Type 10Base2 local area network: LANIC, LANIC cable, ThinMAU with 1-meter integrated PVC AUI cable, BNC "T" connector, connector cover, and software.

Select **one** processor option

Processor Options

100	For Series 37, MICRO 3000, or MICRO 3000XE
300	For Series 39–42, 52
400	For Series 44, 48, 58
500	For Series 64–70

EtherTwist Options

142	For EtherTwist
242	ThickLAN connection

Support Products

30240A+S00 Software Material Subscription (SMS) for ThinLAN 3000/V Link
30240A+W00 Extended SMS for ThinLAN 3000/V Link

(Response Center Support and Account Management Support customers must also order the appropriate Data Communications Category Support, if it has not already been purchased. The highest category need be purchased only once for all products in that or lower category; C=highest, A=lowest.)

Customers with hardware support agreements must add the appropriate level of coverage (SMMC or BMMC) for this Link product to their support agreement.

Documentation

Included with the ThinLAN 3000/V Link

30240-90002 LANIC Installation and Service Manual for Series 29, 4x, 5x, 6x, and 70.
30240-90101 LANIC Installation and Service Manual for MICRO 3000, MICRO 3000/XE, and Series 37.

Related Documents

5957-4624 Making the LAN Connection
5955-7680 LAN Cable and Accessories Installation Manual
5955-7681 Link Hardware Troubleshooting Manual
5955-7689 LAN 3000/V ThinLAN
5959-2208 HP SiteWire Twisted-Pair Cabling Installation Guide
30242-90002 Local Area Network Cabling and Installation Guide
30242-90003 LAN 3000/V Diagnostic and Troubleshooting Guide
32344-90001 NS 3000/V User/Programmer Reference Manual
32344-90002 NS 3000/V Network Manager Reference Manual V.1
32344-90012 NS 3000/V Network Manager Reference Manual V.2
32344-90003 NS 3000/V Communications Handbook Section
32344-90005 NS 3000/V Error Messages and Recovery Manual
27208-90001 ThinLAN 3000/V Installation Instructions (for HP Vectra LANIC)
28641-90001 ThinMAU Installation

Coaxial Cable and LAN Accessories

HP 30240A ThinLAN 3000/V Link provides all the components of an HP 3000 connection to the coaxial cable of an IEEE 802.3 Type 10Base2 local area network. A complete line of local area network products, including coaxial cable, installation tools, and BNC connector products, are available from the HP Computer Users Catalog. These accessory products are described briefly here. For detailed planning information, refer to the LAN 3000/V and ThinLAN 3000/V Design Guide (P/N 5955-7689), available from your HP sales representative.

The following products may be ordered from the HP Computer Users Catalog.

Thin Coaxial Cables and Connectors

92227 (A-H) Thin Coaxial Cable Kits – cut-to-length connectored PVC-jacketed thin coaxial cables
92227J Thin Cable cut-to-length unconnectored PVC-jacketed thin coaxial cable
92227K Thin Cable cut-to-length unconnectored FEP-jacketed thin coaxial cable

See the HP Computer Users catalog for ThickLAN products

Accessories for Cut-to-Length Thin Cable

92227L Connector pair for cut-to-length thin cable
92227M Cable tool kit for cut-to-length thin cable
92227N BNC "T" connector
92227P Terminator pair
91117R BNC "T" connector cover

Test Kit

92227Q Loopback connector for ThinMAU required for operation of node diagnostic for customer isolation of failures to coaxial cable or ThinMAU.

HEWLETT® PACKARD

NS Point-to-Point 3000/iX

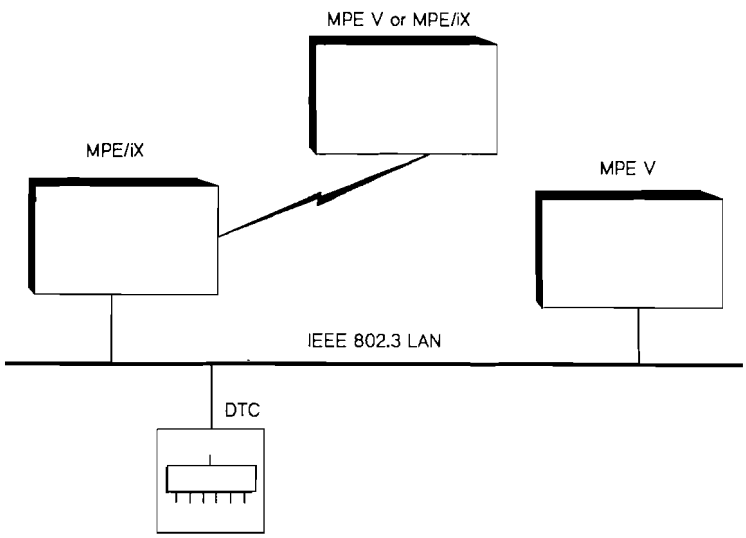
Technical Data

For HP 3000 Series 900 Computer Systems
Product Number
HP 36922A

The NS Point-to-Point Network Link for MPE/iX-based systems provides the network connection for an HP 3000 Series 900 computer to communicate with another HP 3000, MPE/iX- or MPE V-based system. Customers can connect HP 3000s using NS Point-to-Point with either a leased line or switched auto-dial line. Customers with direct-connect configurations or requirements should use the LAN links.

Features

- Implements industry-standard Defense Advanced Research Projects Agency (DARPA) TCP/IP protocols from the transport and network layers of the OSI Reference Model.
- Provides packet routing for transport access over multiple nodes.
- Provides gateway capability for transparent access between networks.
- Includes integrated node management software for on-line configuration and logging.
- Provides programmatic access so users can write distributed applications between HP 3000s. The Network InterProcess Communication (NetIPC) intrinsics provide this programmatic interface.
- Provides access to higher level services such as Virtual Terminal, Network File Transfer, Remote Process Management, Remote Database Access, and Remote File Access when used in conjunction with NS3000/iX Network Services (P/N 36920A).
- Supports LAP-B protocol, an OSI standard for full-duplex line communication.



Functional Description

This product can be used in conjunction with NS3000/iX Network Services Software (P/N 36920A), or it can be used as a standalone link with user-written applications by using the NetIPC intrinsics. The NS3000/iX Network Services software provides the user-level services to perform functions such as Network File Transfer, Virtual Terminal, Network File Access, and Remote Process Management. The programmatic access via the set of NetIPC intrinsics allows customers to write their own distributed applications on different nodes to exchange information in an efficient, peer-to-peer manner.

With NS Point-to-Point 3000/iX customers' networks can be connected in a way that is transparent to users and allows high connectivity between networks. For example, a transparent gateway can be configured between a point-to-point network and a LAN. Consequently, users on the point-to-point network would be able to transparently access resources on the LAN, and LAN users would be able to transparently access resources on the point-to-point network.

Users do not need to know the network topology. This transparency means that the user simply specifies the destination node name for access to another CPU on the same network or for access to a remote CPU on a different network.

NS Point-to-Point 3000/iX Network Link (utilizing the LAP-B protocol only) is supported to work with all full duplex auto-dial modems which work with the DS Point-to-Point Modem Link or the NS Point-to-Point 3000/V Network Link in full duplex mode.

The following is a list of full duplex modems which have been verified by HP to work with the NS Point-to-Point 3000/iX Network Link utilizing the LAP-B protocol:

- AT&T 201C (Dataphone 2400)
- AT&T 209A (Dataphone 9600)
- AT&T Dataphone II 2024A
- AT&T Dataphone II 2048A
- AT&T Dataphone II 2096A
- AT&T Dataphone II 2248A

Functional Specifications

The following modem support is provided with NS Point-to-Point 3000/iX Network Link:

Modem Migration from DS/V Point-to-Point or NS/V Point-to-Point to NS/iX Point-to-Point

Mode of Operation	DS/V Pt-to-Pt	NS/V Pt-to-Pt BISYNC	NS/V Pt-to-Pt LAP-B	NS/iX Pt-to-Pt
Half Duplex	YES	YES	NO	NO
Full Duplex	YES	NO	YES	YES

Product Components

Hardware

NS Point-to-Point 3000/iX Network Link includes the hardware interface card and 5-meter cable for connection to the user's modem. Users with direct connect configurations or requirements should use HP LAN Links. The hardware interface is the Programmable Serial Interface (PSI) card. The PSI microprocessor utilizes all of the communication data link protocol, thus relieving the HP 3000 of that task. The PSI architecture accommodates line speeds from 1200 bps to 64 Kbps.

Software

NS Point-to-Point 3000/iX Network Link provides the OSI level 2 Standard, LAP-B Protocol. LAP-B provides full-duplex transmission, thereby eliminating line turn-around time.

The network transport software, TCP/IP, implements the de facto industry standard DARPA TCP/IP protocols. TCP/IP follows the OSI Reference Model specifying the transport and network layers.

Product Requirements

- An HP 3000 Series 900
- A single-high slot
- At least 16 Mbytes (24 or more are recommended) of memory. See your HP System Engineer to help determine your requirements.
- Leased line or switched auto-dial line
- Full-duplex modems

Migration from DS Point-to-Point and NS Point-to-Point 3000/V

The NS Links and Services are HP's new generation of communication products providing enhanced capabilities over that of the DS Links and Services. Customers with DS products currently installed are encouraged to migrate their networks to the NS product line. When planning this migration, both services and link products need to be considered.

User applications written using DS services will run with little modification under NS3000/iX Network Services. Customers need to be aware that program-to-program communication (PTOP) is not supported in the MPE/iX environment. Customers whose applications use PTOP are strongly encouraged to move to the newer, more efficient NetIPC environment for MPE/iX user applications. The NS Point-to-Point 3000/iX Link can be added to networks that currently include DS link products. In order for DS nodes to communicate with NS/iX nodes, the DS node will have to go through an intermediate NS/V node. Customers are urged to migrate their DS nodes to NS/V nodes to eliminate networking confusion and to enhance performance.

The NS Point-to-Point 3000/iX Network Link product conforms to layers 1 through 4 of the OSI seven-layer model. The DS Link product predates the OSI model and, therefore, has a different architecture from the NS Link product. As a consequence of these architectural differences, DS/3000 Point-to-Point and NS Point-to-Point 3000/iX cannot communicate with each other.

It is recommended that users establish a migration plan with an HP Network Consultant or Datacom Specialist.

Installation and Configuration Policy

The customer is responsible for loading the NS Point-to-Point 3000/iX Network Link software onto the system. Hewlett-Packard will install the Programmable Serial Interface (PSI) and provide connection to the customer's communication line (provided the line is available at installation), and will perform minimum configuration of the NS Point-to-Point 3000/iX Network Link in order to verify minimum product functionality. These activities are included in the product purchase price.

Customer Responsibility
Prior to having HP personnel on-site to install the PSI and perform minimum configuration of the NS Point-to-Point 3000/iX Network Link, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Installing and verifying modems and phone lines for communication between HP 3000 systems using the NS Point-to-Point 3000/iX Network Link

- Obtaining a valid IP address prior to the configuration of the NS Point-to-Point 3000/iX Network Link
- Updating the HP 3000 system to the proper release level and installing the NS Point-to-Point 3000/iX Network Link software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001)
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge and networking knowledge are available when HP is on-site to complete the installation and minimum configuration of the NS Point-to-Point 3000/iX Network Link

The customer is also responsible for completing the configuration in order to fully integrate the NS Point-to-Point 3000/iX Network Link into the existing customer network after HP has completed the minimum configuration of the NS Point-to-Point 3000/iX Network Link.

HP Responsibility
Following the installation of the software component of the NS Point-to-Point 3000/iX Network Link, HP is responsible for the following:

- Installing, verifying, and connecting the Programmable Serial Interface (PSI) card for the NS Point-to-Point 3000/iX Network Link to the customer's modem.
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the NS Point-to-Point 3000/iX Network Link to a minimum default configuration necessary to verify the software and hardware functionality. This includes configuring the link and Network Interface (NI) in the network configuration file (NMCONFIG) using the NMMGR utility and cross-validating the PSI related configuration with the system configuration.
- Verifying the NS Point-to-Point 3000/iX Network Link configuration by issuing the NETCONTROL (and NSCONTROL, if applicable) start command for the NS Point-to-Point 3000/iX Network Link, NI, and ensuring that a connection can be established with another HP 3000 system using this new NS Point-to-Point 3000/iX Network Link.

These steps complete HP's portion of the installation and minimum configuration of the NS Point-to-Point 3000/iX Network Link.

Addition Implementation Assistance
For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

The NS Point-to-Point 3000/iX Link may be used as a standalone product with intrinsic access, or with NS3000/iX Network Services (P/N 36920A).

HP 36922A NS Point-to-Point 3000/iX Network Link for HP 3000 Series 900 systems. Compatible with NS3000/iX Network Services (36920A).

Select **one** PSI option and one cable option and one processor option:

PSI Options

001 Central Bus PSI (for Series 925, 925LX, 935, 949, 950, 955, 960, 980)
002 Precision Bus PSI (for Series 920, 922, 922LX, 9X7LX, 9X7RX, 9X7SX, CS990, CS992, 922RX, 932, 948, 958)
090 No PSI (software only)

Cable Options

010 RS-232 Connection
020 V.35 Connection
025 RS-232 auto-dial connection
099 No cable (software only)

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license
399 Hardware only

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
0CD Credit for Processor Option 310
0GJ Credit for Processor Option 315
0CE Credit for Processor Option 320
0CF Credit for Processor Option 330
0GL Credit for Processor Option 335
0GM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select the upgrade credit option which pertains to their current user license option or processor option in addition to the new user license option on the same order.

Support Products

36922A+S00 Software Material Subscription (SMS) for NS Point-to-Point 3000/iX Network Link.

36922A+W00 Extended SMS for NS Point-to-Point 3000/iX Network Link.

Response Center Support and Account Management Support customers must also order the appropriate Data Communications support, if it has not already been purchased. A given category need be purchased only once for all products in that category.

Customers with hardware support agreements must add the appropriate level of coverage (SMMC or BMMC) for this link product to their support agreement.

Documentation

Included with NS Point-to-Point 3000/iX Network Link:

36922-61001 NS Point-to-Point 3000/iX Network Configuration Guide
36923-61001 Guide to NS 3000/iX Documentation
36922-61002 NS 3000/iX Configuration Planning and Design Guide
36922-90035 NS 3000/iX Operations and Maintenance Reference Manual
36922-90021 NS 3000/iX Error Message Reference Manual
36922-90034 NS 3000/iX NMMGR Screen Reference Manual
36920-61005 NetIPC 3000/iX Programmer's Reference Manual
32022-90009 Using the Node Management Services (NMS) Utilities
36922-90033 HP 3000/iX Network Planning and Configuration Guide

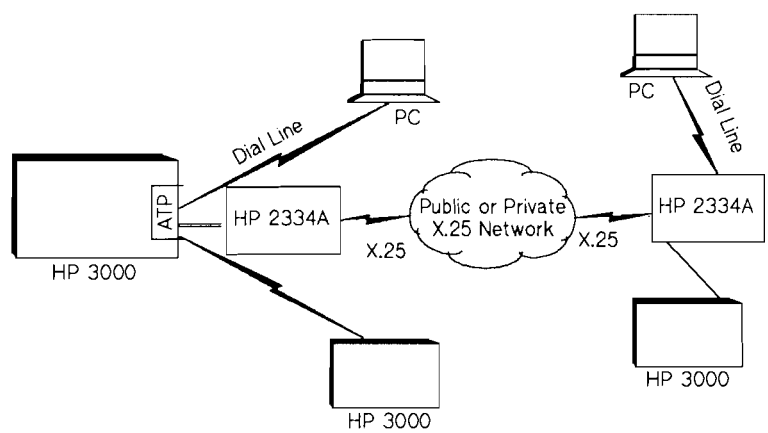
HEWLETT® PACKARD

Asynchronous HP Serial Network Link

Technical Data

For HP 3000/V Computer Systems Product Number HP 32003A

HP Serial Network Link is Hewlett-Packard's remote asynchronous connection for HP 3000/V computer systems and HP Vectra, Touchscreen and IBM PCs and provides access to HP's distributed data processing and Business System Plus services. HP Serial Network Link fully integrates PCs and HP 3000s, providing a complete office automation solution. HP Serial Network supports the HP OfficeShare family of networking software for PCs, allows users access to disk and file sharing, printer sharing with spooling, unattended backup and restore, and terminal emulation with file transfer from personal computers to HP 3000s from a remote location. HP Serial Network provides the same services and functionality for remote PCs to an HP 3000/V as HP LAN connection products.



HP Serial Network is comprised of the Asynchronous Serial Network Link (P/N 32003A) for the HP 3000 and for the PC, HP OfficeShare Network Software for the Serial Link, User Services and Configuration/Diagnostics software. The HP 3000 requires an ATP port to be available and an RS-232 adapter card must be provided on the PC.

The Asynchronous Serial Network Link (P/N 32003A) also provides a network connection for an HP 3000 system to communicate asynchronously with another remote HP 3000 over a switched manual-dial line. The communication link provides programmatic access between HP 3000s or can be used in conjunction with NS 3000/V Network Services software (P/N 32344A) for higher-level user services such as Network File Transfer, Virtual Terminal, and Remote Database Access.

In addition to remote modem connections, HP Serial Network also supports HP 2334A stat muxes for connecting HP 3000s, HP Vectra and IBM PCs. HP Serial does not support Touchscreen connected through HP 2334A stat muxes.

Features

- Provides remote, transparent access to shared information and peripherals.
- Runs all of the strategic Personal Productivity Series Applications, popular MS-DOS® software programs and most programs that support Microsoft® Networks.
- Provides full support of HP's powerful electronic mail system, HP AdvanceMail and HP DeskManager, and Productivity Services Information Access.
- Terminal emulation and file transfer capabilities for complete data processing applications support on HP 3000s, using HP AdvanceLink software.
- Consists of HP 3000 software and PC user software.
- Supports 1200, 2400, or 9600 baud connections. Data transfer rate for remote connection is dependent upon modem choice.
- Supports remote PC or HP 3000 connections through HP 2334A stat muxes.
- Provides virtual terminal access.
- Uses standard ATP hardware.
- Software allows adjacent ATP ports to be used as asynchronous network links or as terminal/printer ports.
- Network transport software is based on de facto industry-standard Defense Advanced Research Projects Agency (DARPA) protocols, including the transport and network layer functions from the OSI Reference Model.
- Provides online configuration and logging with integrated node management software

Functional Description

HP Serial Network Link provides an asynchronous point-to-point link allowing HP Vectra PCs, IBM PCs, and HP Touchscreen PCs to communicate with HP 3000s. HP Serial Network Link in conjunction with Personal Productivity Services provides transparent access to data and peripherals as well as unattended backup and restore on the HP 3000. The connection corresponds to layer 2 of the ISO/OSI model.

Asynchronous Network Link for HP 3000-to-HP 3000 Communication

The Asynchronous Network Link (P/N 32003A) provides the network connection for an HP 3000 system running Network Services software (P/N 32344A) to communicate with another remote HP 3000. The communication link, through the ATP, can be made by using a switched line with manual-dial modem or switched line with auto-dial modem. The Asynchronous Network Link provides all software for a complete network connection for an HP 3000 computer, including programmatic access between HP 3000s. The ATP hardware must be purchased separately. The ATP is the standard terminal/printer controller on any HP 37, MICRO, 64, 68, or 70 system. Only one port on the ATP is needed for each system-to-system link or system-to-PC link. The remote-connect line speed is limited by modem speed up to 9600 baud.

Functional Description for HP 3000-to-HP 3000 Communication

Asynchronous Network Link provides an asynchronous point-to-point link allowing an HP 3000 Series 37 through 70, via the standard ATP, to communicate to a remote HP 3000. This link provides programmatic access to network communication, through a set of Network InterProcess Communication intrinsics (NetIPC).

The connection corresponds to layer two of the ISO/OSI model.

This product may be used in conjunction with NS3000/V Network Services software. The link product provides virtual terminal and software necessary to pass data between HP 3000s. The NS3000/V software provides the user level services to perform functions such as Network File Transfer and Remote Database Access.

Software Components

HP Serial Network includes software corresponding to layers 1 through 7 of the Open Systems Interconnection (OSI) Reference Model. The Physical Link, layer 1, is provided by the Advanced Terminal Processor (ATP) on the HP 3000 and the serial interface on PCs. The Physical Link supports RS-232-C and RS-422 interfaces. The HP Serial Network Link uses the Asynchronous Network Protocol (ASNP) as its protocol. The ASNP protocol corresponds to the Data Link, layer 2. The ASNP protocol ensures error detection and data integrity by using the 16-bit, cyclic redundancy check error polynomial. Data transfer rates are also enhanced with data compression.

The Network Layer, corresponding to OSI layer 3, is based on the DARPA Internet Protocol (IP). IP provides fragmentation/reassembly and internetting capability.

The Transport Layer, corresponding to OSI layer 4, is based on the DARPA Transmission Control Protocol (TCP). TCP provides end-to-end reliable connection-oriented services with flow control and multiplexing. TCP also provides mechanisms for detecting and correcting for duplicated, lost, or out-of-sequence packets.

Virtual Terminal

From a remote PC, Virtual Terminal Access allows terminal emulation to most HP 3000 applications. Character-mode applications and block-mode applications using VPLUS are supported.

Node Management Software for HP 3000

Node management software for the HP 3000 is also included in the Asynchronous Serial Network Link. It provides a friendly user interface for the network management functions of configuration, tracing, and logging. Node management provides an on-line user configurator for easy initial configuration and reconfiguration without bringing down the HP 3000. Node management also delivers flexible event logging and the ability to selectively trace several levels of network software.

Product Requirements

- An HP Vectra, 150A, Touchscreen, Touchscreen II, IBM PC/AT/XT or PS/2 (for PC-HP 3000 links)
- An HP 3000 MICRO 3000 or Series 37XE, 39, 40, 42, 44, 48, 52, 58, 64, 68, 70
- An ATP (one port is needed for each link)
- MPE V/E Extended microcode firmware
- Modem (see supported modems for ATP in ATP data sheet)
- At least 2 Mbytes of memory (dependent on system load)

Hardware Components

HP Serial Network Link uses standard ATP hardware for connection to the HP 3000. (See ATP data sheet for additional detail.

Supported Modems

Supported Modems for HP 3000-to-HP 3000 Communication

The following modems are supported for Asynchronous Serial Network Links:

- 1200 Hayes (HP 92205A) or any other 1200 baud modem that is ATP-compatible
- 2400 Hayes (HP 92205B)
- 2400 U.S. Robotics Courier
- 1200 HP Remote Support Link modem (HP 37212A)
- 9600 Hayes SmartModem , V-Series

Supported Modems for PC-to-HP 3000 Communication

- HP internal modems for the Vectra
- HP internal modems for the HP Touchscreen
- Hayes Smart Modems (except Model 9600, V-Series)
- U.S. Robotics Courier 2400
- HP 37212A

Auto-dial capability is supported by the Hayes and U.S. Robotics modems.

Note: See supported modems for HP 3000-to-HP 3000 communication in ATP data sheet.

Network Capacity and Performance

Although data may be traveling through the network at a rate up to 9600 bits per second, the throughput achieved by a user may be lower. This is primarily due to the overhead of the software providing network services and the user's applications programs. Among the factors affecting user throughput are the type of software capability being used, the main memory and speed of each processor (and its peripherals) involved in the transfer, and the load on each system from non-network applications. Data transfer rates are enhanced with data compression which will give improved performance.

Because of the number and complexity of these factors, it is difficult to make useful generalizations about the performance or capacity of the network in a particular application. Hewlett-Packard Systems Engineers and Data Communications Specialists are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

Installation and Configuration Policy

The customer is responsible for loading the HP Serial Network software onto the system. Hewlett-Packard will install the Advanced Terminal Processor (ATP) and perform minimum configuration of HP Serial Network in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel on-site to install the ATP and perform minimum configuration of the HP Serial Network, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Verifying that any PCs to be used with the HP Serial Network link are properly installed and configured with the corresponding PC software prior to the installation of the HP Serial Network.
- Installing and verifying modems and phone lines for communication between HP 3000 systems and/or PCs using the HP Serial Network link.
- Obtaining a valid IP address prior to configuration of the HP Serial Network product.
- Updating the HP 3000 system to the proper release level and installing the HP Serial Network product software using AUTOINST. Refer to the HP 3000 Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge and network knowledge are available when HP is on-site to complete the installation and minimum configuration of the HP Serial Network product.

The customer is also responsible for completing the configuration in order to fully integrate the HP Serial Network product into the existing customer network after HP has completed the minimum configuration of HP Serial Network.

HP Responsibility
Following the installation of the software component of HP Serial Network, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the HP Serial Network to a minimum default configuration necessary to verify the software and hardware functionality. This includes configuring the ATP for the Asynchronous Serial Network Link into the system I/O configuration via SYSDUMP and configuring the link and Network Interface in the network configuration file (NSCONF) using the NMMGR utility.
- Verifying the HP Serial Network product configuration by issuing the NETCONTROL (and NSCONTROL, if necessary) start command for the asynchronous network link Network Interface (NI) and ensuring that a connection can be established from a PC or another HP 3000 system using this new HP Serial Network link.

These steps complete HP's portion of the installation and minimum configuration of the HP Serial Network product.

Additional Implementation Assistance
For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP 32003A Asynchronous Serial Network Link for HP 3000 MPE/V Series

Processor Options (must purchase ATP separately or use current ATP ports, if available).

310	For Tier 1 SPUs, one RTU/sublicense
020	For Tier 3 SPUs, one RTU/sublicense
030	For Tier 4 SPUs, one RTU/sublicense

Note: Please order ATP port controllers separately.

For specific information and product numbers on PC Links, Services, and Configuration and Diagnostic products, see the HP OfficeShare Network for Personal Computers data sheet.

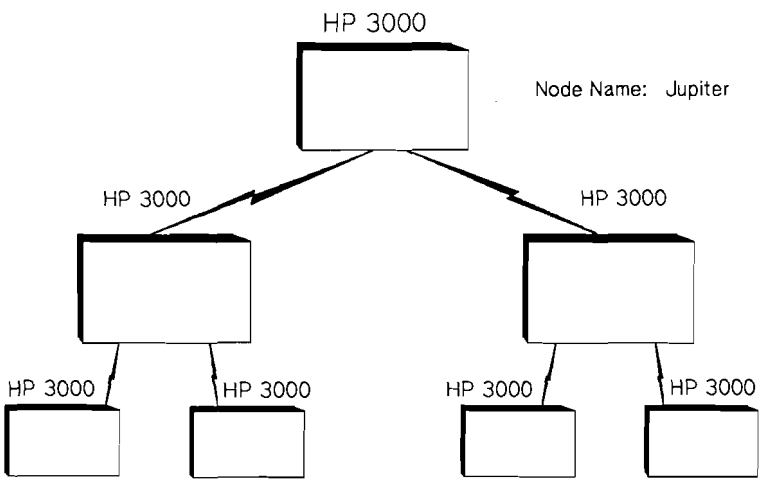
HEWLETT® PACKARD

NS Point-to-Point 3000/V Network Link

Technical Data

For HP 3000 Computer Systems Product Numbers HP 30284A and 30285A

The NS Point-to-Point Network Link for MPE V-based systems provides the network connection for an HP 3000 system to communicate with another remote HP 3000 over a leased line, switched manual dial line, or switched auto dial line. The communication link provides programmatic access between HP 3000 systems or can be used in conjunction with NS3000/V Network Services software (P/N 32344A) for higher level user services such as Network File Transfer, Virtual Terminal and Remote Data Base Access. The NS Point-to-Point 3000/V Link includes the protocol management software through OSI level 5, a hardware interface card (INP), and cables.



Features

- Offers improved performance over DS Point-to-Point Network Link (30271A).
- Implements industry-standard Defense Advanced Research Projects Agency (DARPA) TCP/IP protocols from the transport and network layer functions of the ISO Reference Model.
- Provides packet routing for transparent access over multiple nodes.
- Provides gateway capability for transparent access between networks.
- Includes integrated node management software for on-line configuration and logging.
- Provides Network InterProcess Communication (NetIPC) for design of distributed applications.
- Supports LAPB protocol, an OSI standard for full-duplex line communication.
- Supports bisynchronous communication protocol for half-duplex line communication.

- Uses Intelligent Network Processor (INP) hardware for support of line speeds up to 56 Kbps.

Functional Description

The NS Point-to-Point 3000/V Link provides the communication link that enables an HP 3000 to communicate with a remote HP 3000 over a modem or by a direct hardwired connection. This link product provides programmatic access to network communication through a set of Network Interprocess Communications (NetIPC) intrinsics. Distributed applications can be written with NetIPC allowing autonomous processes running concurrently on different nodes to exchange information in an efficient, peer-to-peer manner.

This product may also be used in conjunction with NS3000/V Network Services software. The link product provides the hardware and software necessary to pass data between connected CPUs. The NS3000/V Network Services software provides the user level services to perform functions such as Network File Transfer, Virtual Terminal, Remote Database Access, Remote File Access, and Remote Process Management.

Users do not need to know the network topology. This transparency means that the user simply specifies the destination node name for access to another CPU on the same network or for access to a remote CPU on a different network.

Functional Specifications

NS Point-to-Point 3000/V Network Link, utilizing the bisynchronous protocol, is supported to work with all half-duplex and full-duplex modems which work with the DS Point-to-Point Modem Link in the half-duplex mode. Full-duplex modems which work with the DS Point-to-Point Modem Link in the half-duplex mode. Full-duplex modems which work with the DS Point-to-Point Modem Link in full-duplex mode will not work with the NS Point-to-Point 3000/V Network Link utilizing the bisync protocol. The proper migration path from DS to NS in this situation is to NS Point-to-Point 3000/V Network Link utilizing the (full-duplex) LAP-B protocol.

The following is the list of half-duplex modems which have been verified by HP to work with the NS Point-to-Point 3000/V Network Link utilizing the bisync protocol:

AT&T 201C (Dataphone 2400)
AT&T 208B (Dataphone 4800)

AT&T Dataphone II 2248A
AT&T Dataphone II 2296A
Codex 2260
Codex 2264

The following is the list of full-duplex modems which have been verified by HP to work with the NS Point-to-Point 3000/V Network Link utilizing the LAP-B protocol:

AT&T 201C (Dataphone 2400)
AT&T 209A (Dataphone 9600)
AT&T Dataphone II 2024A
AT&T Dataphone II 2048A
AT&T Dataphone II 2096A
AT&T Dataphone II 2248A
AT&T Dataphone II 2296A
AT&T Dataphone II 2556 DSU
AT&T Dataphone II 2596 DSU
Codex 2260
Codex 2264 Codex 2620
Codex 2640
Codex 2660
Codex 2680
GTE L500A DSU (2400 to 9600)
GTE L500A DSU (56,000)

The following modem support is provided with NS Point-to-Point 3000/V Network Link:

Modem Migration from DS/V Point-to-Point to NS/V Point-to-Point

Mode of Operation	DS Point-to-Point	NS/V Point-to-Point	
		BISYNC	LAP-B
Half-duplex	YES	YES	NO
Full-duplex	YES	NO	YES

Product Components

Hardware

The NS Point-to-Point 3000/V link product includes the hardware interface card and 10-meter (33 feet) cable for connection to the user's modem. (Users with hardwired configurations must order direct cables separately.) The interface is the Intelligent Network Processor (INP). The INP microprocessor performs all of the communication data link protocol, thus relieving the HP 3000 of that task. Its architecture accommodates various protocols, interfaces and line speeds between 1200 bps to 56 Kbps.

Software

Two level 2 protocols are supported, LAPB and bisynchronous. LAPB is an OSI level 2 standard. It ports full-duplex transmission thereby eliminating line turn-around time. This higher performance, OSI-based protocol is the preferred implementation. The bisynchronous protocol is provided for backward compatibility and for those installations that are restricted to the use of half-duplex modems.

The network transport software implements de facto industry-standard Defense Advanced Research Projects Agency (DARPA) TCP/IP protocols. TCP/IP follows the ISO Reference Model specifying the transport and network layers.

Product Requirements

- An HP 3000 MICRO 3000, MICRO 3000XE/LX/GX, Series 37, 39, 4x, 5x, 6x, 70.
- Uses a single INP slot.
- MPE VE-Extended microcode firmware.
- At least 2 MBytes of memory. (Generally, systems that are now memory limited should add 1 MByte to maintain current performance.) See your HP System Engineer to help determine your requirements.

Migration from DS Point-to-Point Network Link

The NS Links and Services are HP's new generation of communication products, providing enhanced capabilities over that of the DS Links and Services. Customers with DS products currently installed are encouraged to migrate their networks to the NS product line. When planning this migration, both services and link products need to be considered.

The NS3000/V Network Services are a superset of the DS Services. User applications written using DS Services will run with little modification under NS3000/V Network Services. In addition, DS Link products will run with the NS3000/V Network Services though only DS-compatible services are supported in this configuration. To take advantage of the enhanced capabilities of NS3000/V Network Services, users should upgrade to the NS Point-to-Point 3000/V Link.

The NS Link product conforms to layers 1 through 5 of the OSI seven layer model. The DS Link product predates the OSI model and therefore has a different architecture from the NS Link product. As a consequence of these architectural differences, DS point-to-point and NS point-to-point cannot communicate with each other.

NS and DS point-to-point links can, however, coexist on the same node. The NS Point-to-Point 3000/V Link can therefore be added to networks that currently contain DS link products.

It is recommended that users establish a migration plan working with an HP Network Consultant or Datacom specialist.

Installation and Configuration Policy

The customer is responsible for loading the NS Point-to-Point 3000/V Network Link software onto the system.

Hewlett-Packard will install the Intelligent Network Processor (INP) and provide connection to the customer's communication line (provided the line is available at installation), and will perform minimum configuration of the NS Point-to-Point 3000/V Network Link in order to verify minimum product functionality. These activities are included in the product purchase price.

Customer Responsibility

Prior to having HP personnel on-site to install the INP and perform minimum configuration of the NS Point-to-Point 3000/V Network Link, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Installing and verifying modems and phone lines for communication between HP 3000 systems using the NS Point-to-Point 3000/V Network Link.
- Obtaining a valid IP address prior to configuration of the NS Point-to-Point 3000/V Network Link.
- Updating the HP 3000 system to the proper release level and installing the NS Point-to-Point 3000/V Network Link software using AUTOINST. Refer to the HP Software Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge and networking knowledge are available when HP is on-site to complete the installation and minimum configuration of the NS Point-to-Point 3000/V Network Link.

The customer is also responsible for completing the configuration in order to fully integrate the NS Point-to-Point 3000/V Network Link into the existing customer network after HP has completed the minimum configuration of the NS Point-to-Point 3000/V Network Link.

HP Responsibility

Following the installation of the software component of the NS Point-to-Point 3000/V Network Link, HP is responsible for the following:

- Installing, verifying and connecting the Intelligent Network Processor (INP) card for the NS Point-to-Point 3000/V Network Link to the customer's modem.
- Confirming all of the necessary software modules have been installed and are at the correct version level.
- Configuring the NS Point-to-Point 3000/V Network Link to a minimum default configuration necessary to verify the software and hardware functionality. This includes configuring the INP for use by the NS Point-to-Point 3000/V Network Link into the system I/O configuration via SYSDUMP, and configuring the link and the Network Interface (NI) in the network configuration file (NSCONF) using the NMMGR utility.
- Verifying the NS Point-to-Point 3000/V Network Link configuration by issuing the NETCONTROL (and NSCONTROL, if applicable) start command for the NS Point-to-Point 3000/V Network Link NI, and ensuring that a connection can be established with another HP 3000 system using this new NS Point-to-Point 3000/V Network Link.

These steps complete HP's portion of the installation and minimum configuration of the NS Point-to-Point 3000/V Network Link.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

The NS Point-to-Point 3000/V Link may be used as a stand-alone product, or with intrinsic access from NS3000/V Network Services (32344A).

HP 30284A: NS Point-to-Point 3000/V Link for HP 3000 Series 37 and MICROS. Compatible with NS3000/V Network Services (HP 32344A). Requires selection of one hardware/cable option or one software option.

Hardware Options (HP 30284A)

110 Connection to synchronous modem
120 Connection to V.35 digital phone network
125 Connection to synchronous modem with autocall
810 Add-on INP with connection to synchronous modem
820 Add-on INP with connection to V.35 network
825 Add-on INP with connection to synchronous modem with autocall
190 For Series 37, software only

Upgrade Options (HP 30284A)

150 DS upgrade credit with purchase of H2355A
151 DS Upgrade credit

HP 30285A: NS Point-to-Point 3000/V Link for HP 3000 Series 39 through 70. Compatible with NS 3000/V Network Services (HP 32344A). Requires selection of one hardware/cable option or one software option.

Hardware Options (HP 30285A)

190 For Series 37, software only
310 For Series 39–42, 52 connection to synchronous modem
320 Series 39–42, 52 connection to V.35 digital phone network
325 For Series 39–42, 52 connection to synchronous modem with autocall
390 For Series 39–58, no hardware
410 For Series 44, 48, and 58–70 connection to synchronous modem
420 For Series 44, 48, and 58–70 connection to V.35 digital phone network
425 For Series 44, 48, and 58–70 with connection to synchronous modem with autocall
490 For Series 70, no hardware
610 Series 37, MICROS, add-on INP with synchronous modem
710 Series 38–42, 52, add-on INP with synchronous modem connection for Series 39 through 42 and 52
720 Series 39–42, 52, Add-on INP with V.35 digital phone network connection
725 Series 39–42, and 52, add-on INP with synchronous modem with autocall connection
810 Series 44, 48, and 58–70, add-on INP with synchronous modem connection
820 Series 44, 48, and 58–70, add-on INP with V.35 digital phone network connection
825 Series 44, 48, and 58–70, add-on INP with synchronous modem connection with autocall

Software Options (HP 30285A)

390 Series 39 through 58 software only, no hardware
490 Series 6x and 70 software only, no hardware

Upgrade Options (HP 30285A)

350 DS Upgrade credit with purchase of H2355A
350 DS Upgrade credit
45x DS upgrade credit options for Series 44, 48, and 58 through 70

Cables

30224L External Interconnect Cable (must also order 30224B/C). Required for HP 3000-to-HP 3000 direct hardwired connection.
30224B/C Direct Connect Cable (must also order 30224L). Required for HP 3000-to-HP 3000 direct hardwired connection.

Support Products

30284A+S00 Software Material Subscription (SMS) for NS Point-to-Point 3000/V Link for MICRO 3000, MICRO 3000XE/LX/GX, and S/37
30285A+S00 Software Material Subscription (SMS) for NS Point-to-Point 3000/V Link for S/39—S/70
30284A+W00 Extended SMS for NS Point-to-Point 3000/V Link for MICRO 3000, MICRO 3000XE/LX/GX and S/37
30285A+W00 Extended SMS for NS Point-to-Point 3000/V Link for S/39-S/70

Response Center Support and Account Management Support customers must also order the appropriate Data Communication Category support, if it has not already been purchased. A given category need be purchased only once for all products in that category.

Customers with hardware support agreements must add the appropriate level of coverage (SMCC or BMMC) for the NS Point-to-Point 3000/V Link product to their support agreement.

Documentation

The following manual is included with the product:

Intelligent Network Processor (INP) Installation and Service Manual
(P/N 30244-90002—MICRO, S/37) or
(P/N 30020-90005—S/39-S/70)

HEWLETT® PACKARD

NS X.25 3000/V Network Link

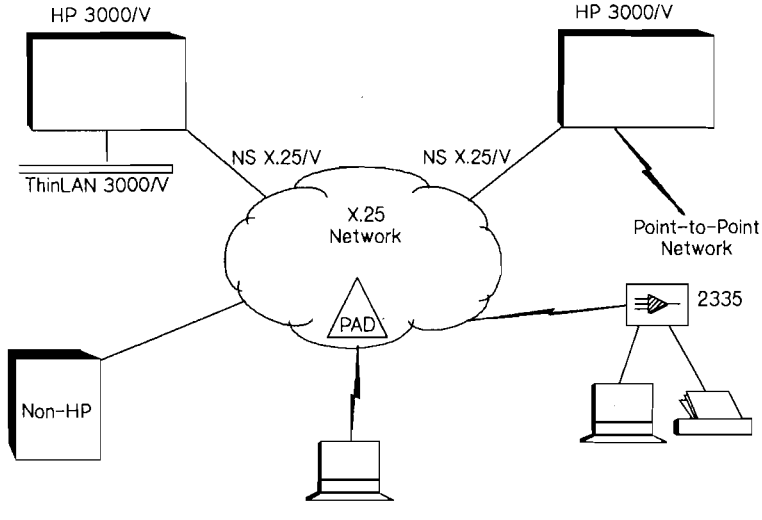
Technical Data

Product Number
HP 24405A

The NS X.25 3000/V Network Link for HP 3000 systems provides a connection to a public or private X.25 Packet-Switched Network (PSN).

Used in conjunction with the NS 3000/V Network Services (HP 32344A), the NS X.25/V link supports communications between HP systems. By itself, the NS X.25/V link supports communications between an HP 3000 host system and remote terminals and printers connected to a Packet Assembler/Disassembler (PAD).

In addition, the NS X.25/V link provides programmatic access to packet level 3. This allows users to develop their own protocols and services for communications with remote HP or non-HP systems over an X.25 network.



Features

- Fully supports the NS 3000/V Network Services (HP 32344A).
- Follows an OSI layered architecture.
- Implements industry-standard DARPA TCP/IP protocols.
- Implements the 1980 CCITT recommendations for X.25/X.3/X.28/X.29.
- Complies with the U.S. DDN TCP/IP-X.25 standards.
- Provides programmatic user access to the X.25 packet level for multivendor or customer-designed communications.
- Provides packet routing and gateway capabilities for transparent access over multiple nodes and between networks.
- Provides X.25 user facilities such as flow control, throughput class negotiation, closed user groups, and one-way/two-way virtual circuits.
- Implements DTE/DCE modes for connection over public and private X.25 networks, leased and direct hardwired lines.

- Dial-up terminal access over PSNs via a network PAD to a host HP 3000 computer system. Supports both character mode and HP VPLUS applications.
- Remote terminal cluster access via an HP 2334A/5A PAD using a single leased line over a PSN to a host HP 3000 computer system. Supports both character mode and VPLUS applications.
- Supports HP printers on an HP 2334A/5A PAD.
- Supports both system-to-system and system-to-terminal communications over a single X.25 link on the HP 3000.

Functional Description

An HP 3000 computer with the NS X.25/V link installed is capable of both originating calls to and receiving calls from other computers over an X.25 network. It can be configured as either Data Terminal Equipment (DTE) or Data Circuit-terminating Equipment (DCE) to run over a public or private X.25 network at speeds up to 56 Kbps.

Additional features of the NS X.25/V link include the ability to multiplex multiple sessions between two HP 3000 computers over one virtual circuit, as well as disconnecting virtual circuits after an inactivity time-out.

NS 3000/V System Communications
NS 3000/V Network Services (HP 32344A) used in conjunction with the NS X.25/V link enables HP 3000 computers to communicate to remote HP 3000 computers over public or private X.25 PSNs and direct connect lines. Users have access to services such as Network File Transfer, Virtual Terminal Access, Remote Database Access, and Remote File Access.

The NS X.25 3000/V link implements the Defense Advanced Research Projects Agency (DARPA) standard Transmission Control Protocol (TCP) at the transport level 4. This layer is also used by the other NS network links, making the network topology transparent to end-users and applications.

Moreover, HP 3000 computers that are configured with connections to an X.25 network and to an 802.3 local area or point-to-point network are capable of transparently routing data between HP 3000 computers on any of these networks. This is accomplished by the implementation of DARPA Internet Protocol (IP) network level 3 on all NS 3000/V network links.

System-to-Dial-Up Terminal
The X.25 communications software allows asynchronous terminals to communicate with HP 3000 computers via the X.3/X.28/X.29 conventions. X.25 allows users at remote sites to access and communicate with any HP 3000 connected to an X.25 PSN through the NS X.25/V link. The remote terminal connects to the X.25 network through a PAD, usually by a local phone call, and then attaches to any HP 3000 computer system connected to the network through the NS X.25/V link. Both character mode and applications using HP VPLUS block mode are supported over the system-to-PAD terminal connection. For a current list of supported HP software subsystems, consult your local Hewlett-Packard Sales Representative.

System-to-Remote Terminal/Printer Cluster
For applications where there are a number of terminals at a single remote location, the HP 2334A/5A allows up to 16 asynchronous RS-232 point-to-point devices to communicate over a single X.25 leased line, with an HP 3000 computer system connected to a PSN through an NS X.25/V link. Both character mode and HP VPLUS block mode are supported on HP terminals at a maximum baud rate of 9600.

Printers are supported as either spooled or non-spooled. Please see the HP 2334A/5A- X.25 Multiplexer data sheet for additional information.

Programmatic Access

The link also provides programmatic access to X.25 packet level 3 to establish communications with remote HP or non-HP applications. The programmatic interface, Network InterProcess Communications (NetIPC), provides this capability independently of the remote computers' protocols. It consists of routines that are accessible from FORTRAN, Pascal, COBOL, and SPL programs, and can manage data transfers (send and receive), connection states (setup and disconnection), and error conditions.

X.25 Packet Level Capabilities

The X.25 packet level 3 applications can handle parameters and elements such as: Permanent Virtual Circuits (PVC), two-way and one-way (incoming and outgoing), Switched Virtual Circuits (SVC) Data, interrupt and reset packets, D-bit and Q-bit Call User Data (CUD), cause and diagnostics fields, Calling DTE address Deferred calls, X.25 user facility sets.

Local User Group (LUG) is available as a system-configurable address table to secure access to and from remote DTEs.

X.25 User Facilities (1980)

The CCITT X.25 (1980 update) recommendation includes a variety of facilities that provide the user with a high degree of flexibility in operating the link.

Flow control, which is defined by parameters such as packet size, window size, and throughput class can be modified on a virtual circuit basis for a given destination address. Closed User Groups (CUG) restrict the access to or from an X.25 public network to a list of X.25 addresses. These are user-defined and managed by the network administration. This facility is complemented by the LUG host-based security mechanism. Virtual circuits can be configured to accept one-way or two-way traffic, thus enabling the HP 3000 computer to initiate or accept calls, or a combination of both.

Other X.25 user facilities are listed below:

Supported X.25 Network Parameters

Level 1

- X.21 bis (RS-232-C) and V.35

Level 2

- LAP-B protocol
- Modulo 8 frame sequence numbering
- Window sizes: 1-7
- Frame sizes: as required for level 3 packet sizes

Level 3

- Switched Virtual Circuits (SVC) Permanent Virtual Circuits (PVC) for X.25 packet level 3 applications only
- End-to-end acknowledgement (D-bit) for X.25 packet level 3 applications only
- Qualifier bit (Q-bit) for X.25 packet level 3 applications only
- Maximum 128 Virtual Circuits
- Modulo 8 packet sequence numbering
- Window sizes: 1-7
- Packet sizes: 16-1024 bytes
- Throughput classes: 7 to 13

Facility Name	CCITT X.25 Reference
Non-standard default window sizes	7.1.2
Default throughput classes assignment	7.1.3
One-way logical channel outgoing	7.1.7
One-way logical channel incoming	7.1.8
Closed user group	7.1.9
Closed user group with outgoing access	7.1.10
Closed user group with incoming access	7.1.11
Reverse charging	7.1.16
Reverse charging acceptance	7.1.17
Non-standard default packet sizes	7.2.1
Flow control parameter negotiation	7.2.2
Throughput class negotiation	7.2.3

Supported HP Terminals and Personal Computers

The following terminals are supported for connection to a host HP 3000 computer via PAD using the NS X.25 3000/V Link:

HP 150	Vectra
HP 2392A	Vectra Model CS
HP 2393A	Vectra Model ES
HP 2394A	Vectra Model ES/12
HP 2397A	700/92 700/94

Supported Printers

The following printers are supported for connection to the HP 2334A/5A:

HP 2601A, HP 2602A, HP 2631B, HP 2563A, HP 2932A, HP 2933A, HP 2934A, HP 2686A/D, HP 2687A (formatting capabilities not supported)

Certified X.25 Packet-Switched Networks

In addition to the HP Private Packet Network (HP PPN), the following public PSNs have certified the NS X.25 3000/V link. The list is current as of January 1990. Please consult your HP Sales Representative for an updated list of certified PSNs.

Country	Network
Austria	Datex-P
Belgium	DCS
Canada	Datapac
Denmark	Datapak
Finland	Datapak
France	Transpac
Germany	Datex-P
Ireland	Eirpac
Israel	Isranet
Italy	Itapac
Luxembourg	Luxpac
Netherlands	Datanet 1
Norway	Datapak
Sweden	Datapak
Switzerland	Telepac
United Kingdom	PSS
United States	DDN standard
United States	Telenet
United States	Tymnet

Product Components

Hardware

The NS X.25/V link includes the hardware interface card and cable for connection to the user's modem. (Users with direct hard-wired configurations must order external interconnect cables separately.) The interface is the Intelligent Network Processor (INP), a 16-bit microprocessor board that performs all of the communication data link protocol, thus relieving the HP 3000 of that task.

The maximum speed at which the HP 3000 communicates with the PSN depends upon the speeds supported by the PSN and the physical link between the HP 3000 and the PSN. The NS X.25/V link supports data transmission speeds from 1200 bps to 19.2 Kbps for RS-232 connections or from 19.2 Kbps to 56 Kbps for V.35 connections.

Software

The transport level utilizes DARPA standard Transmission Control Protocol (TCP). TCP provides end-to-end transport and multiplexing on virtual circuits. DARPA Internet Protocol (IP) provides the internetting capability between networks. At the packet level, CCITTs 1980 Recommendation for X.25 provides virtual circuit connection and control, packet formatting, and packet exchange. The Network InterProcess Communications (NetIPC) interface is used for intrinsic access to the X.25 packet level.

The LAP-B link level software provides a full-duplex communication connection between the DTE computer and the network DCE device.

Additional software is included for nodal management, configuration, logging, and diagnostics.

Product Requirements

- An HP 3000 MICRO 3000, MICRO 3000XE, LX, GX, Series 37, 39 through 70
- Uses a single INP slot
- MPE V/E Extended microcode firmware
- At least 2 Mbytes of memory (Generally, systems that are now memory limited should add 1 Mbyte to maintain current system performance.)

Migration from the DS/X.25/3000 Link

The NS Links and Services are HP's new generation of communication products, providing enhanced capabilities over that of the DS Links and Services. User applications written using the DS Network Services require little modification to run over the NS 3000/V Network Services.

The NS X.25/V link conforms to layers 1 through 4 of the OSI seven-layer model. DS X.25 predates the OSI model and therefore has a different architecture than NS X.25/V. As a consequence of these architectural differences, DS X.25 and NS X.25/V links cannot communicate directly with each other. However, both

the DS X.25 and the NS X.25 link software can coexist on the same node and share an INP for connection to the X.25 network. As a result, NS X.25 network migration can be phased in while maintaining full network connectivity. A migration planning guide can be ordered with the NS X.25/V link for use in planning each customer's move to an NS-based network.

Customers using Telenet Public PAD access should contact their HP Systems Engineer for information on migration considerations.

Additional assistance is available with the purchase of the HP Network Support products.

Installation and Configuration Policy

The customer is responsible for loading the NS X.25 3000/V Network Link software onto the system. Hewlett-Packard will install the Intelligent Network Processor (INP) and provide connection to the customer's communication line (provided the line is available at installation), and will also perform minimum configuration of NS X.25 3000/V Network Link in order to verify minimum product functionality. These activities are included in the product purchase price.

Customer Responsibility
Prior to having HP personnel onsite to install the INP and perform minimum configuration of the NS X.25 3000/V Network Link, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System Configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Installing and verifying the communication line between the HP 3000 system and the X.25 network. When necessary, subscribing to the appropriate administration for access to the public PSN.
- Obtaining a valid IP address prior to configuration of the NS X.25 3000/V Network Link.
- Updating the HP 3000 system to the proper release level and installing the NS X.25 3000/V Network Link software using AUTOINST. Refer to the HP 3000 Update Manual (P/N 32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge and networking knowledge are available when HP is onsite to complete the installation and minimum configuration of the NS X.25 3000/V Network Link.

The customer is also responsible for completing the configuration in order to fully integrate the NS X.25 3000/V Network Link into the existing customer network after HP has completed the minimum configuration of the NS X.25 3000/V Network Link.

HP Responsibility
Following the installation of the software component of the NS X.25 3000/V Network Link, HP is responsible for the following:

- Installing, verifying, and connecting the Intelligent Network Processor (INP) card for the NS X.25 3000/V Network Link to the customer's communication line.
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the NS X.25 3000/V Network Link to a minimum default configuration necessary to verify the software and hardware functionality on the local node. This includes configuring the INP for use by the NS X.25 3000/V Network Link into the system I/O configuration via SYSDUMP, and configuring the link and Network Interface (NI) in the network configuration file

(NSCONF) using the NMMGR utility.

- Verifying the NS X.25 3000/V Network Link configuration by issuing the NETCONTROL start command for the NS X.25 3000/V Network Link NI, and performing an NS X.25 3000/V offline network loopback between the HP 3000 and the X.25 network.

These steps complete HP's portion of the installation and minimum configuration of the NS X.25 3000/V Network Link.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP 24405A NS X.25 3000/V Network Link

Hardware Options

110 For Series 37, MICROs—RS-232 synchronous modems
120 For Series 37, MICROs 3000—V.35 synchronous modems
135 For Series 37, MICROs—direct connections (see 30224L below)
310 For Series 39–58 for RS-232 synchronous modem connect
320 For Series 39–58 for V.35 synchronous modems connect
335 For Series 39–58 for direct hardwired connections (see 30224L below)
410 For Series 64, 68, and 70 for RS-232 synchronous modems
420 For Series 64, 68, and 70 for V.35 synchronous modems
435 For Series 64–70 for direct hardwired connections (see 30224L below)

HP 30224L External Interconnect cable (required for hardwired connections)

Upgrade Options

150 DS Upgrade credit with purchase of H2355A
151 DS Upgrade credit
350 DS Upgrade credit for Series 39–58 with H2355A
351 DS Upgrade credit for Series 39–58
450 DS Upgrade credit with purchase of H2355A
151 DS Upgrade credit

Software Only Options

190 For Series 37, MICROs, software only
390 For Series 39–58, software only
490 For Series 64–70, software only

Documentation

The hardware and software options all include both the link (24405-90002) and INP (30244-90002/30020-90005) guides. Additional documentation options are required only as indicated below.

001 NS 3000/V Services documentation (required for NS X.25/V link configuration, but only if the link will be used without the NS 3000/V Services)
002 DS X.25 to NS X.25 Migration Guide
003 NetIPC Programmer Kit (documents programmatic access features)

Support Products

24405A+S00 Software Materials Subscription (SMS)
24405A+W00 Extended SMS

Response Center Support and Account Management Support customers must also order the appropriate Data Communications Category support, if it has not already been purchased. A given category need be purchased only once for all products in that category.

Customers with hardware support agreements must add the appropriate level of coverage (SMMC or BMMC) for the NS X.25/V link to their support agreement.

Documentation

NS X.25 3000/V Network Link:

24405-90002 NS X.25 3000/V Link Guide
30244-90002 (MICRO, S/37) or 30020-90005 (S/39-70) Intelligent Network Processor (INP) Installation and Service Manual

NS 3000/V Network Services:

32344-90001 NS 3000/V User/Programmer Reference Manual
32344-90002 NS 3000/V Network Manager Reference Manual, Volume I
32344-900012 NS 3000/V Network Manager Reference Manual, Volume II
32344-90005 NS 3000/V Error Message and Recovery Manual
5958-8581 NetiPC 3000/V Programmer's Reference Manual

DS X.25-to-NS X.25 Migration:

24405-90001
DS X.25-to-NS X.25 Migration Guide

HEWLETT® PACKARD

X.25 iX Network Link

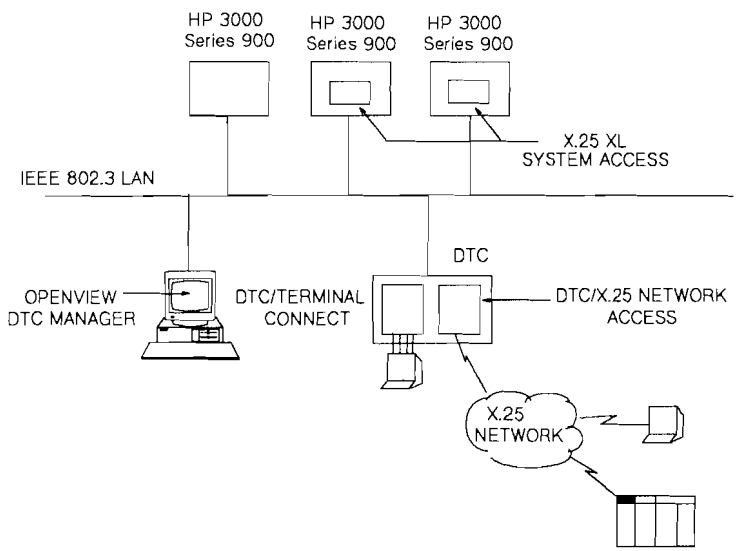
Technical Data

For HP 3000 Series 900 Computer Systems
Product Numbers
HP 2340A, 2343D, 2345A, 2346D/E/F/G, D2355A, 36939A

The iX Network Link for HP 3000 Series 900 computers is a high-performance networking solution that provides Hewlett-Packard customers access to public and private X.25 packet-switching networks. It features extensive communications capabilities with remote HP 3000 hosts and asynchronous PAD (Packet-Assembler/Disassembler) devices.

The X.25 iX Network Link functions with the Datacommunications and Terminal Controller (DTC) to provide customers with high-performance remote communications. The X.25/iX Network Link offers a range of line speeds and connections depending on the DTC. The DTC16/X.25 iX Network Link provides a solution for customers with less extensive communications needs. The DTC48/iX Network Link provides a solution for customers having higher connectivity needs.

The same DTC being used for X.25 and PAD functionality can also be used for multivendor, multisystem terminal server connectivity, providing customers with an integrated communications solution. (Please refer to the "Datacommunications and Terminal Controller" data sheet for more information.)



Based on industry standards, the X.25 iX Network Link is an integral part of the HP AdvanceNet strategy for multivendor communications. It also provides a programmatic interface for software developers needing to access non-HP devices.

The X.25 iX Network Link achieves high-performance networking by offloading protocol processing from the HP 3000 Series 900 host to an optimized DTC/X.25 Network Access card (in the DTC). This LAN-based design allows

multiple Series 900 hosts to share the same X.25 line, making cost-effective use of the X.25 network subscription.

A single operator can manage X.25 connections through the use of a PC-based HP OpenView Windows Workstation. HP OpenView Windows provides an easy-to-use advanced graphics user interface that simplifies the management of multiple DTCs.

X.25 iX Network Link Benefits and Features

Extensive host-to-host communications:

- Full support of NS Services (36920A) and ARPA FTP (36957A) for communications to remote computers across public and private X.25 networks.
- SNA connectivity for HP 3000-to-IBM communications with SNA/X.25 Link/iX, a software product that enables HP SNA Services to be supported over an X.25 network. Please refer to the "SNA/X.25 Link/iX" data sheet for more information.
- Programmatic access to X.25 level 3 and TCP level 4 for program development of special applications such as HP to non-HP communications.
- Packet routing and gateway capabilities to IEEE 802.3 or point-to-point subnetworks, achieving higher network transparency.

Cost-effective terminal-to-host communications:

- Cost-effective solution for remote PAD terminal and printer access to HP 3000 Series 900 computers.
- Support of character mode and VPlus block mode applications.

In addition to providing PAD terminal access to the HP 3000 Series 900 computers, the X.25 Network Access card provides PAD terminal access to HP 3000 MPE V systems (with DTC Extended Switching or TELNET), HP 9000 systems (with TELNET), or non-HP systems (with TELNET). The incoming PAD call is processed in the DTC. Depending on the designated system, the DTC will either send out an optimized LAN packet to the HP 3000 Series 900, or will send out a TELNET package to the HP 3000 MPE V, HP 9000, or non-HP system.

Note: If using a DTC48 for this multivendor PAD access, a memory upgrade (HP 2348A) to the DTC48 is needed. This upgrade is only needed if the DTC date code is less than 3110. Please refer to the "Datacommunications and Terminal Controller" data sheet for more information on these configurations.

Adherence to standards:

- Open Systems Interconnect (OSI) layered architecture.
- Standard CCITT 1980 and 1984 version of X.25 and 1980 and 1984 versions of X.3/X.28/X.29, and Defense Advanced Research Projects Agency (DARPA) TCP/IP protocols.
- Compliance with Defense Data Network (DDN) specifications.

High performance:

- High system connectivity with up to 11 X.25 Network Interfaces (NI) and 1024 virtual circuits per HP 3000 Series 900 host.
- 32 Series 900 hosts can share one DTC/X.25 Network Access card.
- Reduced CPU overhead due to X.25 and PAD protocol processing on the DTC.
- In addition, multiple cards (either in the same DTC48 or in multiple DTC16s) are supported for a single IP address for higher throughput and redundancy. This requires MPE iX Release 2.2 or later.
- Up to 60 X.25 iX Network Links can be managed by a single HP OpenView Windows Workstation.

Flexible solution:

- Based on connectivity requirement, customers can choose to use either a DTC48 or DTC16.
- Up to 3 DTC48/X.25 Network Access cards are supported per DTC48. The DTC48/X.25 Network Access card provides line speeds up to 64 Kbps with a total of 256 virtual circuits per card. Utilizing the maximum 3 cards, a total of 768 Virtual circuits are available per DTC48.
- 1 DTC16/X.25 Network Access card is supported per DTC16. The DTC16/X.25 Network Access Card supports line speeds up to 19.2 Kbps with 32 virtual circuits per card.

Note: The DTC48 cannot support both a X.25 Network Access card and an HP ARPA Telnet Access Card. Please refer to the "HP ARPA Services/iX" data sheet for more information.

Ease of use:

- Easy-to-use graphical user interface, based on HP OpenView Windows (32048A) for DTC management, providing better efficiency for network operators.

High access security:

- PAD terminal and X.25 host access security.

X.25 iX Network Link Components

The X.25 iX Link for HP 3000 Series 900 computers is a networking solution based on the multivendor Datacommunications and Terminal Controller hardware and software. It includes:

- DTC/X.25 Network Access
- X.25 iX System Access
- HP OpenView DTC Manager

DTC/X.25 Network Access card resides in the DTC (either DTC16 or DTC48), and is used to process the X.25 protocols. The necessary software is downloaded to the DTC across the IEEE 802.3 Local Area Network from the HP OpenView DTC Manager, which controls the entire DTC from an HP OpenView Windows Workstation.

DTC/X.25 Network Access card allows connections to be established with HP 3000 Series 900 hosts across the IEEE 802.3 LAN, using HP optimized protocols for maximum efficiency. In this way, it provides cost-effective Series 900 host access to remote X.3/X.28/X.29 PAD users. When used in conjunction with X.25 iX System Access and NS Services or ARPA FTP, it features extensive host-to-host communications across X.25 public and private packet-switching networks.

Functional Description of DTC/X.25 Network Access Card

DTC/X.25 Network Access card is a high-performance VLSI card that implements 1980 and 1984 CCITT X.25 protocols at levels 1, 2, and 3, as well as 1980 CCITT X.3/X.28/X.29 PAD protocols. The DTC16/X.25 Network Access card supports signaling rates up to 19.2 Kbps. The DTC48/X.25 Network Access supports signaling rates up to 64 Kbps.

The DTC is a modular device that can accommodate both asynchronous and X.25 connections. The DTC16 accommodates 1 DTC16/X.25 Network Access card. This same DTC16 can also accommodate up to 2 asynchronous connector cards, which allow local and remote asynchronous connections for terminals and printers.

The DTC48 can accommodate up to 3 DTC/X.25 Network Access cards. This same DTC can also accommodate several asynchronous connector cards, which allow local and remote asynchronous connections for terminals and printers.

Note: DTC48/X.25 Network Access Cards and DTC16/X.25 Network Access Cards are not interchangeable.

In a configuration without X.25 iX System Access, the DTC/X.25 Network Access allows remote X.3/X.28/X.29 PAD terminals and printers to exchange data with any HP 3000 Series 900 computer on the LAN, as configured by the HP OpenView DTC Manager. Consequently, remote PAD users can have direct logon access to any HP 3000 Series 900 host. Access can be either direct, to a single host, or user-selectable to any host on the LAN, through the DTC user interface.

Connectivity of remote X.3/X.28/X.29 PAD terminals to DTC/X.25 Network Access can be restricted using PAD access lists. These lists are configured by the HP OpenView DTC Manager, and restrict user access to a predefined list of HP 3000 Series 900 hosts, based on the calling X.25 address. Security on remote X.25 host access is implemented with the Local User Group utility, which filters incoming and outgoing calls based on the calling and called X.25 address, respectively.

DTC48/X.25 Network Access Specifications

- Up to 32 local HP 3000 Series 900 hosts supported per DTC/X.25 Network Access card.
- Up to three DTC/X.25 Network Access cards supported per DTC.
- Each DTC/X.25 Network Access card is able to support up to 256 Switched or Permanent Virtual Circuits (VC). Each card can support the following:
  - 256 VCs for packet sizes up to 512
  - 150 VCs for packet sizes up to 1024
  - 100 VCs for packet sizes up to 2048
  - 54 VCs for packet sizes up to 4096
- CCITT 1980 and 1984 X.25 and compliant with CCITT 1980 and 1984 X.3/X.28/X.29 PAD Protocols.
- Compliance with standard Defense Data Network (DDN) specifications.
- Acceptance of all 1984 X.25 user and DTE facilities for host-to-host connections for processing at the NS X.25/iX level.
- Closed User Groups (CCITT 1980) supported with PAD access.
- X.25 level 3 parameters:
  - Modulo 8 sequence numbering
  - Window sizes: 1-7
  - Throughput classes: 7-12 (speeds up to 64 Kbps)
  - D-Bit and Q-bit
  - Switched Virtual Circuits
  - Permanent Virtual Circuits for X.25 packet level 3 applications only
- Packet sizes 32-4096.
- LAP-B level 2 parameters: -Modulo 8 or 128 frame sequence numbering -Window sizes: 1-7 -Frame sizes as required by level 3.
- PAD Parameters - Supported packet sizes of 128, 256, and 512.
- PAD support for HP 3000 Series 900 systems connected to the same LAN as the DTC.
- PAD support for HP 3000 MPE V, HP 9000, and non-HP systems (through DTC Extended switching and TELNET protocol).
- Physical interfaces: RS-232-C, RS-422, V.35, V.36.

DTC16/X.25 Network Access Specifications

- Up to 32 local HP 3000 Series 900 hosts supported per DTC/X.25 Network Access card.
- One DTC/X.25 Network Access card supported per DTC16.
- Each DTC/X.25 Network Access card is able to support up to 32 Switched or Permanent Virtual Circuits (VC).
- CCITT 1980 and 1984 X.25 and compliant with CCITT 1980 and 1984 X.3/X.28/X.29 PAD Protocols.
- Compliance with standard Defense Data Network (DDN) specifications.
- Acceptance of all 1984 X.25 user and DTE facilities for host-to-host connections for processing at the NS X.25/iX level.
- Closed User Groups (CCITT 1980) supported with PAD access.
- X.25 level 3 parameters:
  - Modulo 8 sequence numbering
  - Window sizes: 1-7
  - Throughput classes: 7-12 (speeds up to 19.2 Kbps)
  - D-Bit and Q-bit
- Packet sizes 32-4096.
- LAP-B level 2 parameters: -Modulo 8 or 128 frame sequence numbering -Window sizes: 1-7 -Frame sizes as required by level 3.
- PAD Parameters - Supported packet sizes of 128, 256, and 512.
- PAD support for HP 3000 Series 900 systems connected to the DTC. (PAD functions are not supported for other systems connected to the DTC in back-to-back configurations).
- Physical interfaces: RS-232-C

Functional Description of X.25 iX System Access

X.25 iX System Access is a software product that resides on the HP 3000 Series 900 computer. It implements Defense Advanced Research Projects Agency (DARPA) TCP/IP at layers 3 and 4 of the OSI reference model, and interconnects with X.25 layer 3 of the DTC/X.25 Network Access software across the IEEE 802.3 Local Area Network (LAN). Note that X.25 iX System Access is not an X.25 protocol implementation, but simply provides an X.25 addressing and facility interface between the HP 3000 Series 900 computer and the DTC.

An HP 3000 Series 900 host defines a Network Interface (NI) for each DTC/X.25 Network Access card it uses. Each NI can support up to 11 DTC/X.25 Network Access cards, and up to 11 such NIs can be configured on the same host.

When used with the NS3000/iX Network Services (HP 36920A) and HP ARPA FTP Service (HP 36957A), X.25 iX System Access features host-to-host communications with remote computers. Furthermore, connections originating from other HP 3000 computers on the same IEEE 802.3 LAN or from an NS point-to-point network can be transparently routed to the X.25 network via the IP layer 3 internet protocol.

The X.25 iX System Access product provides programmatic access to packet level 3 to allow sophisticated users to develop their own protocols and services for communications with remote HP or non-HP computers.

X.25 iX System Access Specifications

General capabilities:

- Implements Defense Advanced Research Projects Agency (DARPA) standard Transmission Control Protocol/Internet Protocol (TCP/IP).
- Supports up to 11 Network Interfaces per Series 900 host.
- Supports up to 11 DTC/X.25 Network Access cards per NI.
- Can reach up to 1024 remote X.25 HP or non-HP computers.
- Implements NetIPC for TCP and X.25 programmatic access.
- Multiplexes TCP/IP traffic over one X.25 virtual circuit.
- Includes NetTool, a set of tools to monitor, analyze, and diagnose the transport software

Note: X.25 protocol implementation is provided by DTC/X.25 Network Access. For functional description of HP OpenView DTC Manager, please consult the "Datacommunications and Terminal Controller" data sheet.

Supported Essential Facilities	1984 CCITT X.25 Reference
- extended packet sequence numbering	6.2
- incoming calls barred	6.5
- outgoing calls barred	6.6
- non-standard default packet size	6.9
- non-standard default window size	6.10
- flow control parameter negotiation	6.12
- throughput class negotiation	6.13
- Closed User Group selection (1980 CCITT)	6.14
- fast select request and acceptance	6.16-17
- reverse-charging and acceptance	6.18-19
- local charging prevention	6.20
- hunt group	6.25
Supported Facilities with X.25 Level 3 Programmatic Access	
- Closed User Group related facilities	6.14
- bilateral closed user groups	6.15
- network user identification	6.21
- charging information	6.22
- called line modified address notification	6.26
- call redirection and notification	6.25-27
- transit delay selection and indication	6.28

Functional Description of the HP OpenView DTC Manager (Please refer to the "Datacommunications and Terminal Controller" data sheet).

Supported and Recommended devices with DTC/X.25 Network Access

Supported switches and host connections (RS-232, V.35)

- HP-PPN (Private Packet Network) models 45, 60, 70, and 80
- MICOM MB3
- NS X.25 3000/V Network Link
- NS X.25 3000/iX Server

Recommended synchronous modems

- RS-232 -HP 37212A/B -Racal MILGO Alpha 96 -CODEX 2620/40/60/80 (HP 32065, 32066A, 32067A, 32068A) -TELSAT 9650 -Bell 2096A

- V.35 (only supported with DTC48/X.25 Network Access card) -ALCATEL ER B&B 144/20 CODEX 2122
- V.36 (Only supported with DTC48/X.25 Network Access card) -ALCATEL ER B&B 144/20 (Germany only)

Recommended modem eliminator

- BLACK BOX SME 4 (MICOM)

Recommended LAN Devices

Hewlett-Packard supports the following LAN devices for transferring of data across a LAN between a DTC, an HP 3000 Series 900 system, and an HP OpenView Windows Workstation:

- HP Repeater (HP 92223A)
- HP ThinLAN Hub (HP 28645A)
- HP Surge Protector (HP 92256E)
- HP 10-10 LAN Bridge (HP 28648A)
- HP 10-10 LAN Bridge (HP 28673A)
- HP Remote bride (HP 28674A)
- HP EtherTwist Hub (HP 28684A)
- HP EtherTwist Hub Plus (HP 28688A)
- HP Router (HP 27270A)

Hewlett-Packard has also tested the following devices for transfer between a DTC, HP 3000 Series 900 system and the HP OpenView Windows Workstation. Some restrictions may apply. Consult your local HP Sales Representative for more information: -Vitalink TransLAN III and 350 -Siecor EOT-322 Fiber Optic Transceiver.

Note: The HP 10-10 LAN Bridge and the Vitalink devices should not be used if the LAN is heavily loaded and losing 1% of its large (1500 Bytes) packets. If such an environment exists, consult your local HP Representative.

List of Supported ASYNCHRONOUS PAD Devices

Terminals Printers	PCs(b)	
2392A/93A/		
94A/97A	HP150A	2563A/B
2622A(a)	HP150B/Touchscreen	2564B
2623(a)	HP Vectra	2684D/P
2624B(a)	HP Vectra CS	2686A/D
2625	HP Vectra ES	2932A
2627A(a)	HP Vectra QS	2933A
700/92	HP Vectra RS	2934A
700/94	Portable Plus	33340A
	HP Vectra Portable CS	33447A(c)

a ROM Upgrades are required on:
- 2622 with ROM 3199 or later
- 2623A with ROM 3223 or later
- 2624B with ROM 3139 or later
- 2627A with ROM 1818-3487 or later

b There personal computers are supported when operating in terminal Emulation Mode

c Only supported with Printer Type 18

Certified X.25 Packet Switched Networks

In addition to the HP Private Packet Network, the following public PSNs have certified the X.25 Xl Network Link. This list is current as of January 1991. Please consult your HP Sales Representative for an updated list of certified PSNs.

Country	Network
Australia	Austpac
Austria	Datex-P*
Belgium	DCS*
Canada	Datapa
Canada	Infoswitch*
Denmark	Datapak
Finland	Datapak*
France	Transpac
Germany	Datex-P
Hong Kong	Intelpak
Israel	Isranet*
Italy	Itapac*
Luxembourg	Luxpac*
Netherlands	Datanet 1*
New Zealand	Pacnet
Norway	Datapak*
Portugal	Telepac
Singapore	Telepa
South Korea	Dacom-Net
Spain	Iberpak*
Sweden	Datapak
Switzerland	Telepac
United Kingdom	PSS
United States	DDN
United States	Telnet
United States	Tymnet

* DTC48/X.25 Only

Installation and Support Policy

Hewlett-Packard will provide installation of the Datacommunications and Terminal Controller (DTC), the HP Add-on Asynchronous Interface Cards, and the HP OpenView DTC Manager in order to verify minimum functionality. This installation and connection to the customer's ThickLAN or ThinLAN cable is included in the purchase of the DTC, but does not include tapping of the cable.

Installation and Configuration Support Policy

The customer is responsible for loading X.25 iX Network Link software onto the system. Hewlett-Packard will provide installation of the Datacommunications and Terminal Controller (DTC), the DTC/X.25 Network Access cards, and the HP OpenView DTC Manager, and will perform minimum configuration of X.25 iX Network Link in order to verify minimum functionality. These activities are included in the product purchase price.

For product configuration tailored to the customer's specific needs, or for a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer responsibility
Prior to having HP personnel onsite to install the DTC/X.25 Network Access Card and HP OpenView DTC Manager, and to perform minimum configuration of the X.25 iX Network Link, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including: system configurations, logical network map identifying relevant traffic flow and physical network map identifying relevant network hardware components.
- Installing and verifying the communication line between the DTC and the X.25 network.
- Installing all asynchronous device (terminal and printer) cabling leading to the DTC.
- Installing or extending the LAN such that connections to the DTC and/or the HP OpenView Windows Workstation can be made. (If a ThickMAU is not local to the DTC, the customer must also connect the AUI cable to the MAU, and route appropriately.)
- When necessary, subscribing to the appropriate administration for access to the public PSN.
- Updating the HP 3000 system to the proper release level and installing the X.25 iX Network Link system software using AUTOINST, if HP 36939A X.25 iX System Access is purchased. Refer to the HP 3000 MPE iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge and network knowledge are available when HP is onsite to complete the installation and minimum configuration of the X.25 iX Network Link.

The customer is also responsible for completing the installation and configuration in order to fully integrate the X.25 iX Network Link into the existing customer network after HP has completed the minimum configuration of the X.25 iX Network Link.

HP Responsibility
Following the installation of the X.25 iX System Access (HP 36939A) software, if purchased, HP is responsible for performing the following tasks for the various components of the X.25 iX Network Link.

To install the DTC, HP is responsible for the following:

- Setting up the DTC box hardware, attaching a terminal cable to the first DTC port, performing the self-test, and verifying the LAN address.
- Attaching the ThinLAN, EtherTwist, or ThickLAN AUI cable to the DTC, and attaching the communication line from the X.25 network to the DTC/X.25 Network Access card.
- Configuring the DTC on the HP 3000 using the customer supplied values, and cross-validating the DTC-related configuration with the system configuration.
- Adding a DTC icon to the network map and configuring the DTC, including the DTC/X.25 Network Access card via the OpenView DTC Manager.
- Ensuring that the DTC is downloaded properly, and that a terminal connected to the DTC returns the MPE/iX colon prompt.
- Verifying the DTC/Network Access card via the OpenView DTC Manager by performing a DTC/X.25 offline Network Loopback between the card and the X.25 network.

To install Add-on DTC/X.25 Network Access cards, HP is responsible for the following:

- Inserting the Add-on card in the DTC and performing the self-test.
- Attaching the communication line from the X.25 network to the Add-on card.
- Configuring the Add-on card on the HP 3000 using the customer supplied values, and cross-validating the DTC-related configuration with the system configuration.
- Configuring the Add-on card via the OpenView DTC Manager.
- Ensuring that the DTC is downloaded properly.
- Verifying the Add-on card via the OpenView DTC Manager by performing a DTC/X.25 offline Network Loopback between the card and the X.25 network.

To install the OpenView DTC Manager (if necessary), HP is responsible for the following:

- Powering up the HP OpenView Windows Workstation to perform the self-test, verifying the I/O address and interrupt channel of the LAN card, and logging the LAN card address.
- Connecting the HP OpenView Windows Workstation to the ThinLAN cable, or to the ThinLAN Hub for ThickLAN or EtherTwist LAN, and loading the HP OpenView DTC Manager Software.
- Creating a network map and adding a DTC icon for each DTC via the OpenView DTC Manager.
- For each DTC, configuring the DTC CPU board, the DTC/X.25 Network Access card, and all other Asynchronous Connector cards installed in the DTC, using the customer supplied values.
- Ensuring that each DTC is downloaded properly.

To install the HP 36939A X.25 iX System Access for system-to-system communication, HP is responsible for the following:

- Confirming that all the necessary software modules for the X.25 iX System Access software have been installed and are at the correct version level.
- Configuring the X.25 link on the HP 3000 using the customer supplied values and cross-validating the DTC-related configuration with the system configuration.
- Verifying the X.25 link between the HP 3000 and the X.25 network on the HP 3000 by issuing the NETCONTROL Start command for the X.25 Network Link NI and performing a Level 3 Loopback with X25CHECK/X25SERVR, or by issuing the NSCONTROL Start command and performing "DSLINE MYSELF" Loopback on a specified link, if HP 36920A NS3000/iX Network Services is already installed.

Note: Device-specific configuration when migrating from host-based to PC-based is not a part of the HP installation/configuration responsibilities.

Post-Installation Customer Responsibility

After HP has completed its installation responsibilities, the customer is responsible for the following:

- Connecting any additional terminal and printer cables to the DTC, and verifying the cable connections.
- Migrating and customizing the DTC software configuration (using NMMGR on the HP 3000 and/or the HP OpenView DTC Manager) for all the DTCs to meet device-specific requirements.
- Fully integrating the new installation to the existing customer network.

If the customer wants to use an existing HP Vectra as the HP OpenView Windows Workstation, it is the customer's responsibility to assemble and configure the PC hardware and software, such that HP can install the HP OpenView DTC Manager software.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase services from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Product Requirements

The following products are required for the X.25 iX Network Link:

For host-to-host X.25 communications

- HP 3000 Series 900 computer software:
  - MPE/iX Release 2.0 or later version
  - NS3000/iX Network Services (HP 36920A)
  - HP ARPA FTP Service (HP 36957A)
  - requires MPE/iX Release 2.2 or later
- X.25 iX System Access (HP 36939A)
- DTC/X.25 Network Access Card
  - DTC16 (HP 2340A option 310) or additional Network Access card (HP 2343D)
  - DTC48 (HP 2345A options 310, 320, 330, 335) or additional Network Access cards (HP 2346D/E/F/G)
- HP OpenView DTC Manager (D2355A), running on the HP OpenView Window Workstation (HP 32054B)

For PAD-to-host X.25 communications

- HP 3000 Series 900 computer software
  - MPE/iX Release 2.0 or later version
- DTC/X.25 Network Access Card
  - DTC16 (HP 2340A option 310) or additional Network Access card (HP 2343D)
  - DTC48 (HP 2345A options 310, 320, 330, 335) or additional Network Access cards (HP 2346D/E/F/G)
- HP OpenView DTC Manager (D2355A), running on the HP OpenView Window Workstation (HP 32054B)

Ordering Information

If an available DTC is not already installed, a DTC must be ordered for operation of DTC X.25 Network Access. Please refer to the "Datacommunications and Terminal Controller" data sheet for information.

Note: Every DTC must contain at least one asynchronous card for diagnostics and support.

Ordering the DTC16/X.25 Network Access card for the DTC16

For X.25 or PAD functionality a DTC16/X.25 Network Access card must be ordered.

The card can be ordered as an option on a new DTC16, or as an add-on to an installed DTC16. If the card is going to be ordered as part of a new DTC, the following option on the DTC16 (HP 2340A) should be ordered:

- Option 310 – RS-232 interface

If a DTC16 is already installed on the network, DTC16/X.25 Network Access is available through HP field installed DTC16/X.25 Network Access cards.

HP 2343D – Add-on DTC16/X.25 Network Access card: RS-232 interface

Ordering the DTC48/X.25 Network Access card for the DTC48

For X.25 or PAD functionality, between 1 and 3 DTC48/X.25 Network Access cards must be ordered.

DTC48/Network Access cards can be ordered either as an option on a new DTC48, or as add-on cards for an installed DTC48. If the DTC48/Network Access card is to be used in a new DTC, one of the following options should be included as part of the DTC48 (HP 2345A) order:

Option 310 – RS-232 interface
Option 320 – V.35 interface
Option 330 – V.36 interface
Option 335 – RS-422 interface

If a DTC48 is already installed on the network, DTC48/X.25 Network Access is available through HP field installed DTC48/X.25 Network Access cards.

Note: Option #001 must also be ordered if card is installed on a DTC48 containing a date code less than 2851.

Note: If the DTC48 will also be used for accessing TELNET systems, a memory upgrade may also be necessary. If the DTC48 has a date code less than 3110, then you should order HP 2348A, which provides additional memory to the DTC48.

Note: A DTC48 cannot support both an X.25 Network Access card and an HP ARPA Telnet Access card. The HP ARPA Telnet Access card allows a user connected to a TELNET system to access applications on the HP 3000 Series 900. Please refer to the "HP ARPA Services/iX" data sheet for more information.

HP 2346D – Add-on DTC48/X.25 Network Access card: RS-232 interface 001 – DTC48 hardware upgrade kit
HP 2346E – Add-on DTC48/X.25 Network Access card: V.35 interface 001 – DTC48 hardware upgrade kit
HP 2346F – Add-on DTC48/X.25 Network Access card: V.36 interface 001 – DTC48 hardware upgrade kit
HP 2346G – Add-on DTC48/X.25 Network Access card: RS-422 interface 001 – DTC48 hardware upgrade kit

Ordering X.25 iX System Access

For system-to-system communications, X.25 iX System Access Software must be ordered. This software is not required if only PAD functionality is needed.

HP 36939A – X.25 iX System Access

Select **one** Processor Option

Processor Options:

310 For Tier 1 SPU, one RTU sublicense
315 For Tier 2 SPU, one RTU sublicense
320 For Tier 3 SPU, one RTU sublicense
330 For Tier 4 SPU, one RTU sublicense
335 For Tier 5 SPU, one RTU sublicense
340 For Tier 6 SPU, one RTU sublicense
350 For Tier 7 SPU, one RTU sublicense

Upgrade Credit Options:

OCD For Processor Option 310
OGJ For Processor Option 315
OCE For Processor Option 320
OCF For Processor Option 330
OGL For Processor Option 335
OGM For Processor Option 340

In order to receive the upgrade credit, customers must select, on the same order, the upgrade credit option that pertains to their current processor option in addition to the new processor option.

Ordering HP OpenView DTC Manager

If the DTC will be used for multiple system access, Telnet, or X.25 connectivity, an HP OpenView PC workstation, running HP OpenView Windows and HP OpenView DTC Manager, is needed.

HP D2355A – HP OpenView DTC Manager Software

HP 32054B – HP OpenView Windows Workstation – provides users with a specially configured HP Vectra, with the required hardware and software to run HP OpenView DTC Manager. It includes 2 Mbytes additional memory, ThinkJet printer, MS-DOS®, MS-Windows, HP OpenView Windows, and HP AdvanceLink for Windows.

Order option ABA - ABZ for correct localization.

Order **one** network connection option 101, 102, or 103:

101	For ThinLAN connection
102	For ThickLAN connection
103	For Ethertwist connection

Order option 201 for configuring PC with HP OpenView DTC Manager.

Please refer to the "Datacommunications and Terminal Controller" and "HP OpenView Windows Workstation" data sheets for information.

Documentation

Available with the DTC16 hardware (HP 2340A):

- DTC16 Hardware Installation and Service Manual (P/N 02340- 90001)
- Quick Reference for DTC Terminal Users (P/N D2355-90002)

Available with the DTC48 hardware (HP 2345A):

- DTC48 Hardware Installation and Service Manual (P/N 02345- 90021)
- Quick Reference for DTC Terminal Users (P/N D2355-90002)

Available with the HP OpenView DTC Manager (HP D2355A):

- Using the HP OpenView DTC Manager (P/N D2355-90001)

Available with X.25 iX System Access (HP 36939A):

- X.25 iX System Access Configuration Guide (P/N 36939- 90001)
- NetIPC 3000/iX Programmer's Reference Manual (P/N 5958-8600)

The following manuals should also be included under X.25 iX System Access:

- Guide to NS3000/iX Documentation (36923-61001)
- NS3000/iX Configuration Planning and Design Guide (36922- 90007)
- NS3000/iX Operations and Maintenance Reference Manual (36922-90010)
- Using the Node Manage ent Services Utilities (5959-2805)
- NS3000/iX Screens Reference Manual (36922-90008)
- NS3000/iX Error Messages Reference Manual (5959-2836)

Available with the DTC hardware upgrade kit (HP 2346D/E/F/G #001):

- DTC Hardware Installation and Service Manual (P/N 02345-90001)

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HEWLETT® PACKARD

HP NCS 1.5.1 for the HP 3000

Technical Data

The NCS 1.5.1 Product is the Network Computing System Remote Procedure Call version 1.5.1 for our HP 3000 MPE/X systems. NCS 1.5.1 provides capabilities for transparently making network resources available to users and applications by allowing applications written to NCS 1.5.1 to be distributed.

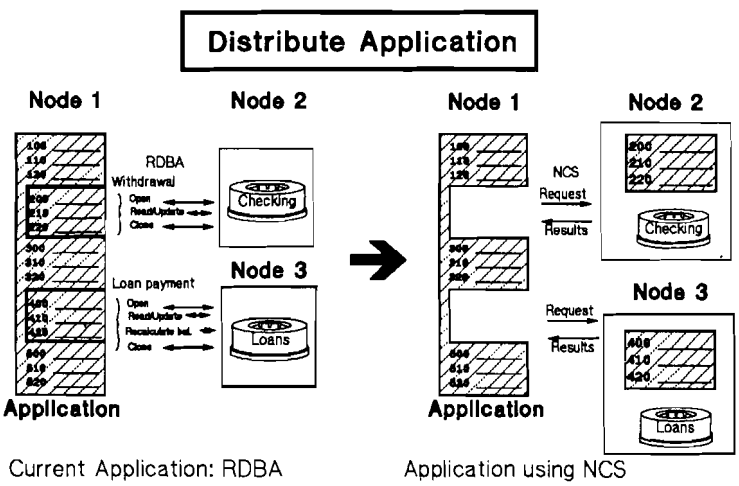
NCS 1.5.1 is the basis for the NCS component of DCE, OSF's Distributed Computing Environment. By providing NCS 1.5.1 for MPE/iX, a migration path is provided for MPE applications moving to DCE.

NCS 1.5.1 is a Remote Procedure Call. It allows remote execution of client procedures on servers throughout the network.

NCS RPC makes it possible to develop and run application procedures remotely allowing them to use network resources without causing network traffic, improving performance for enterprise-wide data access and allowing network resource scalability for future growth.

NCS provides the base foundation for OSF's DCE, the enabling technology for enterprise-wide heterogenous distributed computing in the future. NCS 1.5.1 on MPE/iX provides a strong foundation of growth for HP 3000 customers moving to DCE environments by enabling multivendor application integration. NCS also provides the HP 3000 with improved capabilities for building distributed applications and integrating existing applications, providing a core foundation for distributed OLTP and data access applications in the future.

How NCS Can Be Used



Current Application: RDBA Application using NCS

Put processing at the data, rather than bring data to the application

Benefits of NCS

- **Optimum Use of Network Resources:** By using NCS RPC, parts of applications can be split to run on server systems closer to the data. This allows better use of the network, faster data access, and better use of processing power.

- **Multivendor Application Integration:** NCS 1.5.1 is adopted by the major vendors and is the basis for the DCE Remote Procedure Call. By developing applications using the NCS 1.5.1 RPC, the applications have an easy migration path to the DCE environment in the future. NCS 1.5.1 will provide interoperability with the next generation of DCE environments.

- **Ease of Client/Server Application Development:** NCS 1.5.1 RPC enables applications to be written in a client/server module. Client applications can run specific procedures on servers to take advantage of server functionality. For example, an inventory application running on a client can have a data update procedure run directly on the appropriate database server and then automatically return results to the client upon procedure completion.

NCS Product Structure

NCS 1.5.1 for MPE/iX consists of two components:

The Network Computing Kernel (NCK) is required to execute NCS applications, and the Network Interface Definition Language (NIDL) is required to actually develop the NCS 1.5.1 applications.

The NCK Kernel on MPE/iX provides run-time support for distributed NCS applications and has been tested between NCK implementations on the HP-UX Series 9000/3xx and 8xx platforms. It consists of a set of intrinsics that are accessed by applications at run-time. This Kernel offers applications the ability to execute across networks and facilitates the communication to manage distributed processing.

NIDL on MPE/iX is a tool for developing distributed applications. It provides the NCK Kernel the environment for building those applications by taking input and generating client and server stub programs.

NCS 1.5.1 consists of both above components.

Product Requirements

NCS 1.5.1 will run on MPE/iX version 4.0 or later. It requires the following network and system software to run:

- MPE/iX C compiler and C run-time library
- NS 3000/iX LAN LINK and Transport
- NS 3000/iX Network Services

Ordering Information

NCS 1.5.1 for MPE/iX is being shipped as a limited distribution product. For information on ordering NCS 1.5.1 for MPE/iX, contact your HP sales office.

HEWLETT® PACKARD

HP FTAM 3000/iX

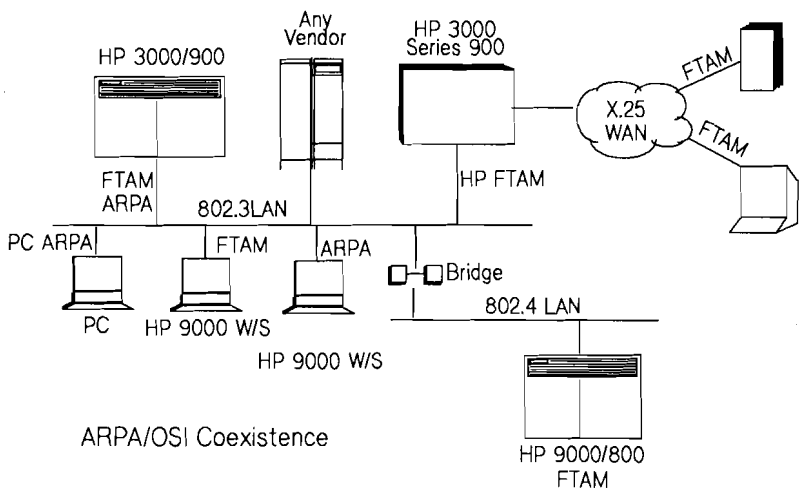
Technical Data

Product Numbers
HP 36972A HP FTAM
HP 36971A HP OTS

HP FTAM 3000/iX is a software product that implements the International Standards Organization (ISO) File Transfer, Access, and Management Standard (ISO 8571). It provides true multivendor file system interoperability for HP 3000 Series 900 computers, permitting transfer or management of any defined data type between HP 3000 Series 900 systems and diverse OSI end systems, regardless of their hardware platform or operating system.

Examples of applications that can benefit from FTAM include: distributed database management, shared data/centralized file storage, document retrieval and update (libraries, auto registration, etc.). FTAM is particularly useful for applications such as large accounting, payroll, or inventory control systems that must transfer large amounts of structured data between heterogeneous end systems over local or wide area networks.

HP FTAM 3000/iX meets basic distributed file system requirements defined in industry and regional OSI profiles, including the U.S. Government OSI Profile (GOSIP) specification. FTAM can coexist on existing TCP/IP networks and provide file system connectivity to a much wider range of systems, including PCs and proprietary systems, than can be connected with current file transfer protocols.



ARPA/OSI Coexistence

Features and Benefits

- Standards compliant FTAM implementation on HP 3000 Series 900 systems for international, multivendor file transfer capability.
  - Reduces costs and personnel requirements by eliminating network gateways and file conversion software required to interconnect today's non-standard file systems.
  - Adds flexibility and functionality to current file transfer protocols.
  - Provides a wide range of price/performance computing options.

- Interactive User Interface (modeled after the ARPA FTP interface).
  - Reduces learning time.
- NS/ARPA/OSI Coexistence and Transition.
  - Protects customer's network and software investments.
  - Users can add initial OSI products to existing networks and "gracefully" evolve to full OSI.
  - Best network foundation for growth to distributed computing.
- Support for U.S. and International Networking Standards (802.3 LAN, X.25 WAN)
  - Increases international competitiveness.
  - Worldwide network interoperability for multinational corporations.

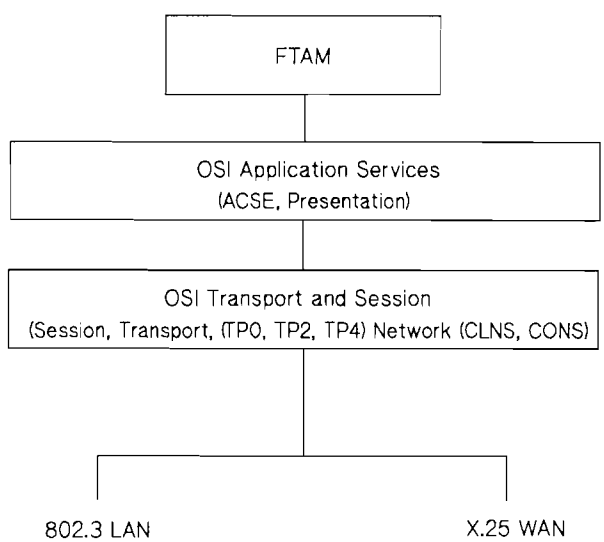
Functional Description

HP FTAM 3000/iX provides file service between HP 3000 Series 900 systems and heterogeneous systems on an OSI network. It expands and improves on the capabilities of existing file transfer protocols like ARPA File Transfer Protocol (FTP) and the NS Network File Transfer (NFT) service. FTAM file services include:

- Text and Binary file transfer
- File Management
  - Create/delete file
  - Read/change file attributes

FTAM uses the concept of a virtual filestore to allow transfer of files between very different systems. Real file systems on local hosts are mapped to the FTAM Virtual File Store (VFS) and multivendor file transfer occurs between the common VFS on OSI end systems. FTAM is a two-party file transfer protocol. There is a controller of file activity (Initiator) that directs the action and a Responder that responds to the Initiator. FTAM uses OSI Application Services (Layer 7), specifically the Association Control Service Element (ACSE), to establish and break associations (virtual connections) between Initiator and Responder. OSI Presentation Services (Layer 6) are used to map real system data syntax (ASCII, EBCDIC, etc.) to and from the Abstract Syntax Notation (ASN.1) used by OSI.

HP FTAM 3000/iX operates over HP OSI Transport and Session (OTS) on top of either local (802.3) or wide (X.25) area network links. OTS allows the user to configure for operation over OSI Transport Classes TP0, TP2, or TP4. Classes TP0 and TP2 provide the lowest level of functionality (no error control) for OSI connections



over reliable, connection-oriented environments (public/private X.25 networks, Teletex networks, etc.). Class TP4 provides fully reliable transport service for unreliable, connectionless network environments (GOSIP LAN or GOSIP WAN).

The interactive user interface commands resemble those of the ARPA File Transfer Protocol (FTP) service providing commands including OPEN CONNECTION, PUT, GET, and DELETE. A complete list of interactive commands, including descriptions and usage examples, is provided in the FTAM/iX User's Guide supplied with the HP FTAM 3000/iX product.

HP FTAM 3000/iX is compliant with U.S. GOSIP Version 1 (FIPS 146), European (CEN/CENELEC), and Pacific regional (INTAP,POSI) OSI profile requirements for a limited-purpose FTAM. It provides the following functions:

Implementation Profiles:

- T1 (Simple File Transfer)
- T2 (Positional File Transfer)
- M1 (Management File Store)

Document Types:

- FTAM-1 (Unstructured Text)
- FTAM-2 (Sequential Text)
- FTAM-3 (Unstructured Binary)

File Management:

- Delete file
- Read attributes of file
- Rename file

HP FTAM 3000/iX is designed to coexist on existing networks with TCP/IP and ARPA or NS services.

HP 3000 Series 900 systems can be configured to support OSI, ARPA, and NS services. In this configuration, TCP/IP and OSI protocol stacks share existing 802.3 or X.25 network connections, allowing users to take advantage of new OSI U.S. GOSIP Version 1.0 (FIPS 146), Stable Implementors Agreements Version 3, Edition 1 (NIST Phase 2) capabilities while continuing to use existing NS/ARPA network services. The HP 3000 Series 900 system, configured with both protocol stacks, can act as an FTAM server allowing non-OSI hosts to log on using NS/ARPA services and initiate FTAM connections to any other local or remote OSI host.

Standards Conformance

ISO:	-8571	FTAM Protocols
	-8824/8825	Abstract Syntax Notation-1(ASN-1)
	-8649/8650	Association Control Service Element (ACSE)
	-8822/8823	Presentation Protocols
	-8326/8327	Session Protocols

Profiles:	FTAM	NIST
	Simple File Transfer	T1
	Positional File Transfer	T2
	Filestore Management	M1
	OSI Stack	
	TP4/CLNS/802.3	
	TP0, 2, 4/CONS/X.25	

Customer Site Requirements

An 802.3 LAN or X.25 WAN is required at the customer site to make effective use of HP FTAM 3000/iX distributed file systems capabilities.

Configuration Information

Product Requirements

The HP OTS 3000/iX product and either the ThinLAN 3000/iX Link or DTC X.25 XL Network Link and X.25 XL System Access products are required for network operation of FTAM.

The HP FTAM 3000/iX product includes the software and manuals. The HP FTAM 3000/iX manual set includes the FTAM User's Guide, OSI/iX Configuration and Startup Guide, and OSI/iX Operations and Maintenance Guide.

Processor Requirements

- HP 3000 Series 900 system with the ThinLAN 3000/iX Link or DTC X.25 link or both
- HP 3000 Series 900 Operating System Version 3.0 or later

Ordering Information

FTAM HP 36972A HP FTAM 3000/iX Right-to-Use

Processor Options:

310	For Tier 1 SPU, one RTU sublicense
315	For Tier 2 SPU, one RTU sublicense
320	For Tier 3 SPU, one RTU sublicense
330	For Tier 4 SPU, one RTU sublicense
335	For Tier 5 SPU, one RTU sublicense
340	For Tier 6 SPU, one RTU sublicense
350	For Tier 7 SPU, one RTU sublicense

OTS HP 36971A HP OTS 3000/iX RIght-to-Use

Processor Options:

310	For Series 920, 922LX
315	For Series 922RX
320	For Series 922, 932, 925, 925LX
330	For Series 935, 948
335	For Series 949
340	For Series 950, 955, 958, 960
350	For Series 980

Note: A processor option must be ordered for both FTAM and OTS.

Processor Upgrades

Upgrade credit is given to customers upgrading within the HP 3000 Series 900 family. To order an upgrade, order the FTAM and OTS product with the new processor option, and one of the following upgrade credit options:

0CD	For Processor Option 310
0GJ	For Processor Option 315
0CE	For Processor Option 320
0CF	For Processor Option 330
0GL	For Processor Option 335
0GM	For Processor Option 340

Documentation

36972-61001 HP FTAM 3000/iX User's Guide
36971-61001 Installing, Configuring, and Starting OSI/iX Network Manager's Guide
36971-61002 OSI/iX Operations and Maintenance Guide

Installation and Support

Customers purchasing HP FTAM 3000/iX must assume the responsibilities listed below. HP can provide expert assistance in all of them, but support of these activities is not included in the HP 36972A and HP 36971A products.

1. Installation of appropriate LAN or X.25 networks (cables, repeaters, connectors, etc.). The establishment of link-level communications between the HP 3000 and other systems on the network is the customer's responsibility.
2. Designation of one person in the customer's organization as Network Manager. This person will assume responsibility for configuration and updates of the customer's systems, and will serve as focal point for Hewlett-Packard's support of the network.
3. Installation of HP FTAM 3000/iX.

Hewlett-Packard strongly recommends that the customer purchase support services for HP FTAM 3000/iX and related hardware and software products.

Support of FTAM also depends on the troubleshooting facilities provided in underlying stack and link components. The combined FTAM/OTS/Link product set provides a complete toolset for effective management of HP FTAM 3000/iX nodes within an OSI multivendor network. The HP FTAM/OTS product set includes a complete set of utilities for diagnostic capabilities for communications problem resolution.

HEWLETT® PACKARD

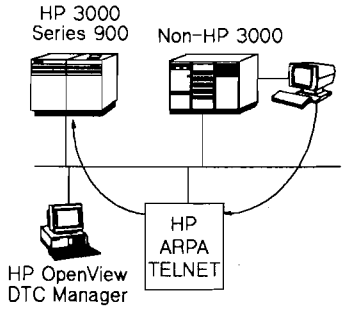
ARPA Services/iX

Technical Data

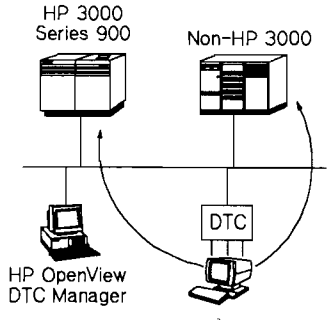
For HP 3000 Series 900 Computers Product Numbers HP 2344A, 2347A, 2348A, 36955A, 36956A, 36957A, D2355A

ARPA Services/iX (ARPA/iX) provides de facto industry-standard multivendor networking services on the HP 3000 Series 900 over both TCP/IP Local Area Networks (LAN) and DDN standard X.25 Wide Area Networks (WAN). Because ARPA/iX uses networking protocols that have been implemented for most vendors' systems, ARPA/iX can be used to connect the HP 3000 Series 900 to HP and many non-HP systems. ARPA/iX protects HP 3000 investment in a diverse computing environment by offering wider access to valuable computing resources and applications. ARPA/iX provides file transfer using the FTP protocol and virtual terminal access using the TELNET protocol.

Access to HP 3000 Applications from a TELNET System User



Access to Applications on a TELNET System from an HP 3000 User



Features

HP ARPA File Transfer Protocol (FTP) is POSIX compliant and provides an easy method for transferring files between different vendors' systems. HP ARPA File Transfer Protocol is a general file utility for performing operations on remote files and directories such as transferring, deleting, renaming, and listing files. It implements MIL-STD 1780, based on the BSD 4.2 interface. It also conforms to RFCs 959 and 1123.

HP ARPA Telnet (TELNET) facilitates logging on remotely between the HP 3000 and other HP and non-HP systems. HP ARPA Telnet is implemented in the Data communications and Terminal Controller (DTC). It enables users connected to the Data communications and Terminal Controller (DTC) to have simultaneous direct access to HP 3000 and non-HP 3000 systems. It also enables users on a TELNET system to log on

and run applications on the HP 3000.

Note that this access requires a HP 2392A terminal or a terminal emulator or the TELNET system. HP ARPA Telnet is based on MIL-STD 1782.

HP ARPA Telnet has two key features:

- Access to HP 3000 applications from a TELNET system user
- Access to applications on a TELNET system from an HP 3000 user

By implementing TELNET in the DTC, the HP 3000 Series 900 is offloaded of the CPU intensive TELNET protocol processing, thus providing protection in On-Line Transaction Processing (OLTP) performance. Since the DTC provides multisystem access, the DTC TELNET implementation provides a cost effective solution for adding additional TELNET sessions and sharing TELNET sessions between multiple HP 3000 Series 900s. If a majority of your asynchronous devices needs access to the HP 3000, then you should consider connecting these devices directly to the DTC. Please refer to the "Datacommunications and Terminal Controller" data sheet for more information.

In addition, a single operator can manage these DTC TELNET connections through the use of an HP OpenView Windows Workstation. HP OpenView Windows provides an easy-to-use advanced graphics user interface which simplifies the management of multiple DTCs. For more information on HP OpenView DTC Manager, please refer to the "Datacommunications and Terminal Controller" data sheet.

Detailed Description

File Transfer Protocol (FTP)
FTP offers a variety of commands for performing file and directory operations over the network. A user can transfer ASCII or binary files to or from a remote system, rename and delete files, list and change directories, and toggle switches to change the FTP environment.

BIND

Berkeley Internet Name Domain (BIND) provides for administering host-to-IP address mapping on selected servers, with most systems on a network looking up IP addresses by accessing a server. By using BIND, local systems can do away with local HOSTS.NET.SYS and NSDIR.NET.SYS files and use the hierarchical nature of Domain Name Servers. All Host-based NS and ARPA services can use a Domain Name Server.

Note that while the HP 3000 supports the routines that send BIND requests, the HP 3000 system can not be a BIND server. The BIND server must be located on another platform.

HP ARPA File Transfer Protocol supports the following FTP user commands:

append	ascii	binary
bye	bytestream	case
cd	close	debug
delete	dir	disconnect
exit	exitonerror	form
get	help	led
ls	mdelete	mget
mkdir	mode	modtime
mput	open	prompt
put	pwd	quit
quote	recv	remotehelp
rename	reset	rmdir
runique	send	site
size	status	struct
sunique	system	timeout
trace	type	user
verbose	:	?

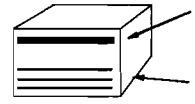
The standard file transfer commands have been enhanced to support optional MPE "BUILD" parameters, to allow the attributes of files destined for an HP 3000 to be determined by the user, providing flexibility in file creation. An online "help" file is provided, which explains the special features of HP ARPA File Transfer Protocol. This ASCII file can be transferred to remote systems to help users who don't have access to the HP ARPA File Transfer Protocol documentation.

FTP is normally run from the operating system prompt (:) by typing commands at the terminal. However, it can also be driven from a command file or invoked by another program (through HPCICOMMAND

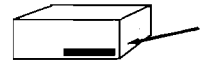
intrinsic calls), permitting automatic file transfers.

The FTP interface and command syntax are the same as in ARPA services on the HP 9000 and most other UNIX® machines, making it easier for users to move between systems. For users more accustomed to MPE/iX, the programmatic interface mentioned above can be used to simulate MPE/iX commands (for example, MPE/iX's "LISTF" instead of FTP's "dir").

- HP ARPA Telnet Access
  - card for DTC48/3000
  - maximum of 40 sessions
  - casual system access
  - low number of users



- HP ARPA Telnet Express
  - dedicated solution
  - maximum of 80 sessions
  - predictable performance
  - ease of management for high number of users



- Solutions can be mixed on network as desired

Supported Networks with HP ARPA FTP

For LAN connections, the ThinLAN 3000/iX Network Link provides the TCP/IP transport mechanism, the IEEE 802.3 connection, and the Ethernet connection. The ThinLAN Link transport can run over interconnected LANs.

For WAN X.25 connections, the X.25/iX Network Link provides the TCP/IP transport mechanism and the X.25 connection for HP ARPA File Transfer Protocol.

The industry-standard and de facto protocols are:

- Transmission Control Protocol (TCP) (MIL-STD 1778)
- Internet Protocol (IP) (MIL-STD 1777)
- Address Resolution Protocol (ARP) (RFC-826)
- IEEE 802.3 CSMA/CD Media Access Control
- Ethernet
- 1984 CCITT standard X.25

Note: HP ARPA File Transfer Protocol and NS3000/iX Network Services (HP36920A) can run over the same link products simultaneously.

Teletype Network Protocol (TELNET)

HP ARPA Telnet is an interactive network virtual terminal service based on MIL-STD 1782. It allows a user to access another computer and its applications anywhere on the network.

HP ARPA Telnet in the DTC provides two features:

- Access to HP 3000 applications from a TELNET system user
- Access to applications on a TELNET system from an HP 3000 user

Access to HP 3000 Series 900 applications using TELNET

Depending on the number of TELNET sessions required, two solutions exist:

- HP ARPA Telnet Access—maximum of 40 concurrent sessions
- HP ARPA Telnet Express—maximum of 80 concurrent sessions

HP ARPA Telnet Access and HP ARPA Telnet Express provide solution flexibility. They can be mixed in any combination on the network to provide the required number of TELNET sessions to an HP 3000 Series 900.

Note: The number of concurrent sessions on each HP ARPA Telnet product is dependent on the type of applications being run. The telnet Access Card allows 40 concurrent sessions, and the Telnet Express allows 80 concurrent sessions when a VPLUS block-mode application is used. If a character-mode application is being run, the concurrent number of sessions with

acceptable performance is greatly reduced. Contact your HP representative for performance recommendations.

Because the HP ARPA Telnet provides multisystem access, TELNET users have direct access to applications on multiple HP 3000 Series 900 systems on the LAN, as configured by HP OpenView DTC Manager. Access can be user-selectable to any system on the LAN through the DTC user interface or transparent to a specified host through a configured switching table. For security reasons, access to the systems on the LAN can be enabled or disabled from the HP OpenView DTC Manager.

Once logged on, the user can issue commands and run most applications as if his or her display were directly connected to the HP 3000. The principal exceptions are non-VPLUS blockmode and character-at-a-time applications, which are not supported over HP ARPA Telnet. Applications using VPLUS blockmode or character-mode are supported. HP ARPA Telnet does not emulate a particular terminal type or convert control characters. The system you are accessing and the application you are running must support the terminal or terminal emulator you are using. Programmatic access from applications on the HP 3000 Series 900 to user devices (like printers) is not currently available with HP ARPA Telnet.

Note: An HP ARPA Telnet session does not currently provide the same HP 3000 application access as a DTC asynchronous port. Some key features not supported by HP ARPA Telnet sessions include powerfail recovery, programmatic access, printer support, and non-VPLUS blockmode support. Please refer to the "Datacommunications and Terminal Controller (DTC)" data sheet for more information on DTC asynchronous features.

- **HP ARPA Telnet Access**
  The HP ARPA Telnet Access product consists of a card that is installed in the same DTC48 used for terminal connections. This card provides the protocol conversion support required for the TELNET, TCP/IP, and Ethernet access to the HP 3000 Series 900. This solution provides a maximum of 40 concurrent TELNET sessions to the HP 3000 Series 900 system.

Note: DTC48s with a date code less than 3110 require a memory upgrade to support TELNET.

- Each HP ARPA Telnet Access card will support:
  - Up to 40 concurrent TELNET sessions
  - Access to any HP 3000 Series 900 on the (Ethernet) LAN
  - VPLUS and character-mode applications support
  - Up to 10 local HP 3000 Series 900s, accessed transparently through a switching table configured with HP OpenView DTC Manager.
- 1 HP ARPA Telnet Access card is supported per DTC48
- An HP ARPA Telnet Access card may not reside in the same DTC48 as a DTC/X.25 Network Access card

Note: There is currently no HP ARPA Telnet Access card for the DTC16.

HP ARPA Telnet Express
The HP ARPA Telnet Express product is based on the same architecture as the HP ARPA Telnet Access card, but is packaged to attach directly to the LAN and is dedicated to providing a maximum of 80 concurrent TELNET sessions to the HP 3000 Series 900 system. This solution is ideal for customers requiring high numbers of TELNET sessions into the HP 3000 Series 900.

- Each HP ARPA Telnet Express solution will support
  - Up to 80 concurrent TELNET sessions
  - Access to any HP 3000 Series 900 on the (Ethernet) LAN
  - VPLUS and character-mode applications support
  - Up to 10 local HP 3000 Series 900s, accessed transparently through a switching table configured with HP OpenView DTC Manager.
- Physical Specifications
  - **Height**: 152 mm (5.98 inches)
  - **Depth**: 467 mm (18.39 inches)
  - **Width**: 325 mm (12.8 inches)

Note: The number of concurrent sessions on each HP ARPA Telnet product is dependent on the type of applications being run. The Telnet Access Card allows 40 concurrent sessions, and the Telnet Express allows 80 concurrent sessions when a VPLUS block-mode application is used. If a character-mode application is being run, the concurrent number of sessions with acceptable performance is greatly reduced. Contact your HP representative for performance recommendations.

Access to Applications on a TELNET System

Users connected directly to a DTC port have the choice of accessing either an HP 3000 Series 900 (using an optimized, high performance protocol) or a non-HP 3000 system (using TELNET). The DTC simultaneously supports both protocols for maximum flexibility in application access.

Note: DTC48s with a date code less than 3110 require a memory upgrade to support TELNET.

Users can access HP 3000 and TELNET systems simultaneously using the multisession capability. In addition to passing application data between the terminal on the DTC and the TELNET system, TELNET provides basic commands to make and terminate connections, determine status, and send escape-from-data-transfer and interrupt (break) characters. Online help provides the syntax and function of all commands. The TELNET interface in the DTC is based on the current DTC interface. There is no programmatic interface.

Supported Networks with HP ARPA Telnet

TELNET sessions over interconnected LANs or X.25 require the use of a bridge or router, as HP ARPA Telnet is not supported over the DTC/X.25/iX Network Link. If you desire interactive access over X.25, HP suggests the use of PAD. (See the "DTC/X.25/iX Network Link" data sheet for PAD details.) PAD will provide higher performance and less expensive interactive sessions over X.25 than TELNET.

The software for the TELNET solution is downloaded across the LAN from an HP OpenView DTC Manager, which controls the entire DTC48 or HP ARPA Telnet Express solution from an HP OpenView Windows Workstation.

Recommended LAN Devices

Hewlett-Packard supports the following LAN devices for transferring of TELNET traffic to and from the HP 3000 Series 900 and the Datacommunications and Terminal Controller (DTC):

- HP Repeater (HP 92223A)
- HP ThinLAN Hub (HP 28645A)
- HP Surge Protector (HP 92256E)
- HP 10-10 LAN Bridge (HP 28648A)
- HP 10-10 LAN Bridge (HP 28673A)
- HP Remote Bridge (HP 28674A)
- HP EtherTwist Hub (HP 28684A)
- HP EtherTwist Hub Plus (HP 28688A)
- HP Router (HP 27270A)

HP is currently testing the CISCO Gateway Server and the P4100+ Proton Router. Please contact your HP sales representative for results. Please also refer to the "Datacommunications and Terminal Controller" data sheet for additional information on supported LAN configurations.

HP ARPA Telnet Access and HP ARPA Telnet Express contain the same high-performance hardware and software that implement the TELNET, TCP/IP, and Ethernet protocols based on the following standards:

- Transmission Control Protocol (TCP) (MIL-STD 1778)
- Internet Protocol (IP) (MIL-STD 1777)
- Address Resolution Protocol (ARP) (RFC-826)
- Ethernet

Connectivity to Other Computers

ARPA services have been implemented on more vendors' systems than any other modern protocol suite. Most hardware vendors and many independent software vendors have ARPA implementations. ARPA/iX is expected to interoperate with most of these.

HP has extensively tested the ARPA/iX solution with HP and non-HP systems to ensure maximum interoperability and maximum accessibility to networked resources and applications.

HP will provide the highest levels of support for software, systems, and intermediate hardware rigorously tested by HP and proven to interoperate well with ARPA/iX. Any ARPA software or associated hardware that is proven by HP not to interoperate well with ARPA/iX will not be supported.

It is recommended that you purchase HP NetAssure support service to gain HP Field and Response Center support for these configurations.

In addition, a test package will be available from HP that will enable ARPA/iX verification with other non-HP systems. Contact your HP representative for details on availability, as well as the most recent list of supported systems and software.

Installation and Configuration Policy

HP ARPA Services/iX is comprised of the HP ARPA File Transfer Protocol (FTP) and the HP ARPA Telnet service. Each of these components has its own configuration and installation policy, as follows.

ARPA Services/iX—Supported Configurations

Computer	Operating System*	Networking Software	Terminal/ Emulator
HP 9000/300	HP-UX 8.0	HP ARPA/9000	HPTERM/MUX + Terminal
HP 9000/800	HP-UX 8.0	HP ARPA/9000	MUX + Terminal
VAX	VMS 5.3	WIN/VX 5.1	MUX + Terminal
Sun 4	SunOS 4.1	SunOS 4.1	SUN X11 console (1)
Apollo DS4500	Domain OS 10.2	Domain 10.2	Apollo console (1)
HP Vectra	MS-DOS® 4.0	PC-ARPA 2.0	HP AdvanceLink (2)
HP 1000	RTE-A, Rel 5.2	HP ARPA/1000	MUX + Terminal
HP 3000	MPE V, Rel Vd9	WIN/TCP 1.1 for MPE V	ATP + Terminal (3)

* Unless otherwise indicated, all subsequent releases are also supported.
1. Character mode only. Note, any workstation with no HP terminal emulation could display problems with HP escape sequences.
2. Version B.02.21 and later.
3. VPLUS blockmode is not supported.

Note: ARPA between an HP 3000 Series 900 and an HP Vectra must be initiated from the HP Vectra.

Installation and Configuration Policy for HP ARPA FTP

The HP ARPA FTP service is completely customer installable. No additional product configuration is necessary. For a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer Responsibility—HP ARPA FTP Service

The customer is responsible for performing the following tasks in order to successfully install HP ARPA FTP:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Verifying the proper installation, configuration, and functioning of the associated link product (ThinLAN 3000/iX Link or X.25/iX Network Link.)
- Updating the HP 3000 system to the proper release level and installing the HP ARPA FTP service software using AUTOINST. Refer to the

HP 3000 MPE/iX Installation and Update Manual (HP 36123-90001).

- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Verifying the successful installation of the FTP service software by streaming the appropriate job to start the FTP server monitor and checking the job stream output for errors.

Installation and Configuration Policy for HP ARPA TELNET Service

Hewlett-Packard will install the HP ARPA Telnet Access Card (HP 2347A or HP 36955A) into a DTC48, install HP ARPA Telnet Express (HP 2344A OR HP 36956A), if purchased, provide first time installation of the HP OpenView DTC Manager (HP D2355A) as described in the installation section of the DTC data sheet (also found in this guide), perform a selftest of the HP ARPA Telnet Access Card and/or the HP ARPA Telnet Express, and perform minimum configuration of the HP ARPA Telnet Access Card and/or HP ARPA Telnet Express to establish a system connection. For a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer Responsibility—ARPA Telnet Service

Prior to having HP personnel on site to install the HP ARPA Telnet Access Card and/or HP ARPA Telnet Express and perform minimum configuration, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Updating the HP 3000 system to the proper release level.
- Installing all cabling leading to the DTC for use by the HP ARPA Telnet Access Card and/or installing or extending the LAN such that HP ARPA Telnet Express can be connected by HP.
- Completing all tasks listed as customer responsibilities for the HP OvenView DTC Manager as described in the installation section of the DTC Terminal Access/3000 data sheet (also found in this guide).
- Performing full system backups (as necessary) and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge and network knowledge are available when HP is on site to complete the installation and minimum configuration of the HP ARPA Telnet service.

HP Installation Responsibility—ARPA Telnet Service

Following the installation of the ARPA Telnet service software, HP is responsible for the following:

- Installing and verifying operation of the HP ARPA Telnet Access Card and/or ARPA Telnet Express.
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the ARPA Telnet Access Card and/or ARPA Telnet Express to the minimum default configuration necessary to verify software and hardware functionality.
- Verifying that with the minimum configuration, the ARPA Telnet service can be used to establish a system connection.

These steps complete HP's portion of the installation and minimum configuration of the HP ARPA Telnet service.

Installation Policy for the HP OpenView DTC Manager

Hewlett-Packard will provide first-time installation of the HP D2355A OpenView DTC Manager. It is a customer responsibility to ensure that the HP OpenView Windows Workstation (HP 32054B) or equivalent is set up ready for this installation. It is also a customer responsibility to install updates to the HP OpenView DTC Manager.

Note: If the HP OpenView Windows Workstation (HP 32054B) is ordered with option 201, the HP OpenView DTC Manager software comes already installed.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration, and verification testing, and network documentation.

Product Requirements

The following products are required for ARPA/iX:

- HP 3000 Series 900 software:
  - MPE/iX Release 2.2 or later
- HP OpenView DTC Manager Software (HP D2355A):
  - Release 10.5 or later

Note: HP OpenView DTC Manager is only a requirement for TELNET capability, and is not required if purchasing HP ARPA FTP as a standalone product.

DTC48s with a date code less than 3110 require a memory upgrade to support TELNET. The memory upgrade is orderable as an option (#001) to the HP ARPA/40 Services/iX (HP 36955A) or to the HP ARPA Telnet Access (HP 2347A) products. In addition, this upgrade may be ordered as a standalone product (HP 2348A).

HP ARPA FTP requires the installation of either the HP ThickLAN 3000/iX Network Link (HP 36923A) or the DTC/X.25/iX Network Link (HP 36939A). Please refer to the data sheets in this specification guide.

Ordering Information

Five ARPA/iX products provide maximum flexibility:

1. HP ARPA/40 Services/iX—Provides FTP and up to a maximum of 40 concurrent TELNET sessions for a specified low end HP 3000 Series 900 system
2. HP ARPA/80 Services/iX—Provides FTP and up to a maximum of 80 concurrent TELNET sessions for a specified high end HP 3000 Series 900 system
3. HP ARPA Telnet Access—Provides up to a maximum of 40 concurrent TELNET sessions to the HP 3000 Series 900
4. HP ARPA Telnet Express—Provides up to a maximum of 80 concurrent TELNET sessions to the HP 3000 Series 900
5. HP ARPA File Transfer Protocol—Provides FTP as a standalone product

Depending on your environment you will purchase the product that best meets your needs:

- If you have a requirement for both TELNET and FTP, you will need to purchase the ARPA product based on your system (that is, 920, 922, 932 etc).
- If you require more TELNET sessions to access an HP 3000 than are provided by one of the ARPA/40 or ARPA/80 products, you will need to purchase additional TELNET products (HP ARPA Telnet Access or Telnet Express).

- If you have a second HP 3000 system and don't require additional TELNET sessions to that HP 3000, you need to purchase the standalone HP ARPA FTP product for the second system.
- If you have an HP 3000 Series 900 system that you are upgrading and you require an FTP upgrade, then the standalone HP ARPA FTP product with the appropriate upgrade credit will be ordered. Even if you originally order an ARPA/40 or ARPA/80 product, the standalone FTP product should be ordered to obtain the necessary FTP upgrade.
- Lastly, if you have an environment that does not have an FTP need, then the HP ARPA Telnet Access and Telnet Express products will meet your TELNET session needs.

Ordering ARPA Services/iX

HP 36955A—HP ARPA/40 Services/iX provides HP ARPA FTP for the selected system and an HP ARPA Telnet Access card (40 concurrent TELNET sessions).

Select **one** Processor Option (3XX) and if necessary, order the DTC48 memory upgrade option 001

Processor Options

310 For Series 920 or 922LX
315 For Series 922RX
320 For Series 922, 925LX, 925 or 932
001 Memory upgrade for DTC48s with date code less than 3110

Note: Option 001 must be ordered to ensure Telnet Access functionality in DTC48s with the specified datacodes.

Only one Telnet Access card may reside in a DTC48, and the same DTC48 may not also contain a DTC/X.25 Network Access card.

HP 2344A—HP ARPA Telnet Express provides user access from ARPA/TELNET hosts to the HP 3000, with a maximum number of 80 concurrent TELNET sessions.

Select **one** LAN configuration option (24X) and if necessary, option 015 for 220 volt operation.

015 For setting Telnet Express for 220 V operation
240 Configure Telnet Express for ThickLAN (MAU and AUI provided)
241 Configure Telnet Express for AUI operation. (NO MAU or AUI provided) To connect the Telnet Express to an EtherTwist network, order the HP EtherTwist MAU (P/N 28685A)
242 Configure Telnet Express for ThinLAN (BNC T-connector provided)

HP 2347A—HP ARPA Telnet Access provides user access from ARPA/TELNET hosts to the HP 3000, with a maximum number of 40 concurrent TELNET sessions.

001 Memory upgrade for DTC48s with date code less than 3110

Note: Option 001 must be ordered to ensure Telnet Access functionality in DTC48s with the specified date codes.

Only **one** Telnet Access card may reside in a DTC48, and the same DTC48 may not also contain a DTC/X.25 Network Access card.

HP 2348A—DTC Upgrade kit—memory upgrade for DTC48. If the DTC48 to be used for TELNET access has a date code less than 3110, this memory upgrade is required.

HP 36957A—HP ARPA File Transfer Protocol (FTP) provides a standalone copy of the ARPA FTP service for the selected system.

Select **one** Processor Option

UD8 For 20-user license
UCZ For 48-user license
UB9 For 64-user license
UD9 For 100-user license
UDV For 160-user license
UBP Unlimited user license

Optionally select **one** Credit Option (OXX)

OCD Upgrade credit for option 310
OGJ Upgrade credit for option 315
OCE Upgrade credit for option 320
OCF Upgrade credit for option 330
OGL Upgrade credit for option 335
OGM Upgrade credit for option 340
UEK Upgrade credit for option 350

Upgrade credits are only applicable when purchasing a license for HP ARPA File Transfer Protocol on a larger HP 3000 Series 900.

Ordering HP OpenView DTC Manager
If the DTC will be used for multivendor TELNET access, an HP OpenView PC workstation, running HP OpenView Windows, and HP OpenView DTC Manager, is needed.

HP D2355A—HP OpenView DTC Manager Software

HP 32054B—HP OpenView Windows Workstation provides users with a specially configured HP Vectra, with the required hardware and software to run HP OpenView DTC Manager. It includes 2MB additional memory, HP ThinkJet printer, MS-DOS, MS-Windows, HP OpenView Windows, and HP AdvanceLink for Windows.

Order option ABA—ABZ for correct localization.

Order **one** network connection option 101, 102, or 103:

101	For ThinLAN connection
102	For ThickLAN connection
103	For EtherTwist connection

Order option 201 to have HP OpenView DTC Manager pre-installed on the HP OpenView Windows workstation.

For more information, please refer to the "HP OpenView Windows Workstation" and the "Datacommunications and Terminal Controller" data sheets.

Documentation

The following set of documentation is included with the HP ARPA Services/iX products (HP 36955A or 36956A).

36957-61001 Installing and Managing HP ARPA File Transfer Protocol Network Manager's Guide
36957-61002 HP ARPA File Transfer Protocol User's Guide
02345-90025 HP 2345A DTC Installation and Service Manual for the HP ARPA Telnet Access (if you purchase HP ARPA/40 Services/iX)
02344-90001 HP 2344A ARPA Telnet Express Installation Guide for the HP ARPA Telnet Express (if you purchase HP ARPA/80 Services/iX)

The following set of documentation is included with the HP ARPA Telnet Access product (HP 2347A):

02345-90025 HP 2345A DTC Installation and Service Manual

The following set of documentation is included with the HP ARPA Telnet Express product (HP 2344A):

02344-90001 HP 2344A ARPA Telnet Express Installation Guide

The following set of documentation is included with the HP ARPA File Transfer Protocol product (HP 36957A):

36957-61001 Installing and Managing HP ARPA File Transfer Protocol Network Manager's Guide

36957-61002 HP ARPA File Transfer Protocol User's Guide

The following set of documentation is included with the HP OpenView DTC Manager product (HP D2355A):

D2355-90001 Using the HP OpenView DTC Manager
D2355-90002 Quick Reference Guide for Terminal Users
D2355-90012 DTC Network Planning and Configuration Guide

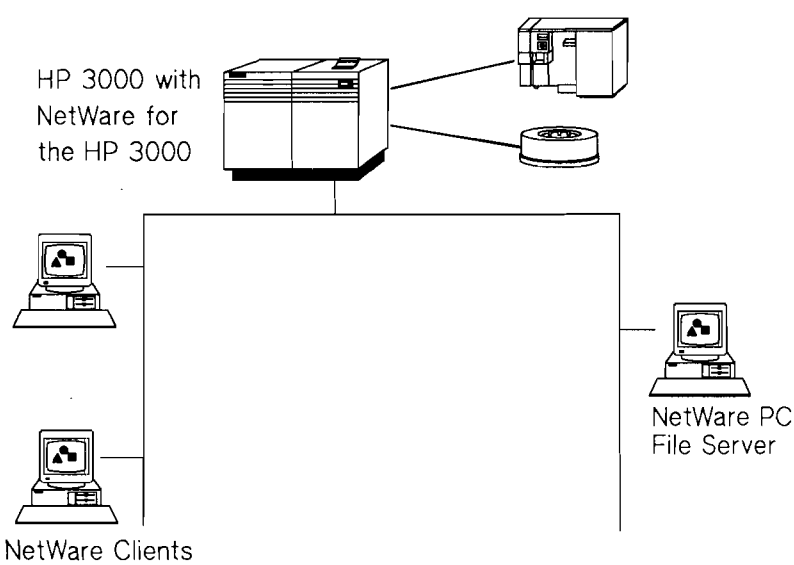
HEWLETT® PACKARD

NetWare for the HP 3000

Technical Data

Product Number
HP 32020B

NetWare for the HP 3000 brings the most commonly installed Personal Computer (PC) Network Operating System (NOS) to the HP 3000 Series 900. NetWare for the HP 3000 provides the functionality of Novell Inc.'s PC services Version 3.11a including file and printer sharing, and server administration functions (such as password security, connection maintenance, bindery facility, print queue management, and accounting services). The HP 3000 with NetWare services will connect to existing Novell networks or can be used to build new NetWare networks and provide the same services as NetWare PC based servers. What the user will see, however, is the power and capability of the HP 3000, such as a wide variety of peripherals, large memory capacity, and processing power.



These features will bring expandability to PC networks never before possible.

In addition to file and print sharing capabilities, NetWare on the HP 3000 provides support for NetWare Application Programming Interfaces (API). These APIs are the foundation for client/server applications on NetWare networks. Client/server applications will highlight the power of the HP 3000 as an On Line Transaction Processing (OLTP) server by using the PC's user friendly features coupled with the powerful OLTP capabilities designed into the MPE operating system.

Traditional terminal based applications are also supported from a NetWare client. The HP PC ARPA and Network Services product can be added to the PC client to provide VT capabilities. This product is ordered separately.

Features

- NetWare for the HP 3000 provides the same services as other NetWare server implementations.
- Support for NetWare's application programming interface (APIs).
- Uses NetWare's SPX/IPX network transport.

Functional Description

NetWare for the HP 3000 provides all of the basic resource sharing functionality a user has come to expect from a NetWare server. Added are the resources that only the power of the HP 3000 Series 900 can provide including larger systems and peripherals, security and reliability, and access to sophisticated, complex, mission-critical applications.

File Sharing

To the end user, the file sharing capability includes familiar NetWare file access, file allocation, and administration features. Also, NetWare features such as resource accounting, password protection, and file backup are included. Backward compatibility for NetWare clients to version 2.1 insures installation of NetWare for the HP 3000 will not cause interruption of Novell networks already installed.

Access to MS-DOS® files from MPE applications is provided through Posix utilities.

Printer Sharing

Printer sharing and print queue management is provided through the same commands familiar to all NetWare users. This insures transparent print services with no special commands or procedures to be learned. Any supported HP 3000 spooled printer can be used to print from a NetWare server print queue. Up to 16 supported HP 3000 spooled printers can be associated with a NetWare server print queue. HP 3000 environment files can be associated with a print queue as well.

Application Programming Interface (API)

Of particular importance to developers and end users alike is support of the interprocess communication capability that NetWare for the HP 3000 provides. APIs are the foundation upon which client-server applications are based. The HP 3000 is a powerful server platform for mission critical OLTP database client-server applications being developed for corporations of all size today.

NetWare for the HP 3000 provides support for APIs such as Transport Layer Interface (TLI) which provides programmatic access to NetWare's Sequenced Packet Exchange (SPX) and Internet Packet Exchange (IPX) transport layer protocols.

HP PC ARPA and Network Services

Access to existing HP 3000 applications from a NetWare client is very important. The HP PC ARPA and Network Services product provides NetWare clients with VT capabilities. HP PC ARPA and Network Services is ordered separately. HP PC ARPA and Network Services provides NetWare clients PCs running MS-DOS with Terminal Access. Network File Transfer, and interprocess communication connectivity to hosts with the complimentary ARPA or NS services.

For detailed information on this product see the HP PC ARPA and Network Services (HP J2246A) data sheet.

Network Capacity

NetWare for the HP 3000 will support up to 250 clients per server. Of course the actual number of clients supported on an individual server will depend on what applications and network functions are running on that server.

A maximum of one NetWare server can be supported per HP 3000 system.

System Environment

NetWare for the HP 3000 is available on all HP 3000 Series 900 systems.

Note: NetWare for the HP 3000 requires installation and operation of the ThinLAN 3000/iX Link or Token Ring 3000/iX Link.

Installation Policy

NetWare for the HP 3000 is a customer installable product. Full installation and operation documentation is included with the product. The customer is responsible for performing the following tasks in order to successfully install and configure NetWare for the HP 3000:

- Verify the proper installation, configuration, and functioning of the network link.
- Update the HP 3000 system to the proper release level and install the NetWare for the HP 3000.
- Verify that all the necessary software modules have been successfully installed and are at the correct version levels.
- Verify the successful installation of the HP NetWare for the HP 3000 product by accessing the NetWare for the HP 3000 server from a NetWare PC client.
- It is highly recommended that customer personnel be trained on Novell's NetWare in order to take advantage of the full range of NetWare capabilities. Contact Novell's education department for information on Novell NetWare education courses.

Support Products

Contact your local HP sales representative for further information on software and network support options for NetWare for the HP 3000 and PC LAN products.

Ordering Information

HP 32020B NetWare for the HP 3000

Select **one** user license option.

User license options

UA3	8-user license
0AF	20-user license
UA7	32-user license
UA9	64-user license
UBD	100-user license
UD6	250-user license
0B0	Delete documentation

Upgrade Credit Options

UD3	Credit for 8-user license
UD8	Credit for 20-user license
UB7	Credit for 32-user license
UB9	Credit for 64-user license
UD9	Credit for 100-user license

When adding users, the customer must select the upgrade credit option which pertains to their current user license option in addition to the new user license option on the same order.

Documentation

The following documentation is provided with NetWare for the HP 3000:

32020-90027 NetWare for the HP 3000 Installing and Administering Guide
J2240-61001 NetWare Installation
J2240-61003 NetWare User Basics for DOS Workstations
J2240-61004 NetWare Utilities
J2240-61005 NetWare Concepts
J2240-61006 NetWare Troubleshooting and Error Messages
J2240-61008 NetWare Print Server

Novell's NetWare DOS and Windows client software and manuals are also included.

HEWLETT® PACKARD

HP LAN Manager/iX (Named Pipes)

Technical Data

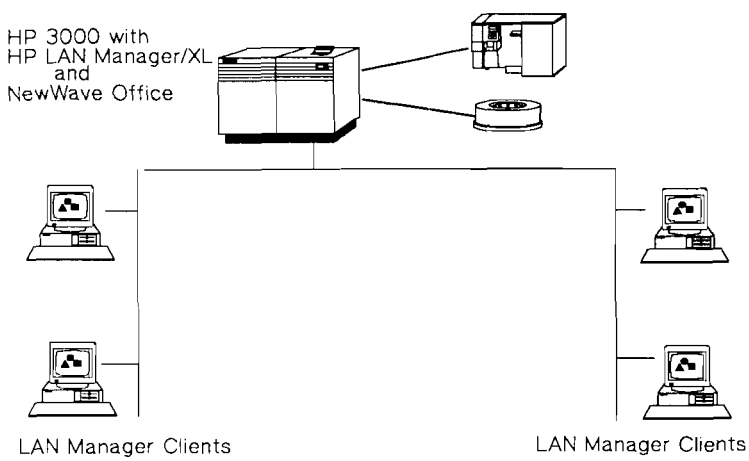
Product Number
HP 32015A

The LAN Manager Network Operating System (NOS) is fast becoming a standard in networking personal computers (PC). Hewlett-Packard has been leading the way in networking PCs and integrating them into corporate wide networks. HP LAN Manager/iX* for the HP 3000 Series 900 provides the Named Pipes functionality to further this leadership.

* Based on Microsoft® LAN Manager/X.

The initial release of LAN Manager on the HP 3000 is for the Application Program Interface (API) Named Pipes. Named Pipes is a method used by application programs to talk to each other and to exchange data. This exchange of data is, of course, the foundation on which client-server computing is based. Because Named Pipes is the API of choice for all LAN Manager client-server implementations, support for it on the HP 3000 Series 900 is very important. The benefit to the customer is interoperability. The benefit to an application developer is portability and network independence. With a common API, LAN Manager clients from one vendor will be able to talk to LAN Manager servers from any vendor.

Many PC LAN users think of file and print sharing when they consider LAN Manager. File and print sharing is already provided on the HP 3000 by New Wave Office. HP LAN Manager clients running on the HP Vectra will be able to access New Wave Office products. Current products offer a great deal of functionality on the HP 3000 for services to the PC. With New Wave Office and support for LAN Manager clients, users can share resources, manage personal applications, and benefit from a wide variety of information access and distribution products. Support for LAN Manager Named Pipes on the HP 3000 Series 900 will enhance these capabilities even more.



Traditional terminal-based applications are also supported from a LAN Manager client. NS 2.1 for DOS can be added to the PC client providing full NS capabilities. These include VT, NFT, and RPM/NetIPC.

Features

- LAN Manager on the HP 3000 provides a growth path from PC based networks.
- Named Pipes is an industry-standard API supported by all major computer and software vendors.
- Named Pipes is a high-level API providing a great deal of platform independence and portability.

Functional Description

HP LAN Manager/iX Named Pipes provides the interprocess communication capability required for developing and implementing client-server applications. Named Pipes includes both the server and client software necessary for a single application to be broken into processes that can be distributed across multiple computers on the network. The following describe in more detail the specific intrinsics supported.

HP Network Services 2.1 Connectivity

Access to existing HP 3000 applications from a LAN Manager client is very important. HP Network Services 2.1/MS-DOS® can be ordered separately and provides LAN Manager client PCs running

MS-DOS with Terminal Access (VT), Network File Transfer (NFT), and Network Interprocess Communication (NetIPC) to hosts with the complimentary NS services. For detailed information on this product see the HP Network Services 2.1/MS-DOS data sheet.

Network Capacity

The network capacity of the HP LAN Manager/iX product is measured by the number of concurrent Named Pipes sessions that can be established between a server and a client. The effective throughput and response time will, of course, be dependent on the size of the system and what other tasks the system is expected to perform. The maximum number of server sessions that can be established, however, is 400. The maximum number of client sessions that can be established from a single client is 240.

Application Programming Interface (API)

Named Pipe API	Functionality
DosMakeNmPipe	Create a new instance of a Named Pipe
DosConnectNmPipe	Make Named Pipe available for connection by client
DosRead	Read from a Named Pipe
DosWrite	Write to a Named Pipe
DosClose	Destroy instance of a Named Pipe
DosBufReset	Block until all data is read from Named Pipe
DosDisconnectNmPipe	Close Named Pipe connection to client
DosPeekNmPipe	Examine data in Named Pipe without removing it
DosQNmpHandState	Get information on state of a Named Pipe endpoint
DosQNmPipeInfo	Get Named Pipe buffer size and instance number
DosSetNmpHandState	Modify read and blocking modes of pipe endpoint
DosTransactNmPipe	Write to and then Read from a Named Pipe
Administrative Functions	
LM ADMIN	Start a shell for issuing LAN Manager commands
LM START SERVER	Start the LAN Manager server
LM STOP SERVER	Stop the LAN Manager server
LM ERROR	Review the error log
LM HELP	On-line help
LM STATUS	Retrieve the status of the server
LM SESS	Retrieve the status of a connection to the server

System Environment

HP LAN Manager/iX is available on all HP 3000 Series 900 systems with Release 3.0 or later.

Note: HP LAN Manager/iX requires installation and operation of the ThinLAN 3000/iX Link.

Installation Policy

HP LAN Manager/iX is a customer installable product. Full installation and operation documentation is included with the product. The customer is responsible for performing the following tasks in order to successfully install and configure HP LAN Manager/iX server and client product:

- Verify the proper installation, configuration, and functioning of the ThinLAN 3000/iX Link.
- Update the HP 3000 system to the proper release level and install the HP LAN Manager/iX product.
- Verify that all the necessary software modules have been successfully installed and are at the correct version levels.
- Verify the successful installation of the HP LAN Manager/iX product by accessing the HP LAN Manager/iX server from a LAN Manager PC client.

HP installation is available on a time-and-materials basis chargeable to the customer.

Ordering Information

HP 32015A HP LAN Manager/iX Right-to-Use

Select **one** Processor Option.

Processor Options

310	For Tier 1 SPUs
315	For Tier 2 SPUs
320	For Tier 3 SPUs
330	For Tier 4 SPUs
335	For Tier 5 SPUs
340	For Tier 6 SPUs
350	For Tier 7 SPUs

Upgrade Credit Options

OCD	For Processor Option 310
OGJ	For Processor Option 315
OCE	For Processor Option 320
OCF	For Processor Option 330
OGL	For Processor Option 335
OGM	For Processor Option 340

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor option in addition to the new processor option on the same order.

Documentation

The following documentation is provided with HP LAN Manager/iX:

32015-61003 HP LAN Manager/iX Programmer's Reference Manual
32015-61001 Installing and Administering HP LAN Manager/iX

HEWLETT® PACKARD

NS3000/iX Network Services

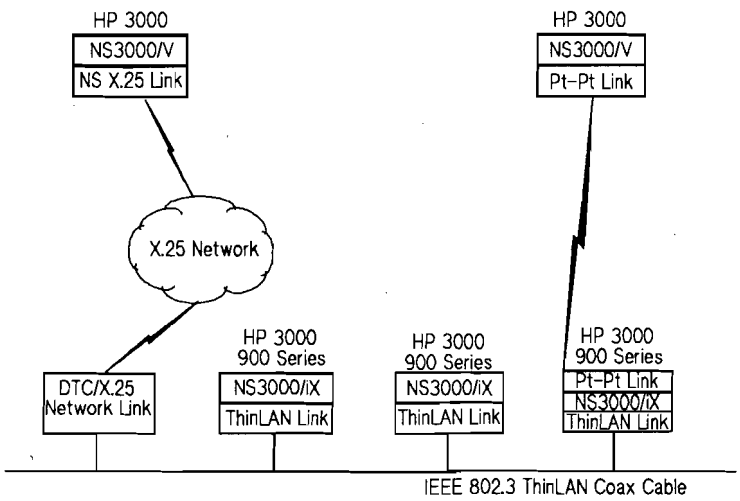
Technical Data

For HP 3000 Series 900 Computer Systems
Product Number
HP 36920A

NS3000/iX (Network Services for the 900 Series HP 3000) provides networking capabilities between locally or remotely networked HP 3000 systems. The high-level services provided to interactive users and to application programs include file transfer, remote IMAGE/SQL database access, virtual terminal access, and remote file and peripheral access.

For MPE/iX-based processors, NS3000/iX extends the domain of many MPE capabilities beyond the boundaries of a single computer. An application program can read and write files and databases on remote systems with the same commands used to read and write local files and databases. This facilitates easy and transparent movement of data or information across the network.

An MPE/iX-based system with NS3000/iX can communicate with HP 3000s running NS3000/V or NS3000/iX over HP local and wide area network links, including the ThinLAN 3000/iX Network Link, Token Ring 3000/iX Network Link, the NS Point-to-Point 3000/iX Network Link, and the X.25/iX Network Link (see network link data sheets for availability).



Features

- For communication with other HP 3000 systems running NS3000/V or NS3000/iX, a variety of network services are available, providing a choice of capabilities to address any specific task:
  - Remote database access
  - Remote file access
  - Remote peripheral access
  - Network file transfer
  - Virtual terminal access
  - NetIPC
  - RPM
- The services provided with NS3000/iX are fully interoperable with those of NS3000/V, with the single exception of Program-to-Program Communication, which is only supported by NS3000/V.
- Network File Transfer and Network InterProcess Communication are supported

to the HP 9000, HP 1000, and HP Vectra. Additionally, Network File Transfer is supported to DEC VAX/VMS computers that are running HP's NS for the DEC VAX product.

- NS3000/iX and the associated NS network link products were built in conformance with the International Standards Organization's Open Systems Interconnection (OSI) model. NS3000/iX provides the functionality of OSI layers six and seven (presentation and application layers).
- NS3000/iX capabilities are accessible from applications in many languages, including COBOL II, FORTRAN, Pascal and SPL Programs.

DEC, VAX, and VMS are trademarks of Digital Equipment Corporation.

Functional Description

NS3000/iX is designed to extend the capabilities of the MPE/iX operating system beyond a single computer to a network of computers. NS3000/iX is particularly useful in applications that involve transaction processing and are functionally dispersed among several HP 3000 systems. Any system command and many operating system intrinsics may be executed remotely through a simple extension provided by NS3000/iX. The terminal user or application programmer requires no knowledge of the communication protocol or physical link.

NS3000/iX requires users to pass all the security checks imposed by MPE/iX, such as entering passwords when logging on to a remote system. NS3000/iX also provides additional security features applicable only to a network environment. For example, the system operator may limit activity on a communication link to either incoming access or outgoing access.

The following describes the facilities provided by NS3000/iX, communicating with NS on an MPE VE- or MPE/iX-based HP 3000 system.

Remote File and Peripheral Access

With NS3000/iX the user gains access to files and peripheral devices on a remote system as easily as access to files and peripheral devices on the local system. MPE provides a set of intrinsics for local file manipulation—FOPEN, FREAD, FWRITE, etc. —and since MPE treats peripherals similarly to files, the same intrinsics are used to handle local peripheral devices. NS3000/iX transparently extends the operation of these intrinsics to files and peripherals residing on another HP 3000.

NS3000/iX implements the extensions at the intrinsic level, in cooperation with the operating system. For this reason, user applications written in most languages, as well as most HP-provided utility programs, gain this ability to access remote files and peripherals. NS3000/iX and MPE must know the location of the file or peripheral to be accessed. The user provides this information by appending ":nodename" to the file name in the call to FOPEN or in the ":FILE" equation. The same security provisions apply to remote access as apply to local access, including logon passwords.

Remote Database Access

IMAGE/SQL provides a set of intrinsics (DBOPEN, DBGET, DBPUT, etc.) that allows an application program to access a IMAGE/SQL database. NS3000/iX transparently extends these intrinsics to permit manipulation of a IMAGE/SQL database residing on a remote system. Password security for logon and IMAGE/SQL database access apply to remote access.

The user specifies the location of the database, through an MPE ":FILE" equation or through a database access file. The MPE ":FILE" equation can be executed either just before invoking the application program or from inside the application program via the MPE COMMAND intrinsic. The first method completely removes any knowledge of the database location from the application program, but not from the user. The second removes the knowledge from the user and embeds it in the application program.

To isolate both the user and the application program from needing to know the database location, IMAGE/SQL allows the database administrator to create a database access file that defines the location of the database and the authorized users. Only the administrator need be concerned with actual locations; IMAGE/SQL and NS3000/iX handle the rest. This flexibility allows the administrator to relocate databases without affecting the users' operating procedures or modifying application programs.

Network File Transfer
The DSCOPY utility program transfers files from one system to another in large buffers containing multiple records. DSCOPY can be invoked from a session, a job, or a program. The source file node, the destination file node, or both may be remote from the node on which the transfer is initiated. Compared to using FCOPY with Remote File Access, DSCOPY reduces the NS3000/iX overhead and makes more efficient use of the communication line capacity.

Virtual Terminal Access
From a terminal on a local HP 3000 system, a user may log on to a remote HP 3000 and conduct an interactive session as if the terminal were directly connected to the remote system. Character-mode applications and block-mode applications using VPLUS are supported. This capability requires no distinct command language, simply a specification of the remote system and the prefix ":REMOTE". For example, to log on to the remote system enter ":REMOTE HELLO user.account". To execute a stream of commands on the remote system, the keyword ":REMOTE" by itself connects the terminal to the remote system until the user requests a return to the local system. Multiple remote sessions to a single node or multiple remote sessions from a single local session can be established. In order to distinguish the sessions, an interactive user can specify the prompt for each session. Programs may also communicate with the remote operating system command interpreter by using the MPE COMMAND intrinsic.

For PCs connected to an HP 3000 over an IEEE 802 LAN, Virtual Terminal Access allows terminal emulation access to most HP 3000 applications. An HP Services product and compatible terminal emulator are required on the PC.

Remote Process Management
Remote Process Management consists of a set of intrinsics used to initiate and terminate remote processes. These intrinsics will normally be used in conjunction with the Network InterProcess Communication intrinsics, allowing an entire distributed application to be controlled from a single system. Created processes may be independent (continue executing when the creating process terminates) or dependent (terminate when the creating process terminates).

Migration to NS3000/iX from NS3000/V

Applications on HP 3000s that use the NS3000/V capabilities of Remote File Access, Remote Database Access, Network File Transfer, Virtual Terminal Access, Remote Peripheral Access, Network InterProcess Communication, and Remote Process Management can be moved to an MPE/iX-based system via a STORE tape. They will run using NS3000/iX with no recompilation necessary in most cases. (Note that the NS3000/V Program-to-Program communication is not supported on NS3000/iX. In addition, no-wait I/O for RFA is not available.)

Migration to NS3000/iX from DS/3000

Applications on HP 3000s that use the DS/3000 capabilities of Remote File Access, Remote Database Access, Network File Transfer, and Virtual Terminal Access can be moved to the MPE/iX-based system via a STORE tape. They will run with NS3000/iX with no required changes to programs or job streams, and with no recompilation in most cases. (Note that the DS/3000 capability of Program-to-Program communication will not be supported on NS3000/iX. With the advent of a newer, more powerful technology in NetIPC, it is to the user's advantage to

use this technology as opposed to the older, less functional PTOP.)

Network Capacity and Performance

The maximum number of separate conversations with other nodes that a single processor can support and the peak user data rates achievable on each communication link are complex functions of many interrelated variables. Among these are the type of NS3000/iX capability being used, the main memory and speed of each processor that is a party to the conversation (and its peripherals), and the load on each system from non-network applications.

Because of the number and complexity of these factors, it is difficult to make accurate generalizations about capacity and performance. Hewlett-Packard Technical Consultants are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

Supported HP Subsystems and Applications

Most HP subsystems are supported by NS3000/iX. These include the MPE Commands and FOS Subsystems provided with MPE/iX. Other HP subsystems and applications are being tested on a continuing basis; consult your HP Sales Representative for the current detailed list of supported software.

Installation and Configuration Policy

The NS3000/iX Services product is completely customer installable. No additional product configuration is necessary.

Customer Responsibility

The customer is responsible for performing the following tasks in order to successfully install the NS3000/iX Services product:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Verifying the proper installation, configuration, and functioning of the associated NS link product (ThinLAN 3000/iX Link, Token Ring 3000/iX Network Link, NS Point-to-Point 3000/iX Network Link and/or DTC X.25/iX Network Link).
- Updating the HP 3000 system to the proper release level and installing the NS3000/iX Services product using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Verifying the successful installation of the NS3000/iX Services product by issuing the appropriate NSCONTROL start command for an associated started Network Interface and communicating with another node on this network installed with either the NS3000/V Services (HP 32344A) or NS3000/iX Services.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP 36920A NS 3000/iX Network Services

User license option must align with MPE/iX license.

Select **one** user license option.

User License Options

0AF 8/20-user license
UCY 32/40-user license
UA9 64-user license
UBD 100-user license
UCN 128/160-user license
UAT 256/384/unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
0CD Credit for Processor Option 310
0GJ Credit for Processor Option 315
0CE Credit for Processor Option 320
0CF Credit for Processor Option 330
0GL Credit for Processor Option 335
0GM Credit for Processor Option 340
UEK Credit for Processor Option 350
0G1 Rt/credit for MPE/V 310
0G2 Rt/credit for MPE/V 320
0G3 Rt/credit for MPE/V 330

In order to receive the upgrade credit, customers must select the upgrade credit option which pertains to their current user license option or processor option in addition to the new user license option on the same order.

Network Links

HP 36923A ThinLAN 3000/iX Network Link
HP J2167A Token Ring 3000/iX Netwrk Link
HP 36922A NS Point-to-Point 3000/iX Network Link

DTC/X.25/iX Network Link

HP 36939A X.25/iX System Access
HP J2070 opt 1CW X.25/RS-232 Netwrk Access card
HP J2070A opt 1CX X.25/V.35 Netwrk Access card
HP J2079A Add-on X.25 Network Access card for DTC72MX
- opt 1CW Add-on X.25/RS-232 Network Access card for DTC72MX
- opt 1CX Add-on X.25/V.35 Network Access card for DTC72MX

HP 2346D Add-on RS-232 DTC48 X.25 Network Access card
HP 2346E Add-on V.35 DTC48 X.25 Network Access card

The appropriate software, hardware, interface card, and cables are included in each network link. For more information, consult the appropriate data sheet.

Support Products

36920A+S00 Software Material Subscription (SMS) for NS3000/iX
36920A+W00 Extended SMS for NS3000/iX

Documentation

Provided with NS3000/iX

36920-61000 Using NS3000/iX Network Services

Related Documentation

36922-61005 NS3000/iX Operations and Maintenance Reference Manual
36923-61000 NS3000/iX Error Messages Reference Manual
36922-61003 NS3000/iX NMMGR Screens Reference Manual
36920-61005 NetIPC 3000/iX Programmer's Reference Manual
32022-61005 Using the Node Management Services (NMS) Utilities
36922-61023 HP 3000/iX Network Planning and Configuration Guide
36922-61029 HP SNMP/iX User's Guide
36939-61004 Configuring and Managing Host-Based X.25 disks

HEWLETT® PACKARD

NS3000/V Network Services

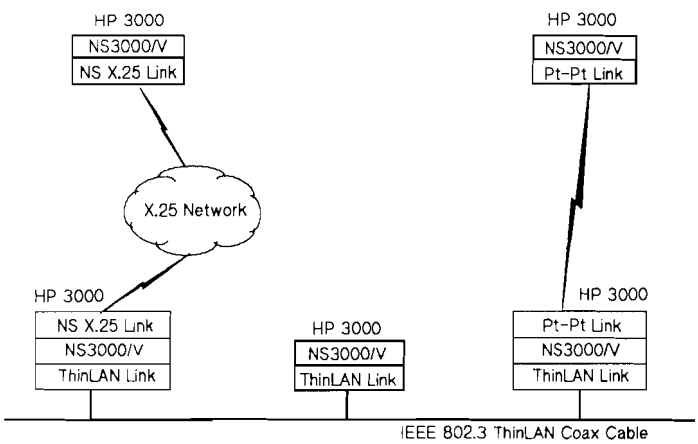
Technical Data

For HP 3000 Computer Systems Product Number HP 32344A

NS3000/V (Network Services for the HP 3000) provides extensive networking capabilities between locally or remotely networked HP 3000 systems. The high-level services provided to interactive users and to application programs include file transfer, remote database access, virtual terminal access, interprocess communication, remote process management, and remote file and peripheral access.

For HP 3000 processors running the MPE VE and subsequent operating systems, NS3000/V extends the domain of many MPE capabilities beyond the boundaries of a single computer. An application program can read and write files and databases on remote systems with the same commands used to read and write local files and databases. This facilitates easy and transparent movement of data or information across the network.

An HP 3000 system with NS3000/V can communicate with other HP 3000s running NS3000/V or NS3000/iX over HP local and wide area network links, including the ThinLAN 3000 Network Link, the NS Point-to-Point 3000 Network Link, the NS X.25 3000 Network Link, the Asynchronous Serial Network Link, and the Satellite Network Link.



Features

- For communication with other HP 3000 systems running NS3000/V or NS3000/IX over NS network link products, a variety of network services are available, providing a choice of capabilities to address any specific task:
  - Remote Database Access
  - Remote File Access
  - Remote Peripheral Access
  - Network File Transfer
  - Virtual Terminal Access
  - Program-to-Program Communication (NS3000/V only)
  - Remote Process Management

- Network InterProcess Communication (included in ThinLAN 3000)

- The services provided with NS3000/V are fully interoperable with those of NS3000/IX, with the single exception of Program-to-Program Communication, which is only supported by NS3000/V.
- Network File Transfer and Network InterProcess Communication are supported to the HP 9000, HP 1000 and HP Vectra. Additionally, Network File Transfer is supported to DEC VAX/VMS computers that are running HP's NS for the DEC VAX product.
- NS3000/V and the associated NS network link products, in accordance with the HP AdvanceNet strategy, were built in conformance with the International Standards Organization's Open Systems Interconnection (OSI) model. NS3000/V provides the functionality of OSI layers six and seven (presentation and application layers).
- For communication with other HP 3000 systems running DS3000/V over DS network links, the following subset of capabilities is available:
  - Remote Database Access
  - Remote File Access
  - Remote Peripheral Access
  - Network File Transfer
  - Virtual Terminal Access
  - Program-to-Program Communication

* DEC, VAX, and VMS are trademarks of Digital Equipment Corporation.

- NS3000/V capabilities are accessible from applications in many languages, including COBOL II, FORTRAN, Pascal, and SPL.

Functional Description

NS3000/V is designed to extend the capabilities of the MPE operating system beyond a single computer to a network of computers. NS3000/V is particularly useful in applications that involve transaction processing and are geographically or functionally dispersed. Any system command and many operating system intrinsics may be executed remotely through a simple extension provided by NS3000/V. The terminal user or application programmer requires no knowledge of the communication protocol or physical link.

NS3000/V requires users to pass all the security checks imposed by MPE, such as entering passwords when logging on to a remote system. NS3000/V also provides additional security features applicable only to a network environment. For example, the system operator may limit activity on a communication link to either incoming access or outgoing access. The following describes the facilities provided by NS3000/V running between two HP 3000s over local or remote network links.

Remote File and Peripheral Access

With NS3000/V, the user gains access to files and peripheral devices on a remote system as easily as access to files and peripheral devices on the local system. MPE provides a set of intrinsics for local file manipulation—FOPEN, FREAD, FWRITE, etc.—and since MPE treats peripherals similarly to files, the same intrinsics are used to handle local peripheral devices. NS3000/V transparently extends the operation of these intrinsics to files and peripherals residing on a remote HP 3000.

NS3000/V implements the extensions at the intrinsic level, in cooperation with the operating system. For this reason, user applications written in most languages, as well as most HP-provided utility programs, gain this ability to access remote files and peripherals. NS3000/V and MPE must know the location of the file or peripheral to be accessed. The user provides this information by appending ":nodename" to the file name in the call to FOPEN or in the ":FILE" equation. The same security provisions apply to remote access as apply to local access, including logon passwords.

Remote Database Access

IMAGE provides a set of intrinsics—(DBOPEN, DBGET, DBPUT, etc.)—that allows an application program to access an IMAGE database. NS3000/V transparently extends these intrinsics to permit manipulation of an IMAGE database residing on a remote system. Password security for logon and IMAGE database access apply to remote access.

The user specifies the location of the database, either through an MPE ":FILE" equation or through a database access file. The MPE ":FILE" equation can be executed either just before invoking the application program or from inside the application program via the MPE COMMAND intrinsic. The first method completely removes any knowledge of the database location from the application program, but not from the user. The second removes the knowledge from the user, and embeds it in the application program.

To isolate both the user and the application program from needing to know the database location, IMAGE allows the database administrator to create a database access file that defines the location of the database and the authorized users. Only the administrator need be concerned with actual locations; IMAGE and NS3000/V handle the rest. This flexibility allows the administrator to relocate databases without affecting the users' operating procedures or modifying application programs.

Network File Transfer

The DSCOPY utility program transfers files from one system to another in large buffers containing multiple records. DSCOPY can be invoked from a session, a job, or a program. The source file node and the destination file node, or both, may be remote from the node on which the transfer is initiated. Compared to using FCOPY with Remote File Access, DSCOPY reduces the NS3000/V overhead, and makes more efficient use of the communication line capacity.

Virtual Terminal Access

From a terminal on a local HP 3000, a user may log on to a remote HP 3000 and conduct an interactive session as if the terminal were directly connected to the remote system. Character-mode applications and block-mode applications using VPLUS are supported. This capability requires no distinct command language, simply a specification of the remote system and the prefix ":REMOTE". For example, to log on to the remote system, enter ":REMOTE HELLO user.account". To execute a stream of commands on the remote system, the keyword ":REMOTE" by itself connects the terminal to the remote system until the user requests a return to the local system. Multiple remote sessions to a single node or multiple remote sessions from a single local session can be established. In order to distinguish the sessions, an interactive user can specify the prompt for each session. Programs may also communicate with the remote operating system command interpreter, using the MPE intrinsic COMMAND.

For PCs connected to an HP 3000 over an IEEE 802 LAN, Virtual Terminal Access allows terminal emulation access to most HP 3000 applications. An HP Network Services product and compatible terminal emulator are required on the PC.

Network InterProcess Communication

Network InterProcess Communication is a set of eighteen intrinsics used when there is a need to rapidly exchange data between processes. The relation between the process is peer-to-peer. Any process can initiate communication and any process can send or receive messages using these intrinsics. NetIPC can connect processes running on any combination of HP 3000s. It can also be used for local communication among processes on a single HP 3000.

Network InterProcess Communication is the ideal means for implementing efficient distributed applications. For example, an application program might be needed to post frequent transactions to a remote database. The communication overhead needed for the NS3000/V transparent extensions of the low-level IMAGE intrinsics might impose a performance penalty. The Network InterProcess Communication intrinsics allow the transactions to be sent to a cooperating application program, which performs complex database accesses locally and returns only the final result.

Program-to-Program Communication

NS3000/V provides a set of nine intrinsics for Program-to-Program communication, the "PTOP" intrinsics, over all network links. These intrinsics make it possible for two or more user programs residing in separate HP 3000s to exchange data and control information directly over a communication link. PTOP communication is master-slave (request-response). The master program always initiates the slave, and message exchange is always synchronized. PTOP is provided for compatibility with DS/3000.

Remote Process Management

Remote Process Management consists of a set of intrinsics used to initiate and terminate remote processes. These intrinsics will normally be used in conjunction with the Network InterProcess Communication intrinsics, allowing an entire distributed application to be controlled from a single system. Created processes may be independent (continue executing when the creating process terminates) or dependent (terminate when the creating process terminates).

NS3000/V Improvements over DS

NS3000/V offers improved transparency of access to remote files, peripherals, and databases; remote sessions can use :REMOTE NODE (Command) and FILE commands can include the node name (:FILE X=FILE. GROUP.ACCT:NODE). Enhanced capabilities include the ability to transfer a group of files with one DSCOPY command. DSCOPY does not require previous establishment of remote sessions; a remote logon ID can be appended to the node name, for example DSCOPY FILE:NODE[USER.ACCT]. Multiple remote sessions are possible to the same node, and each remote session can display a user-specified prompt. In addition, NS3000/V includes the Remote Process Management intrinsics. Network InterProcess Communication intrinsics are available as part of the NS network link products.

NS3000/V Compatibility with DS

The NS network links and services are HP's new generation of communication products, providing enhanced capabilities over that of the DS network links and services. Customers with DS products currently installed may choose to migrate their networks to the NS product line. When planning this migration, both network services and link products need to be considered.

The NS3000/V Network Services are a superset of the DS Network Services. User applications written using DS Network Services will run with little modification under NS3000/V Network Services. In addition, DS link products will run with the NS3000/V Network Services, though only DS-compatible services are supported in this configuration. To take advantage of the enhanced capabilities of NS3000/V Network Services, users should upgrade to NS3000/V network link products.

The NS network link products conform to layers 1 through 4 of the OSI seven-layer model. The DS network link products predate the OSI model and therefore have a different architecture from the NS network link products. As a consequence of these architectural differences, DS network links and NS network links cannot communicate with each other.

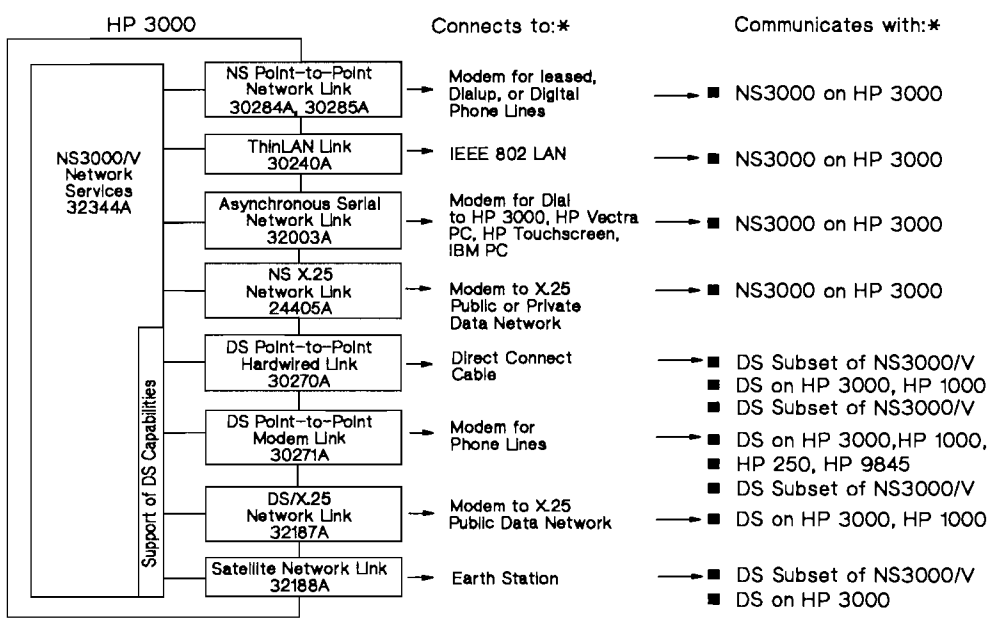
NS and DS network links can, however, coexist on the same node. NS3000/V network links can therefore be added to networks that currently contain DS network link products.

It is recommended that users establish a migration plan working with a Dedicated Network Systems Engineer.

Network Capacity and Performance

The maximum number of communication lines and separate conversations with other nodes that a single processor can support, and the peak user data rates achievable on each link, are complex functions of many interrelated variables. Among these are the type and speed of each communication line, the type of NS3000/V capability being used, the main memory and speed of each processor that is a party to the conversation (and its peripherals), and the load on each system from non-network applications.

Table 1.



*All network links require the same link products at both ends of the connection

NS3000/V and Network Links on HP 3000

Because of the number and complexity of these factors, it is difficult to make accurate generalizations about capacity and performance. Hewlett-Packard Systems Engineers and Peaked Network Systems Engineers are available to consult in network design. They have data on the system and network parameters that affect network operation. With this information and an accurate understanding of the target environment, they can assist in designing an effective network.

Product Requirements

- An HP 3000 MICRO 3000 (LX, GX, or XE), Series 37, 39, 4x, 5x, 6x, or 70
- MPE VE Extended microcode firmware
- At least 2 Mbytes of memory. (Generally, systems that are now memory-limited should add 1 Mbyte to maintain current performance.) See your HP System Engineer to help determine your requirements.

System Environment

NS3000/V is supported on the HP 3000 MICRO 3000 (LX, GX, or XE), Series 37 through 70, executing the MPE VE operating system, "U" MIT or later version.

Supported HP Subsystems and Applications

Most HP subsystems and applications are supported by NS3000/V. These include:

- MPE Commands and FOS Subsystems
- Office Systems, including HP DeskManager
- HP-to-IBM data communications

Other tested HP subsystems and applications are being added to this list on a continuing basis; consult your HP Sales Representative for the current detailed list of supported software (see Table 1).

Installation and Configuration Policy

The NS 3000/V Services product is completely customer installable. No additional product configuration is necessary.

Customer Responsibility

The customer is responsible for performing the following tasks in order to successfully install the NS 3000/V Services product:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Verifying the proper installation, configuration, and functioning of the associated NS link product (ThinLan 3000/V Link, NS Point-to-Point 3000/V Network Link, NS X.25 3000/V Network Link, and/or HP SERIAL Network).
- Configuring the Virtual Terminal (VTERM) devices into the system I/O configuration (if the HP 3000 does not already have a pool of VTERMs configured).
- Updating the HP 3000 system to the proper release level and installing the NS 3000/V Services product using AUTOINST. Refer to the HP 3000 Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Verifying the successful installation of the NS 3000/V Services product by issuing the appropriate NSCONTROL start command for an associated started Network Interface and communicating with another node on this network installed with either the NS 3000/V Services or NS 3000/iX Services (HP 36920A).

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP 32344A NS3000/V Right-to-Use on HP 3000 Series

Select **one** Processor Option.

Processor Options

310 For Series 37, MICROs
320 For Series 39–58
330 For Series 64–70

Upgrade Credit Options

0CD Upgrade credit for option 310
0CE Upgrade credit for option 320
311 DS upgrade credit with purchase of H2355A
312 DS Upgrade Credit
321 DS upgrade credit with purchase of H2355A
322 DS Upgrade Credit
331 DS upgrade credit with purchase of H2355A
332 DS Upgrade Credit

Documentation Options

099 Delete documentation

Network Links

30240A ThinLAN 3000/V Network Link LAN3000/V Network Link (optional)
30284/30285A NS Point-to-Point 3000/V Network Link
32003A Asynchronous Serial Network Link
24405A NS X.25 3000/V Network Link
32188A Satellite Network Link

The appropriate software, hardware interface card, and cables are included in each Network Link. For more information, consult the appropriate data sheet.

Support Products

32344A+S00 Software Material Subscription (SMS) for NS3000/V
32344A+W00 Extended SMS for NS3000/V

Documentation

Provided with NS3000/V:

32344-90001 NS3000/V User/Programmer Reference Manual
32344-90002 Volume I, NS3000/V Network Manager Reference Manual
32344-90012 Volume II, NS3000/V Network Manager Reference Manual
32344-90005 NS3000/V Error Message and Recovery Manual
5958-8581 NetIPC 3000/V Programmer's Reference Manual

Related Documentation

5958-8563 NS Cross-System NFT Reference Manual

HEWLETT® PACKARD

HP SNA Distributed Host Command Facility/iX

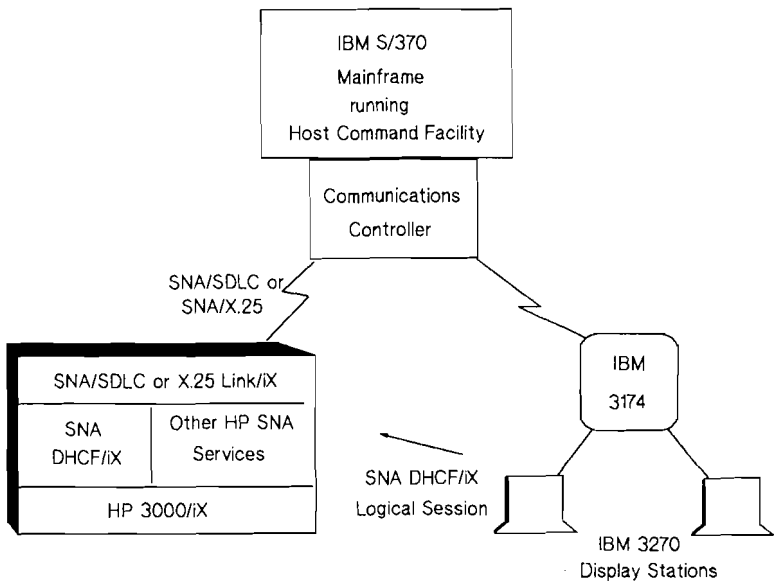
Technical Data

For HP 3000 Series 900 Computer Systems
Product Number
HP 36935A

The HP SNA Distributed Host Command Facility/iX (HP SNA DHCF/iX) software product provides IBM mainframe users who use IBM 3270 display stations with interactive access to an HP 3000 Series 900 system. Together with the IBM Host Command Facility (HCF Version 2) product on the IBM mainframe system, SNA DHCF/iX gives IBM 3270 display station users the capability to run many applications on the HP 3000 system. These applications include TTY-mode and VPLUS applications.

SNA DHCF/iX provides the data conversion services that translate output between applications on the HP 3000 and the IBM 3270 datastream required by IBM display stations. SNA DHCF/iX enables IBM 3270 display station users to access the HP 3000 system over their existing SNA or X.25 network. SNA DHCF/iX requires the installation and use of the SNA/SDLC Link/iX (P/N 30291A) or the SNA/X.25 Link/iX (P/N 30298A) product (referred to jointly as SNA Link). SNA Link products manage the physical link to the IBM mainframe and implement the datacom protocols in the lower three layers of SNA.

Note: Unless stated otherwise, "HP 3000" refers to MPE XL or MPE/iX only.



Features

- SNA DHCF/iX provides IBM 3270 display stations with HP terminal capabilities including support for TTY-mode (simple ASCII) applications and many VPLUS applications.

- VPLUS has been optimized for applications used with SNA DHCF/iX; VPLUS forms can be compiled into IBM 3270 terminal formats prior to runtime.
- SNA DHCF/iX provides HP terminal emulation support for screen sizes of 24, 32, or 43 lines for TTY-mode applications. VPLUS applications are supported with screens of up to 24 lines less any lines required for a window line or softkeys.
- In VPLUS applications, SNA DHCF/iX supports HP terminal softkeys (as PF keys) and a "window" line on IBM 3270 display stations using the bottom three lines of the screen.
- One MPE/iX session is provided for every SNA DHCF/iX user; each SNA DHCF/iX session appears as a Network Services Virtual Terminal (NS VT) session.
- SNA DHCF/iX supports the HP "Break" and "Control-Y" keys.
- SNA DHCF/iX can support up to 64 simultaneous sessions per SNA Link node. Using multiple SNA Link nodes, SNA DHCF/iX's session count is limited only by the number of shareable LDEVs available on the HP 3000.
- SNA DHCF/iX, SNA NRJE/iX, SNA IMF/iX, and LU6.2 API/iX software products are supported over the same SNA Link; each SNA Link can support up to 64 Logical Unit (LU) sessions. The maximum line speed supported by SNA Link is 64 Kbps.
- SNA DHCF/iX users can access HP MM II applications on the HP 3000.
- SNA DHCF/iX provides a full screen, ISPF-like editor for use by HP DeskManager users.
- SNA DHCF/iX contains a comprehensive and flexible logging facility that records SNA DHCF/iX session and error messages.

Functional Description

HP SNA DHCF/iX is a software product that provides an IBM 3270 display station with access to applications on an HP 3000. SNA DHCF/iX emulates many features of a remotely attached HP terminal; thus, it appears as if the IBM 3270 display station has a direct connection to the HP 3000 computer. SNA DHCF/iX can be operated across an existing SNA or X.25 network.

SNA DHCF/iX communicates with Host Command Facility (HCF) on the IBM mainframe in order to exchange data between the user's MPE session and the IBM terminal. To the HP 3000 system, each SNA DHCF/iX session appears as an NS VT session. For IBM 3270 display stations, SNA DHCF/iX provides access to two primary groups of applications on the HP 3000 Series 900 system.

- TTY-mode applications are characterized by their simple use of terminal control characters (carriage return, line feed, form feed, tab, bell). SNA DHCF/iX translates the data as output being sent to the IBM terminal. This group of applications includes the basic MPE/iX CI (Command Interpreter) commands.
- VPLUS applications are characterized by the use of the VPLUS forms subsystem that is included with the MPE FOS. VPLUS has been enhanced so that an applications programmer can design VPLUS-based applications for the IBM 3270 display station in addition to other HP terminals. Consequently, IBM 3270 display station users can be provided with access to many VPLUS-based applications using SNA DHCF/iX.

When developing VPLUS applications for use with SNA DHCF/iX, the application designer can develop and modify VPLUS forms using techniques similar to those for HP terminals. When the VPLUS forms have been designed and are ready to be compiled, the applications designer will select the "IBM 3270" box in the Terminal Selection Menu of FORMSPEC, in addition to any HP terminal options normally selected, in order to include the IBM 3270 format in the VPLUS forms file. Please note that, in an existing application, some VPLUS forms may need to be modified due to limitations of the IBM 3270 display station. Many of the VPLUS forms may require no changes.

Usage Considerations

HP SNA DHCF/iX is not a complete replacement for HP terminals such as the HP 700/92 and HP 700/94 terminals. Due to limitations of the IBM 3270 display station, SNA DHCF/iX cannot support all HP 3000 applications. In addition, some HP 3000 applications may require modifications prior to use with SNA DHCF/iX. Please refer to the SNA DHCF/iX Application Programmer's Guide (P/N 36935-61003) for information on usage considerations discussed here.

HP 3000 applications that use special screen-mode or block-mode features that are specific to HP terminals are not supported. Some of these restrictions include:

- HP terminal escape sequences used for cursor positioning, terminal strap settings, programmable softkeys, etc.
- Screen enhancements such as inverse video, blinking, underlining, etc.

SNA DHCF/iX can provide universal access to HPDESK for an integrated office automation solution.

Within VPLUS applications, SNA DHCF/iX supports all of the VPLUS intrinsics except for VPRINTSCREEN and VPRINTFORM. Due to limitations of the IBM 3270 display station, VPLUS forms caching is not supported with SNA DHCF/iX. In addition, several points need to be considered in VPLUS forms design including:

- Prior to using a VPLUS application with SNA DHCF/iX, the VPLUS forms file must be recompiled using the 'IBM 3270' terminal option.
- When using FORMSPEC to design VPLUS forms, an HP terminal such as the HP 700/94 is required.
- Unlike HP terminals, IBM 3270 display stations require an actual space on the screen for an attribute byte that describes the attributes of the following field.
- Each field on the IBM display station needs to be preceded by this attribute byte; consequently, back-to-back fields are not allowed on the IBM 3270.
- With SNA DHCF/iX, a VPLUS form can have at most 24 lines; if features such as softkeys (two lines) or a window line (one line) are used in the application, then the available lines for the form are reduced by the number of lines required by these features.

If the target application violates any of these restrictions, then it is not supported by SNA DHCF/iX. An error condition will be returned to the application when an unsupported feature is used. Prior to installation of SNA DHCF/iX, target HP 3000 applications should be qualified to ensure that they meet these restrictions.

When using SNA DHCF/iX, IBM 3270 display station users may experience different performance and functionality than HP terminal users. For IBM 3270 display stations, response times may be somewhat greater than an HP terminal due to the SNA network overhead.

Functional Specifications

- SNA DHCF/iX supports many of the basic functions of HP terminals. Please refer to the Usage Considerations section for features that are not supported. Supported features include:
  - Modified Data Tags
  - Security Fields
- SNA DHCF/iX supports three different display enhancements for IBM 3270 display stations: full-bright, half-bright, and non-display. (Non-display is for security fields.)
- SNA DHCF/iX supports those IBM devices officially supported by IBM for the Host Command Facility, Version 2. Please refer to IBM's HCF Product Specification Guide (GC27-0647) for a complete listing.
- SNA DHCF/iX can be accessed from an IBM S/36 running SNA 3270 Emulation to HCF.
- Each SNA DHCF/iX session appears as a Virtual Terminal session. The pool of Virtual Terminal sessions available for other users will be reduced by the number of SNA DHCF/iX sessions that are currently active.

The HP keyboard differs from the IBM keyboard. The chart below shows some differences.

HP Terminals	IBM Terminals
HP Function Keys	IBM PF Keys 1-8 (VPLUS Applications only)
Security fields, Full-Bright and Half-Bright fields	Equivalent functions provided
Previous Page Key, Next Page Key, Insert Line Key, and Delete Line Key	No equivalent functions provided for IBM terminals
HP terminal characters: Break Control-Y Hard RESET	IBM terminal mapping: PA1 PA2 CLEAR

- SNA DHCF/iX can support multiple simultaneous sessions, depending upon the number of LDEVs distributed across multiple SNA Links.
- Each SNA Link can support up to 64 concurrent sessions distributed among the various SNA/iX services.
- Using an HP 3000 Series 900 and SNA DHCF/iX as a gateway system, IBM 3270 display stations can access only TTY-mode applications on other HP 3000 (MPE V, MPE XL, or MPE/iX) systems. Access to other systems requires the NS Network Service and Link products.
- SNA DHCF/iX supports "reverse VT" functionality; this permits an HP application to acquire remote IBM 3270 display stations provided that the SNA DHCF/iX session has already been established.

Product Requirements

- Hewlett-Packard System Requirements
  - HP 3000 Series 900 Computer System
  - MPE XL Release 2.2 or MPE/iX Release 4.0 or later
  - SNA/SDLC Link/iX (P/N 30291A) or SNA/X.25 Link/iX (P/N 30298A)
- SNA DHCF/iX requires an IBM System/370 or compatible mainframe with an IBM 37xx communications controller. SNA DHCF/iX has been certified with the following minimum levels of IBM software for the IBM mainframe and communications controller:
  - MVS (OS/VS2 Release 3.8)
  - ACF/VTAM Release 3.2 or later
  - ACF/NCP Release 5.2 or later
- For communication to an IBM S/36 the following software must be running on the IBM system:
  - SNA 3270 Emulation
- HCF V2 (Host Command Facility, Version 2 – IBM P/N 5668-985) must be installed on the IBM host. IBM supports HCF V2 under MVS as well as OS/VS1 and DOS/VSE (see below) operating environments.
- Although IBM supports HCF V2 under the OS/VS1 Rel. 7.0 and DOS/VSE Rel. 35 operating environments, HP SNA DHCF/iX has not been tested or certified with these operating systems.

HP will support certain versions and later releases of the above software. Your HP support representatives must determine whether SNA DHCF/iX can be supported with your network configuration. The Network Implementation Support Plan (NISP) will assist the HP account team in determining support requirements prior to the installation of SNA DHCF/iX.

Installation and Configuration Policy

The customer is responsible for loading the SNA DHCF/iX software onto the system.

Hewlett-Packard will perform minimum configuration of SNA DHCF/iX in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility
Prior to having HP personnel onsite to perform minimum configuration of SNA DHCF/iX, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - system configurations
  - logical network map identifying relevant traffic flow
  - physical network map identifying relevant network hardware components.
- Verifying that the necessary host mainframe software is installed and configured to support SNA DHCF/iX. The customer should contact their HP Sales Representative for typical host parameter values or consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (5958-8543) for details.
- Verifying that SNA Link is properly installed and configured prior to this installation of SNA DHCF/iX unless SNA Link will be installed at the same time.
- Updating the HP 3000 system to the proper release level and installing the SNA DHCF/iX software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of SNA DHCF/iX.

The customer is also responsible for completing the configuration in order to fully integrate SNA DHCF/iX into the existing customer network after HP has completed the minimum configuration of SNA DHCF/iX.

HP Responsibility
Following the installation of SNA DHCF/iX, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the SNA DHCF/iX product to a minimum configuration (1 LU) in order to verify software and hardware functionality.
- Verifying the SNA DHCF/iX configuration by issuing the DHCFCONTROL START command and ensuring that the LU to SSCP session becomes active for the LU that was configured.

These steps complete HP's portion of the installation and minimum configuration of SNA DHCF/iX.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

36935A SNA DHCF/iX License to use

Select **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
OCD Credit for Processor Option 310
OGJ Credit for Processor Option 315
OCE Credit for Processor Option 320
OCF Credit for Processor Option 330
OGL Credit for Processor Option 335
OGM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option on the same order.

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

Documentation

The following documentation is for SNA DHCF/iX:

36935-61001 HP SNA DHCF/iX User Support Guide
36935-61002 HP SNA DHCF/iX Node Manager's Guide
36935-61003 HP SNA DHCF/iX Application Programmer's Manual
36935-61004 HP SNA DHCF/iX Diagnostic Message Manual
5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/NCP and ACF/VTAM Guide

HEWLETT® PACKARD

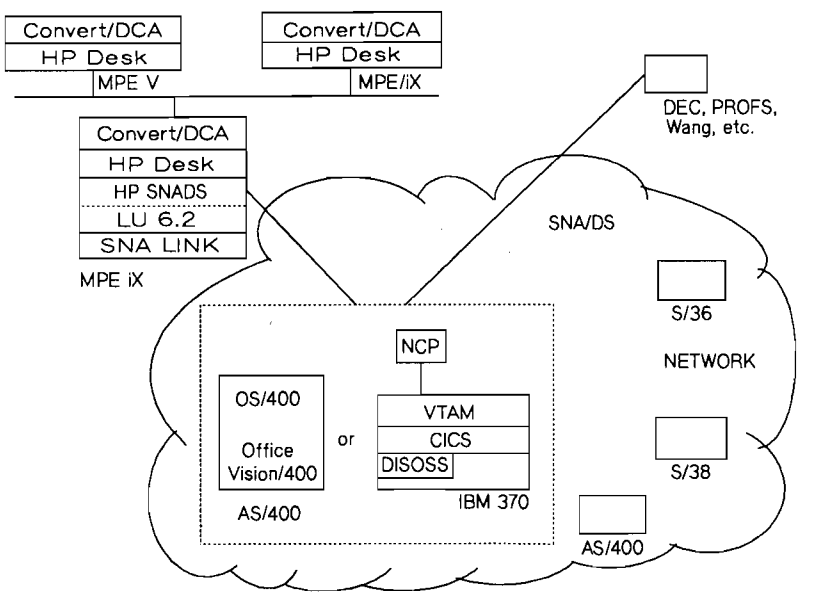
HP SNA Distribution Services/iX

Technical Data

For HP 3000 Series 900 Computer Systems Product Number HP 32006A

HP SNA Distribution Services/iX (HP SNADS/iX), an element of New Wave Computing, strengthens Hewlett-Packard's transparent multivendor connectivity commitment. HP SNADS/iX implements IBM's SNA Distribution Services (SNA/DS), a strategic component of Systems Application Architecture (SAA).

HP SNADS/iX provides electronic mail exchange between HP DeskManager and IBM's OfficeVision/400 product (when connected to IBM AS/400) or between HP DeskManager and IBM's OfficeVision/MVS, or DISOSS products (when connected to an IBM mainframe). It enables both HP DeskManager users and users of IBM's OfficeVision/400, OfficeVision/MVS, or DISOSS products to send and receive messages, PC files, and DCA documents to one another with no knowledge of user locations or addresses. Messages can also be exchanged with users of other vendor electronic mail systems that also implement SNA/DS and are connected to the AS/400 or IBM host.



HP SNADS/iX provides a migration path to MPE/iX for current HP OfficeConnect to DISOSS/V customers and offers improved performance and simplified configuration and administration.

Features and Benefits

With HP SNADS/iX, company communications are integrated, network reliability is increased, and administrative support and network costs are reduced with the following features:

- **Transparent Access:** HP DeskManager users send and receive electronic mail to and from IBM users. Mixed distribution lists of SNA/DS users and HP DeskManager users can be created without

knowledge of user locations or address formats.

- **End-to-End Acknowledgments:** HP or IBM users can send messages requesting acknowledgment, ensuring that recipients have received messages.
- **Flexible Document Conversion:** Messages from HP DeskManager to IBM can be configured to be converted to IBM DCA Revisable Form Text (RFT), Final Form Text (FFT), or Notes prior to transmission to the IBM host. In the reverse process, DCA documents transmitted to HP will not be automatically converted. HP DeskManager users read nonconverted documents, then invoke a converter prior to editing. The HP Convert/DCA product is used to provide this user-transparent function. HP DeskManager PLUS contains this product to do the conversion. High performance is maintained on the HP SNADS/iX node by distributing the conversion function to the end-user node.
- **PC File Transfers:** Binary data, such as PC files, can be sent and received. An HP DeskManager user may attach an unlimited number of PC files in a message. No conversion is performed.
- **Simplified Configuration**: All configuration is performed with existing configuration tools; MAILCONFIG for HP DeskManager related configuration and NMMGR for SNADS/iX configuration. HP DeskManager and IBM users are configured using the HP DeskManager configurator. No individual user mailboxes need to be configured on the IBM host for HP DeskManager users.
- **Partial Operation:** HP SNADS/iX continues to operate if one of its components is inactive. For example, if the SNA connection is unavailable, HP SNADS/iX continues to process outgoing HP Desk messages. If HP DeskManager is temporarily unavailable, HP SNADS/iX continues to receive incoming messages from the SNA network.
- **Administrative and Diagnostic Tools:** HP SNADS/iX provides a complete tool set including dynamic reconfiguration, configuration validation, and error recovery.
- **Easy Migration:** Migration from HP OfficeConnect to DISOSS to HP SNADS/iX is simplified with a table conversion utility. The customer can use this tool at the time of installation to convert user addresses in the HP OfficeConnect to DISOSS Address Conversion Table (ACT) to address entries in a format acceptable to HP DeskManager. The customer is relieved of the task of reconstructing the table and only has to perform minor edits.

Functional Description

Messages are transmitted between the HP 3000 Series 900 system and an IBM AS/400 or an IBM System 370/MVS mainframe using LU 6.2 protocols. Message delivery is asynchronous to the user; the sender and receiver do not establish an end-to-end session. HP SNADS/iX is a bundled product that includes the APPC subsystem component. HP LU 6.2 API/iX (P/N 30294A) can be purchased separately for other application use.

HP SNADS/iX is required on only one MPE/iX system in an HP DeskManager network. The HP DeskManager subnetwork may be comprised of either MPE V or MPE/iX systems or a combination of both. Every system with HP DeskManager users who communicate with IBM users needs to run HP Convert/DCA for document conversion services. HP DeskManager users may be local on the HP SNADS/iX node.

HP Convert/DCA is bundled with HP DeskManager PLUS B.05 and later releases.

HP SNADS/iX can share an SNA Link with other HP SNA services including SNA NRJE/iX, SNA IMF/iX, SNA DHCF/iX, and LU 6.2 API/iX. Either of the SNA Link types can be used when connecting to an IBM mainframe: SNA/SDLC Link/iX or SNA/X.25 Link/iX. SNA/SDLC Link/iX must be used when connecting to an

IBM AS/400. SNA/X.25 Link/iX, to connect to an IBM AS/400, is not supported.

NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simplified Chinese, and Traditional Chinese.

Interoperability

HP SNADS/iX has been verified to interoperate with other electronic mail systems which also connect to an IBM AS/400 or IBM DISOSS host. The following products have been tested:

- IBM OV/MVS
- IBM PS/CICS
- IBM OV/400
- IBM PROFS*
- IBM OfficeVision/VM*
- DEC ALL in One and MessageRouter/SNADS*
- Wang OIS-VS and Wang OFFICE/DISOSS Gateway*
- VAX/VMS mail
- Higgins mail
- cc: mail
- HP DeskManager and HP OfficeConnect to DISOSS*

* Connections are via an IBM DISOSS host. Other interoperability testing continues, and this list will be updated. Please check with your Hewlett-Packard Sales Representative.

Product Requirements

- An HP 3000 Series 900 running MPE XL Release 2.2 or MPE/iX Release 4.0 or later operating system. For IBM AS/400 connectivity, MPE/iX Release 4.0 or later is required.
- Either SNA/SDLC Link/iX (P/N 30291A) for IBM AS/400 or IBM mainframe connectivity
  - or -
  SNA/X.25 Link/iX (P/N 30298A) for IBM mainframe connectivity.
- HP DeskManager PLUS B.05 or later (P/N 36567A). This product includes HP Convert/DCA (for document conversion services)
  - or -
  HP DeskManager B.05 or later (P/N 36570A) for customers who have already purchased the HP Convert/DCA product. (HP Convert/DCA is no longer available as a separate product.)

HP 3000 Disk Space requirements:
Installation: 300,000 free sectors
Product Installed Size: 45,000 sectors
Free Space needed to run: 65,000 sectors plus space for message storage
User Acknowledgement Table (UAT) Size: 256 bytes/DISOSS recipient

If connecting to IBM Mainframe

- An IBM System/370 or compatible mainframe with an IBM 37xx communications controller. HP SNADS/iX has been certified with the following minimum levels of IBM software for the IBM mainframe and communications controller:
  - MVS Version 3.1
  - ACF/NCP Release 5.2.1 or later
  - ACF VTAM Release 3.2 or later
- CICS Release 1.7 PUT 8903 or later
- DISOSS Release 3.4 PUT 8901 or later

If connecting to IBM AS/400

- An IBM AS/400.
  - OS/400 Version 1.2 or later
  - OfficeVision/400 Version 1.2 or later (OfficeVision/400 version 1.x previously called AS/400 Office 1.x)

Installation and Configuration Policy

The customer is responsible for loading the HP SNADS/iX software onto the system.

Hewlett-Packard will perform minimum configuration of HP SNADS/iX to verify minimum product functionality. These activities are included in the product purchase price.

Customer Responsibility
Prior to having HP personnel onsite to perform minimum configuration of HP SNADS/iX, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Verifying that the necessary host mainframe software is installed and configured to support HP SNADS/iX. The customer should contact their HP Sales Representative for typical host parameter values or consult the "HP SNA Products: ACF/VTAM and ACF/NCP Guide" (5958-8543) for details.
- Verifying that the SNA Link (SNA/SDLC Link/iX or SNA/X.25 Link/iX) is properly installed and configured prior to the installation of HP SNADS/iX.
- Verifying that HP DeskManager is installed and configured.
- Verifying that HP SNADS/iX gateway is configured in HP DeskManager.
- Updating the HP 3000 system to the proper release level and installing the HP SNADS/iX software using AUTOINST. Refer to the HP 3000 Installation and Update Manual (P/N 36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels, using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of HP SNADS/iX.

The customer is also responsible for completing the configuration in order to fully integrate HP SNADS/iX into the existing customer network after HP has completed the minimum configuration of HP SNADS/iX.

HP Responsibility
Following the installation of HP SNADS/iX, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the APPC/iX subsystem with two APPC sessions.
- Configuring the HP SNADS/iX product to a minimum configuration necessary to verify software functionality. This includes configuring one cluster and one mapper in SNADS.
- Verifying the HP SNADS/iX configuration by issuing the VERIFY command in the HP SNADS/iX Manager Program and ensuring that the test completes successfully. Further verification may be performed by sending one message from HP DeskManager to OfficeVision/400, OfficeVision/MVS, or DISOSS and another from OfficeVision/400, OfficeVision/MVS, or DISOSS to HP DeskManager.

These steps complete HP's portion of the installation and minimum configuration of HP SNADS/iX.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase services from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP 32006A HP SNA Distribution Services/iX

One User License Option must be selected. The User License Option must align with the MPE/iX License. In addition, one Upgrade Credit Option or one Migration Credit Option may be selected, if applicable.

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
OCD Credit for Processor Option 310
OGJ Credit for Processor Option 315
OCE Credit for Processor Option 320
OCF Credit for Processor Option 330
OGL Credit for Processor Option 335
OGM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option on the same order.

Migration Credit Options for HP OfficeConnect to DISOSS (MPE V) software to HP SNADS/iX

A Migration Credit Option must be ordered with a User License Option on the same software order. Only one Migration Credit Option is permitted per HP SNADS/iX User License Option order.

OG1 Credit for OfficeConnect to DISOSS and LU 6.2 Base Option 310
OG2 Credit for OfficeConnect to DISOSS and LU 6.2 Base Option 320
OG3 Credit for OfficeConnect to DISOSS and LU 6.2 Base Option 330

Documentation

For HP SNA Distribution Services/iX:

32006-61001 HP SNADS/iX HP Desk Gateway Administrator's Guide
32006-61002 HP SNADS/iX Node Manager's Guide
32006-61003 HP SNADS/iX SNA/Distribution Services: Electronic Mail User Support Guide
32006-61004 HP SNADS/iX HP Desk User Support Guide
32006-61009 HP DeskManager Intrinsics
5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/NCP and ACF/VTAM Guide
5958-8546 HP SNA Products: CICS Guide
5958-8547 HP SNA Products: DISOSS Guide

Specification Conformance

HP SNA Distribution Services/iX is implemented according to IBM Systems Network Architecture Format and Protocol Reference Manual: Distribution Services (IBM P/N SC 30-3098-2).

HEWLETT® PACKARD

RJE/Remote Job Entry/iX

Technical Data

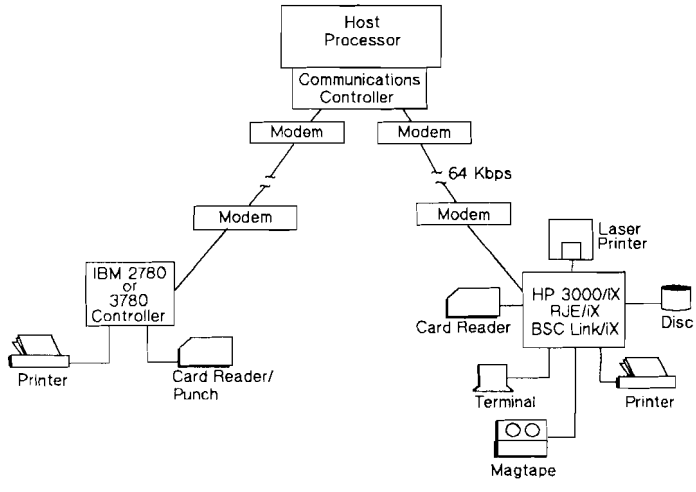
For HP 3000 Series 900 Computer Systems Product Number HP 30295A

RJE/Remote Job Entry/iX and BSC Link/iX allow an HP 3000 Series 900 system to emulate the major functions of an IBM 2780 or IBM 3780 workstation. RJE/iX can transmit batch jobs to, and receive output from, a host processor that can support standard IBM 2780/3780 devices. Additionally, RJE/iX can exchange files between an HP 3000 Series 900 and many other processors that emulate standard IBM 2780/3780 devices.

RJE/iX requires the installation and use of BSC Link/iX. BSC Link/iX manages the data communications protocol and link between the HP 3000, the IBM-compatible mainframe, and communications controller. It contains software, a hardware interface card, and a cable.

Features

- Allows the HP 3000 Series 900 to emulate an IBM 2780 or 3780 workstation, using a point-to-point connection to the host.
- Provides a way of exchanging files between HP 3000 computers and many other systems that emulate standard IBM 2780 or 3780 devices.
- Allows users to submit jobs and receive output programmatically.
- Provides flexibility with regard to the devices used for input and output; many HP 3000 I/O devices may be used.
- Can be used concurrently with other HP 3000 Series 900 applications.
- Optionally performs data compression.
- Optionally allows transparent mode transmission, thus allowing transmission of any arbitrary binary data stream.
- Allows specification of Native Language Support for data transmission. NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simplified Chinese, and Traditional Chinese.



Functional Description

RJE/iX and BSC Link/iX allow an HP 3000 Series 900 system to emulate the major features of an IBM 2780 or IBM 3780 workstation. Using RJE/iX, one can transmit batch jobs to, and receive output from, a host processor that can support standard IBM 2780/3780 devices. Additionally, one can use RJE/iX and BSC Link/iX to exchange files between an HP 3000 and many other processors that emulate standard IBM 2780/3780 devices, including another HP 3000.

An HP 3000 Series 900 and an HP 2680 Laser Printer can use RJE/iX and BSC Link/iX to act as a high-speed print station for a host computer. Remote sites with an HP 3000 can get the maximum printer output by using a 64 Kbps modem.

RJE/iX makes it possible for multiple users to submit jobs and receive output programmatically. Users can create files consisting of a set of commands; a user-written program can then submit the names of these command files to a message file. The RJE/iX Subsystem sequentially scans the message file and executes commands encountered in each of the command files. The RJE/iX Subsystem can be set up to go into a continuous receive mode after it has finished executing all the command files.

Users can continue to use the RJE/iX Subsystem in a single-user-at-a-time manual mode, if desired.

RJE/iX and BSC Link/iX can operate concurrently with all the other processing facilities of the HP 3000. This allows HP 3000 users to perform such functions as Database Management, Transaction Processing, Data Collection, and program development locally, while being able to transmit collected data (orders, payroll, etc) or large CPU bound jobs, to a remote host for further processing.

By setting appropriate parameters, RJE/iX allows transmission of binary data streams (including control characters) and compression of successive and trailing blanks. Successive blanks are replaced by a 2-byte sequence, a control character, and the number of blanks. This makes job transmission more efficient – particularly at a lower speed.

In an IBM 2780 system an end of medium (EM) mark is required before the trailing blanks in each record. RJE/iX truncates trailing blanks when the truncate option is specified. No EM marks are required. However, when EM marks are present, they perform the intended function.

RJE/iX accepts both horizontal tabulation and vertical form control codes. It recognizes host carriage control characters and translates them to the corresponding characters for the HP 3000 printers. This makes it possible to print specially formatted forms. However, when special forms are used, output must be manually directed to the printer on which the appropriate form is mounted.

Functional Specifications

RJE/iX emulates all standard features of the IBM 2780/3780 systems except it does not accept the six-bit transcode.

RJE/iX has a set of high-level user commands that make it easy to use. The table on the following page lists these commands.

NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simplified Chinese, and Traditional Chinese.

Product Requirements

- An HP 3000 Series 900 running MPE XL Release 2.2 or MPE/iX Release 4.0 or later operating system.
- HP 32007A BSC Link/iX.
- An IBM System/370 or compatible host running a job entry subsystem that supports 2780/3780 (RJE) protocols.
- A data communications line between the HP 3000 and the host, which can be either leased or dial-up.

Command	Function
#:MPE command	Enables the user to execute many MPE/iX commands from RJE by preceding the command with a colon.
#RJCMDFILE	Causes RJE/iX to take its commands from another file.
#RJCOMMENT	Provides a method for in-line comments.
#RJCONTINUE	Enables user to provide a procedure to evaluate errors and provide limited direction for error handling.
#RJLINE	Defines the characteristics of the communications line.
#RJIN	Transmits input data from your HP 3000 Computer System to the remote processor.
#RJOUT	Requests and processes routed output from the remote processor.
#RJIO	Initiates transmission of a one-line message to the remote processor.
#RJINFO	Initiates a file display printing of the communications line.
#RJLIST	Requests and processes routed and unrouted list output from the remote processor.
#RJPUNCH	Requests and processes routed and unrouted punched output from the remote processor.
#RJEOD	Transmits an EOT control character (end-of-file) to the remote processor after sending the last buffer of data from an RJIN command.
#RJEND	Terminates the HP RJE/iX subsystem.
#RJSTAT	Provides statistical information on frequency of subsystem command use, elapsed times, and tallies of data transmitted and received.
#RJLOG	Serves to enable or disable the RJE/iX upper level logging.
#RJHELP	Displays a help screen showing the RJE/iX commands and each command's description and syntax.

Installation and Configuration Policy

The customer is responsible for loading the RJE/iX software onto the system.

Hewlett-Packard will perform minimum configuration of RJE/iX in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel onsite to perform minimum configuration of RJE/iX, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - system configurations
  - logical network map identifying relevant traffic flow
  - physical network map identifying relevant network hardware components.
- Verifying that the necessary remote system software is installed and configured to support RJE/iX.
- Updating the HP 3000 system to the proper release level and installing the RJE/iX software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of RJE/iX.

The customer is also responsible for completing the configuration in order to fully integrate RJE/iX into the existing customer network after HP has completed the minimum configuration of RJE/iX.

HP Responsibility

Following the installation of RJE/iX, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.

- Configuring the RJE/iX product to a minimum configuration in order to verify software and hardware functionality.
- Verifying the RJE/iX configuration by sending a sign-on card when communicating with a host mainframe or issuing the RJLINE command when communicating with other systems.

These steps complete HP's portion of the installation and minimum configuration of RJE/iX.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

RJE/iX and BSC Link/iX are available on all HP 3000 Series 900 systems with currently supported releases of the MPE XL or MPE/iX operating system.

Ordering Information

RJE/Remote Job Entry/iX requires 32007A BSC Link/iX

HP 30295A RJE/iX License to use

Select **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
OCD Credit for Processor Option 310
OGJ Credit for Processor Option 315
OCE Credit for Processor Option 320
OCF Credit for Processor Option 330
OGL Credit for Processor Option 335
OGM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option on the same order.

Migration Credit Options for MPE V software to MPE/iX software upgrades

OG1 For MPE V software Option 310
OG2 For MPE V software Option 320
OG3 For MPE V software Option 330

In order to receive the migration credit, customers must order the migration credit option in addition to the new MPE/iX software option on the same order.

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle. For more information, contact your HP sales representative, or refer to the HP data sheets for specific support services.

Documentation

30295-61001 RJE User/Programmer's Reference Manual
30295-61002 RJE/iX Node Manager's Guide

HEWLETT® PACKARD

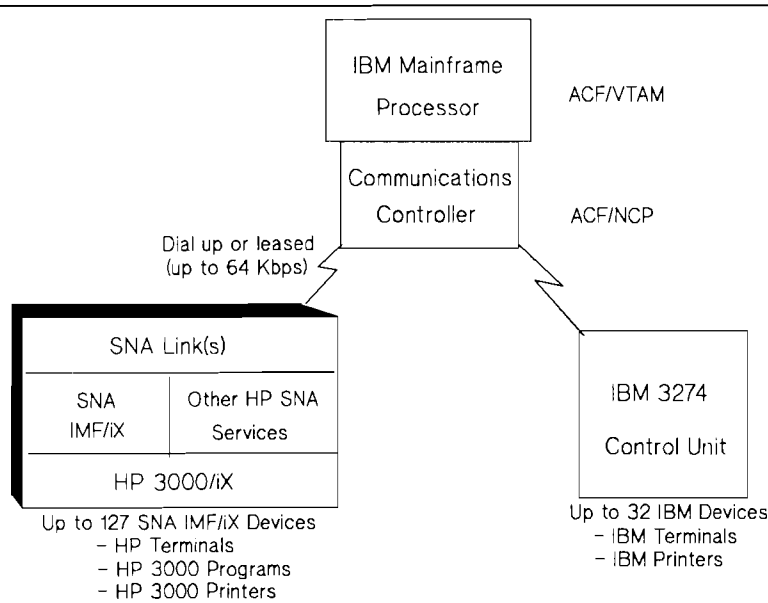
SNA IMF/iX Interactive Mainframe Facility

Technical Data

For HP 3000 Series 900 Computer Systems
Product Number
HP 30293A

The SNA Interactive Mainframe Facility/iX (SNA IMF/iX) product provides IBM 3270 device emulation for Hewlett-Packard terminals, printers, and HP 3000 Series 900 systems. (SNA IMF/V, P/N 30247A, provides similar functionality for MPE V systems.)

SNA IMF/iX on an HP 3000 Series 900 allows interactive communications between the HP 3000 and an IBM System/370-compatible mainframe using SNA 3270 protocols. SNA IMF/iX emulates the base function set of an IBM 3270 control unit using SNA Physical Unit Type 2 (PU2), Logical Unit Types 1,2,3 (LU1,2,3) protocols. HP terminals, printers, and applications on the HP 3000 running SNA IMF/iX emulate IBM terminal and printer functions.



SNA IMF/iX allows access to 3270 subsystems on the mainframe (such as TSO, CICS, and IMS) through a set of high-level intrinsics. There are two modes of operation. In programmatic mode, customer-written application programs on the HP 3000 emulate IBM 3270 terminals and printers, exchanging data with the host applications via intrinsics. The customer's application program decides which intrinsics to call. In Pass Thru mode, an HP-written application program on the HP 3000 also emulates IBM 3270 terminals and printers, exchanging data with host applications via intrinsics. In Pass Thru mode, the selection of which intrinsics to call is fixed.

SNA IMF/iX requires the installation and use of SNA/SDLC Link/iX (30291A) or SNA/X.25 Link/iX (30298A). The SNA Link products manage the physical link to the host and implement protocols in the lower three layers of SNA.

Asian options also supported include:

- HP Asian Vectra PCs
- HP Asian Terminals
- HP Asian Printers
- Asian IBM environments

Features

- SNA IMF/iX and an SNA Link product allow the HP 3000 to emulate the base function set of an IBM 3270 control unit using SNA (PU2, LU1,2,3) protocols.
- SNA IMF/iX, SNA NRJE/iX, LU6.2 API/iX, and SNA DHCF/iX can all be supported simultaneously over one SNA/SDLC Link/iX or SNA/X.25 Link/iX. The maximum datacom line speed is 64 Kbps.
- SNA IMF/iX supports up to 127 devices (terminals, printers, and application programs) concurrently. With MPE/iX Release 4.0 or later, SNA IMF/iX supports up to 127 devices per SNA Link. With MPE XL Release 2.2, SNA IMF/iX supports up to 64 devices per SNA Link (up to 127 devices with two SNA Links).
- The Pass Thru capability of SNA IMF/iX allows HP 3000-attached printers and terminals to emulate the base function set of IBM 3270 printers and terminals.
- SNA IMF/iX Pass Thru takes advantage of the Modified Data Tag feature of selected HP terminals (such as the HP 700/94) and supports a write optimization feature that limits screen updating to modified rows only. These features significantly reduce response time.
- SNA IMF/iX provides a "rolling softkeys" feature that allows the user to define and label multiple levels of terminal function keys to be their most frequently used IBM 3270 program function keys. Users can also define various "menus" of function keys that are clearly displayed on the terminal screen. The SNA IMF Programmer's Reference Manual documents the terminals supporting this feature, some of which provide up to 16 softkeys on the screen at one time.
- Terminals/printers being used in the Pass Thru mode do not have to be dedicated. The user may access either the HP 3000 or the remote host from the same terminal.
- SNA IMF/iX allows programs on an HP 3000 to communicate with programs on the host system, through a set of high-level intrinsics. Programs may be written in C, FORTRAN, COBOL, COBOL II, BASIC, Pascal, or SPL.
- Most host application programs designed to work with IBM 3270 terminals can usually be used with minimal change.
- SNA IMF/iX runs concurrently with other HP 3000 applications and can be accessed from other systems via HP's Network Services.
- SNA IMF/iX supports HP's Native Language Support (NLS 8-bit character mapping), which allows application programmers to create local language applications for end users. NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simplified Chinese, and Traditional Chinese.
- SNA IMF/iX supports IBM applications with 480, 1920, or 3440 character screen sizes.
- For Asian options only:
  - SNA IMF/iX (ASIAN) supports IBM's DBCS protocol to ensure 16-bit data integrity communication between the HP 3000 and the Asian host.
  - SNA IMF/iX (ASIAN) allows both 16-bit interactive as well as programmable access to the Asian IBM host.
  - SNA IMF/iX (ASIAN) provides 16-bit character mapping between the HP (HP-15) and the IBM (DBCS) data.
  - SNA IMF/iX (ASIAN) supports languages such as Japanese, Korean, and Traditional Chinese.

Table 1: **SNA IMF/iX Intrinsics Summary**

Intrinsic	Function
ABORT3270	Aborts an outstanding no-wait REC3270 or TRAN3270 request.
ACQUIRE3270	Provides the SNA IMF/iX users the capability to start Pass Thru on an HP 3000 terminal or printer programmatically.
ATTRLIST	Returns the locations of attribute characters within all or a subsection of a screen.
CLOSE3270	Equivalent to turning off the specified device.
ERR3270	Returns the error message associated with a given intrinsic error number.
EXTFIELDATTR	Returns the IBM attribute information of the Double Byte Character Set character attribute to the caller.
FIELDATTR	Returns information about the attributes of the specified field.
IOWAIT3270	Informs the user program that a previous I/O operation has completed.
IODONTWAIT3270	Waits for a previous no-wait I/O request to complete.
OPEN3270	Equivalent to turning on the power of a 3270 Display Station or Printer. It allocates the internal screen buffer used by SNA IMF/iX.
PRINT3270	Prints a copy of the internal screen image to a spool file.
READFIELD	Reads a field of data from the internal screen buffer and returns the data to an HP application program.
READSCREEN	Reads all or part of the internal screen buffer and returns this data to the HP application program.
RECV3270	Allows the user program to receive the screen after modification by the host.
RESET3270	Equivalent to pressing the RESET key on an IBM 3270 Display Station keyboard.
SCREENATTR	Returns information about the attributes of the screen image currently in the internal buffer.
STREAM3270	Equivalent to typing a Series of keystrokes on a 3270 Display Station keyboard. Provides a mechanism for performing "special function key" operations from the HP application program. Also allows more than one field of data to be updated in one Intrinsic call.
TRAN3270	Equivalent to pressing a transmit key on the 3277 or 3278 Display Station keyboard. It causes modified data to be transmitted to the host the next time the host polls the device.
VERS3270	Returns the number of the version of SNA IMF/iX that is being executed on the HP 3000.
WRITEFIELD	Writes data from the HP application program into an unprotected field of the internal screen buffer.
READSTREAM	Reads all or part of the untranslated host data stream.
WRITESTREAM	Creates the data stream that an HP application program sends to the IBM host.

Functional Description

SNA IMF/iX is a software product that allows an HP 3000 and attached devices to emulate the base function set of an IBM 3274 control unit and attached devices, which does not include graphics, programmed symbols, color, or extended highlighting.

SNA IMF/iX requires SNA/SDLC Link/iX or SNA/X.25 Link/iX. These links manage the communications link and implement lower-level SNA (PU2) protocols. SNA IMF/iX provides interactive and programmatic 3270 communications with a mainframe and can run simultaneously along with other SNA services such as SNA NRJE/iX and LU6.2 API/iX on MPE/iX systems.

In the programmatic mode, user-written programs on the HP 3000 can communicate with programs on the host. HP 3000 programs may be written in C, FORTRAN, COBOL, COBOL II, BASIC, Pascal, or SPL.

Program access is accomplished through use of a set of intrinsics that are powerful procedures which perform the low-level task of decoding the data streams.

(Table 1 provides a list of available intrinsics.) The intrinsics can be used with the intrinsics of other HP 3000 facilities such as IMAGE/3000, VPLUS/3000, KSAM/3000, or NS/3000. The high-level, easy-to-use nature of these intrinsics results in improved programmer productivity.

Because programmatic mode works by exchanging information through screen images, most host applications that have been written for use with IBM 3270 controllers will work with SNA IMF/iX with little or no modification. For customers who are in the process of changing from centralized to distributed processing, this feature helps provide a smooth transition.

The Pass Thru mode of SNA IMF/iX provides users the capability of using HP 3000 attached printers and DTC attached terminals for interactive access to a host computer.

In this mode, SNA IMF/iX users can directly access host software such as CICS or IMS, or they can use TSO for program development. Using the Pass Thru mode does not require the use of dedicated terminals.

The Pass Thru mode of SNA IMF/iX is not intended as a replacement for real IBM 3270 devices.

For HP terminals being used in the Pass Thru mode, the response time will be longer than that of IBM terminals:

- The data transmission rate between the HP 3000 and the terminals is slower than that between the IBM 3270 controller and its attached terminals.
- For terminals not supported by the write optimization feature, the screens on the HP 3000 and Pass Thru terminals are rewritten any time a change is made. For small changes, this contributes to an increase in response time.
- SNA IMF/iX uses the Modified Data Tag feature of the HP 700/94, HP 2394A, and HP 150 terminals in order to accurately and flexibly handle null and blank characters. In addition, this may result in improved response time when compared to other HP terminals.

For applications where response time is critical, please consult your HP Sales Representative for more information.

Although the principal functions of IBM 3270 terminal keyboards are implemented – including Program Function (PF) keys and Program Attention (PA) keys – there are some differences:

- Some keys are in different positions, some keys have different labels, and some keys are not implemented. Table 2 (on the following page) lists the major differences between IBM 3270 terminals and HP 2392 terminals.

There are minor logical differences in the way HP terminals and IBM 3270 terminals behave. Differences include:

1. With Pass Thru mode, only unprotected fields in which one or more characters have actually been changed are transmitted to the host. If a Pass Thru user "modifies" an unprotected field by replacing the field with exactly the same characters as it had previously, the field would NOT be transmitted to the host with SNA IMF/iX, since no characters had changed. A real 3270-type terminal will transmit such modified fields whether or not any characters are actually changed.
2. Leading blanks can be converted to nulls based on a configuration option at Pass Thru startup.
3. Trailing blanks can be converted to nulls based on a configuration option at Pass Thru startup.
4. Trailing nulls can be converted to blanks based on a configuration option at Pass Thru startup.
5. Magnetic card reader, auxiliary card reader, and light pen are not provided on HP terminals using Pass Thru mode.
6. SNA IMF/iX does not support the numeric lock feature.
7. Pass Thru mode does not support slave printers (printers attached to terminals).

Functional Specifications

- SNA IMF/iX emulates the base function set of the IBM 3274 terminal controller; the base set does not include color, graphics, programmed symbols, or extended highlights.
- SNA IMF/iX supports communications to an IBM System/370 (or compatible) mainframe running either the MVS/SP, MVS/XA, DOS/VSE, or VM operating systems with ACF/ VTAM through an IBM 37xx communications processor running ACF/NCP.
- SNA IMF/iX supports communications with an IBM S/36 running SSP or an IBM S/38 running CPF or an IBM AS/400 running OS/400.
- The SNA Link/iX product supports Physical Unit Type 2 protocols; SNA IMF/iX provides Logical Unit Type 1, 2, and 3 emulation over the link. The SNA Link/iX can support interactive (SNA IMF/iX and SNA DHCF/iX), batch (SNA NRJE/iX), and programmatic (LU6.2 API/iX) communications simultaneously over a single link to an IBM host.
- In Pass Thru mode, SNA IMF/iX emulates the IBM 3278-2, 3278-3 and 3278-4 display stations and IBM 3287 printers.
- SNA IMF/iX supports up to 127 devices (terminals, printers, or application programs) concurrently per SNA link with MPE/iX Release 4.0 or later. SNA IMF/iX supports up to 64 devices concurrently per SNA Link with MPE XL Release 2.2. With MPE XL Release 2.2, two SNA Links must be used to support up to 127 devices concurrently.
- The HP 700/94 terminal is recommended for use with SNA IMF/iX in Pass Thru mode as it offers the greatest performance and functionality. SNA IMF/iX also supports null suppression mode on HP 700/94 terminals which results in further performance improvements.
- The following terminals support Modified Data Tags and, consequently, provide a 10-50% performance improvement in Pass Thru mode and greater functionality over other terminals.
  - HP 700/94
  - HP 150
  - HP 2394A
  - HP Vectra
  - PC with Reflection 7 PLUS Version 3.3 (or later)
- In Pass Thru mode, non-MDT terminals are not supported with all host applications that are sensitive to nulls and blanks. In these circumstances, an MDT terminal will function properly and is strongly recommended to be the terminal of choice.

The following terminals are supported with HP 3000 MPE/iX systems in Pass Thru mode via the DTC attachment.

- HP 150
- HP 700/92
- HP 700/94
- HP 2392A
- HP 2394A
- HP Vectra PC with AdvanceLink 2392

Table 2

3270 Typewriter Keyboard	HP 2392A Keyboard
Program Function Keys	User specifies by typing desired program function number or through user-defined configuration of HP function keys
FIELD MARK, TEST REQ, CURSOR BLINK, ALT CURSOR, IDENT, DEV CNCL, DUP, CLOCK, PRINT and CURSOR SELECT Keys	No equivalent on HP terminals
PA1, PA2, PA3, CLEAR, SYSTEM REQUEST	Keys are in different locations (Softkeys are used)
SYSTEM AVAILABLE, INSERT MODE, INPUT INHIBITED Indicators	Indicators not provided
ERASE INPUT, ERASE EOF, TAB, BACKTAB, NEWLINE, RESET INSERT Keys	Equivalent functions provided
3270 Characters	Corresponding HP Terminal Characters
cent sign ¢	[
!	]
solid vertical bar |	!
"NOT" sign	^

- HP Vectra PC with Reflection 7 PLUS, Version 3.3 (or later)

- SNA IMF/iX supports the write optimization feature for improved performance in Pass Thru mode with the following terminals:
  - HP 150
  - HP 700/92
  - HP 700/94
  - HP 2392A
  - HP 2394A

- With the HP X.25/iX Network Link (36939A) and NS 3000/iX Network Services (36920A), SNA IMF/iX supports these terminals when they are directly attached to an HP 2334A Plus or HP 2335 PAD:
  - HP 700/9x
  - HP 2392A
  - HP 2394A
  - HP 150A

  This feature is supported on SNA IMF/iX or SNA IMF/V (30247A) only and is NOT supported on the IMF/V (30250A) product. Other Pass Thru-supported terminals configured to be one of the terminals listed above are NOT supported.

- The HP 700/94, HP 2394A, HP 150, HP 700/92, and HP 2392A terminals support a 19.2 Kbps connection to the HP 3000.
- The following terminals support multiple levels of "rolling softkeys" allowing up to 96 user-definable function keys.
  - HP 150
  - HP 700/94
  - HP 2394A
- SNA IMF/iX supports any HP system printer.
- The HP 150 does not support the 43-line feature of SNA IMF/iX.
- The HP 2392 terminal running in Pass Thru mode must have at least 8 Kbytes of memory.
- Link Level Message encoding:
  - SNA IMF/iX supports both NRZ and NRZI encoding.
- Access to the SNA IMF/iX intrinsics in programmatic mode is provided in compatibility-mode as well as native-mode with the use of HP-provided switch stubs.
- In Pass Thru mode, terminals configured as consoles are not supported.
- The following Asian devices are supported in Pass Thru mode via DTC attachment:
  - Asian HP Vectra PC (HP 45970C, 45970D) running Asian AdvanceLink S/W (HP 68333W)
  - Asian HP AX Vectra PC (HP 45970-AXH-AX components) -- Japan Only running AX AdvanceLink S/W (HP D1717F)
  - Asian HP Terminal (HP C1010T, C1010K, C1010J)
  - Asian HP Workstation Printer (HP 41063A/B)
  - Asian HP Line Printer (HP C1200A, C1202A)
- All HP Asian terminals and PCs function as non-Modified Data Tag terminals only.
- SNA IMF/iX and SNA/SDLC Link/iX may require occasional IBM operator intervention when connected to the IBM S/38.

Product Requirements

- SNA IMF/iX requires an IBM System/370 or compatible mainframe (models 370, 30xx, or 43xx) with an IBM 37xx communications controller. The following software must be running on the IBM host and communications controller:
  - MVS/SP, MVS/XA, DOS/VSE, or VM
  - ACF/VTAM
  - ACF/NCP
- For communications to an IBM S/36, IBM S/38, or IBM AS/400 minicomputer, the following software must be running on the IBM system:
  - SSP (S/36) Release 5
  - CPF (S/38) Release 7.0
  - OS/400 (AS/400) Release 2

  and the HP 3000 must be running MPE XL Release 2.2 or MPE/iX Release 4.0 or later.
- HP will support certain versions, releases, modifications, and PTF levels of the above software. Your HP Sales Representative or Systems Engineer can determine whether SNA IMF/iX can be supported with your particular configuration. The Network Implementation Support Plan (NISP) will help the customer engineer determine support requirements in advance of the installation of SNA IMF/iX in a particular network.
- SNA IMF/iX Product Requirements
  - HP 3000 Series 900 computer system
  - HP 30291A SNA/SDLC Link/iX

  or
  - HP 30298A SNA/X.25 Link/iX

Installation and Configuration Policy

The customer is responsible for loading the SNA IMF/iX software onto the system.

Hewlett-Packard will perform minimum configuration of SNA IMF/iX in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility
Prior to having HP personnel onsite to perform minimum configuration of SNA IMF/iX, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including:
  - system configurations
  - logical network map identifying relevant traffic flow
  - physical network map identifying relevant network hardware components.
- Verifying that the necessary host mainframe software is installed and configured to support SNA IMF/iX. The customer should contact the HP Sales Representative for typical host parameter values or consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (5958-8543) for details.
- Verifying that the SNA/SDLC Link/iX or SNA/X.25 Link/iX is properly installed and configured prior to the installation of SNA IMF/iX unless the link product will be installed at the same time.
- Updating the HP 3000 system to the proper release level and installing the SNA IMF/iX software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of SNA IMF/iX.

The customer is also responsible for completing the configuration in order to fully integrate SNA IMF/iX into the existing customer network after HP has completed the minimum configuration of SNA IMF/iX.

HP Responsibility
Following the installation of SNA IMF/iX, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the SNA IMF/iX product to a minimum configuration in order to verify software and hardware functionality.
- Verifying the SNA IMF/iX configuration by issuing the RUN TTSSON.PUB.SYS command with the appropriate parameters and entering the IBMTEST command. This test verifies the LU to SSCP session.

These steps complete HP's portion of the installation and minimum configuration of SNA IMF/iX.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

SNA IMF/iX is available on all HP 3000 Series 900 systems with currently supported releases of the MPE XL or MPE/iX operating system.

SNA IMF/iX requires installation and operation of HP 30291A, SNA/SDLC Link/iX or HP 30298A, SNA/X.25 Link/iX.

Ordering Information

HP 30293A SNA IMF/iX License to use

Select **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options:

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options:

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
OCD Credit for Processor Option 310
OGJ Credit for Processor Option 315
OCE Credit for Processor Option 320
OCF Credit for Processor Option 330
OGL Credit for Processor Option 335
OGM Credit for Processor Option 340
UEK Credit for Processor Option 350
OGX Upgrade Credit for Options AB0, AB1, ABJ

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option on the same order.

Migration Credit Options for MPE V Software to MPE/iX Software Upgrades:

OG1 For MPE V software Option 310
OG2 For MPE V software Option 320
OG3 For MPE V software Option 330

In order to receive the migration credit, customer must order the migration credit option in addition to the new MPE/iX software option on the same order.

Asian Options:

AB0 For use in Taiwan (Traditional Chinese)
AB1 For use in Korea (Hangul)
ABJ For use in Japan (Kanji)

Customers must purchase the processor options before or together with an Asian Option.

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

Documentation

The following documentation is for SNA IMF/iX:

30293-61000 SNA IMF/iX Node Manager's Guide
30293-61005 SNA IMF Programmer's Reference Manual
30293-61008 Using SNA IMF Pass Thru
5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/NCP and ACF/VTAM Guide
5958-8545 HP SNA Products: IMS Guide
5958-8546 HP SNA Products: CICs Guide
30293-60211 SNA IMF/iX: User Support Guide (For use in Taiwan)
30293-60221 SNA IMF/iX: User Support Guide (For use in Japan)
30293-60231 SNA IMF/iX: User Support Guide (For use in Korea)

HEWLETT® PACKARD

HP SNA Server/HP SNA Server Access

Technical Data

For HP 3000 Systems
Product Numbers
HP 30254A, 30255A

HP's SNA Server capability provides transparent access to SNA IMF and/or SNA NRJE (HP-IBM SNA network services) for users on a Local Area Network (LAN). It appears to users connected to each processor on the LAN as if the HP-IBM SNA network services reside directly on their processor, when the SNA network services actually reside on just one HP 3000 Series 37 through 70 processor connected to the LAN.

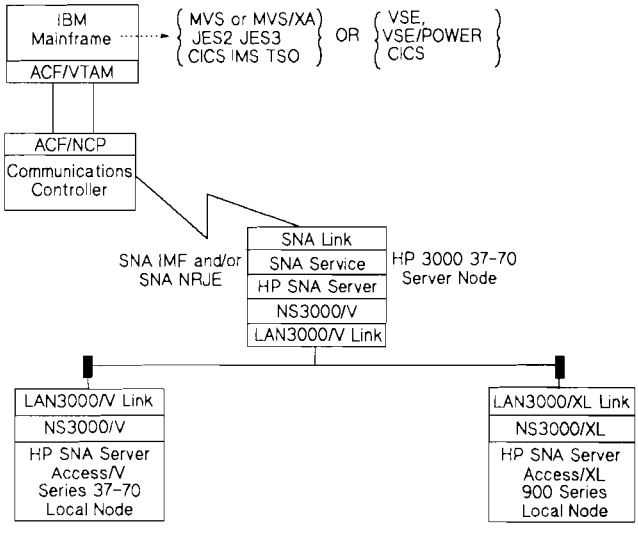
Two products provide SNA Server Capability:

- HP SNA Server (HP 30254)
- HP SNA Server Access (HP 30255)

(Referred to jointly as SNA Server Access.)

SNA Server is software on an HP 3000 processor (server node) that takes output received through SNA IMF and/or SNA NRJE on an HP 3000 Series 37 through 70 and directs this output to the appropriate local node over a LAN. This local or "server access" node is where SNA Server Access resides.

SNA Server Access permits HP 3000 computers (MPE V and MPE/iX systems) on a LAN to transparently send input to, and receive output from, an IBM mainframe through a single MPE V-based HP 3000 with the SNA Server product.



Features

SNA Server Access enables any HP 3000 processor on a LAN to transparently submit to and receive batch jobs from IBM mainframes through SNA NRJE (and SNA Link) located on an HP 3000. Users may also initiate interactive sessions transparently and receive printed output through SNA IMF. For both SNA IMF and SNA NRJE, users enter a one-word command in place of several lines of equations involving numerous parameters.

Functional Description

Without SNA Server Access, any commercial processor on a LAN may access HP-to-IBM network services (for example, SNA IMF, or RJE) residing on an HP 3000 elsewhere on the LAN. This is accomplished through the Virtual Terminal capability of NS3000. By accessing HP-IBM network services via file equations, users can communicate interactively using SNA IMF, or start a batch job using SNA NRJE, with an IBM mainframe.

With NS3000, 3287 print output using SNA IMF can be printed, but only at the processor with SNA IMF residing on it.

With SNA Server Access, 3287 print output can be routed to any device supported by SNA IMF on any processor on the LAN. Users who access SNA NRJE across a LAN may already route their output back to any device supported by SNA NRJE attached to any processor on the LAN. However, they must employ a number of steps involving a fairly detailed knowledge of the system configuration. SNA Server Access compresses those steps into a single, simple command.

For interactive users of SNA IMF, response time will be longer for users accessing SNA IMF over a LAN than for those directly attached to the processor on which SNA IMF resides. SNA NRJE throughput to the local node will be lower than the throughput directly from the IBM mainframe to SNA NRJE.

Programmatic applications using SNA NRJE and/or SNA IMF must reside on the server node. Additional programming using available NS3000 services is necessary to route output from programmatic applications over the LAN. The Reverse NRJE capability of SNA NRJE is not supported by SNA Server Access across a LAN.

SNA Server Access with NRJE will only support up to eight configured workstations. In addition, SNA Server Access is subject to other limitations of SNA IMF and SNA NRJE.

Product Requirements

Server Access ("Local") Node

For Server Access from an MPE VE-based HP 3000, the following is required:

- An HP 3000 Series 37 through 70 running MPE VE (U delta-1 or later).
- HP SNA Server Access (HP 30255).
- LAN3000/V Link (HP 30242A).
- NS3000/V (HP 32344).
- 2 MB of system memory is recommended. An HP Applications Engineer can help determine your requirements.

For Server Access from an MPE iX-based HP 3000, the following is required:

- HP 3000 Series 900.
- HP SNA Server Access (HP 30255 Option 340).
- LAN3000/iX Link (HP 36921A).
- NS3000/iX (HP 36920).
- 2 MB of system memory is recommended. An HP Applications Engineer can help determine your requirements.

Server Node

To provide Server capability on an MPE VE-based HP 3000, the following is required:

- An HP 3000 Series 37 through 70 running MPE V (U delta-1 or later).
- HP SNA Server (HP 30254).
- SNA Link (HP 30246A).
- SNA NRJE (HP 30245) and/or SNA IMF (HP 30247).
- LAN3000/V Link (HP 30242A).
- NS3000/V (HP 32344).
- 4 MB of system memory is recommended. An HP Applications Engineer can help determine your requirements.

IBM Mainframe

- The HP-IBM datacom products require an IBM System/370 compatible mainframe (30xx or 43xx) with an IBM 37xx or compatible communications controller.
- The software must be running on the host and communications controller (see chart below).

HP will support certain versions, releases, modifications, and PTF (Program Temporary Fix) levels of the above software. Your HP Sales Representative or Applications Engineer can determine whether SNA Server Access can be supported with your particular configuration.

Installation and Configuration Policy

HP SNA Server Access is customer installable and configurable.

Customer Responsibility

The customer is responsible for performing the following tasks in order to successfully install and configure HP SNA Server Access:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including:
  - System configurations.
  - Logical network map identifying relevant traffic flow.
  - Physical network map identifying relevant network hardware components.
- Verifying that NS3000 and LAN3000 Link on both the server node and the local node are properly installed and configured prior to the installation of HP SNA Server Access.
- Verifying that SNA NRJE and/or SNA IMF and SNA Link on the server node are installed and configured prior to the installation of HP SNA Server Access.
- Updating the HP 3000 system to the proper release level and installing HP SNA Server Access software using AUTOINST. Refer to the HP 3000 MPE iX Installation and Update Manual (36123-90001) or the HP 3000 Software Update Manual (32033-90036) for MPE V systems.
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Configuring the product to fully integrate HP SNA Server Access into the existing network.

Operating System	MVS	VSE
Host Software	ACF/VTAM	ACF/VTAM
Communications Controller Software	ACF/NCP	ACF/NCP
Batch Job Entry	JES2 or JES3	VSE/POWER
Interactive Subsystems	CICS, IMS, TSO Other	CICS Other

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

SNA Server (HP 30254A) and SNA Server Access (HP 30255A) are available on the HP 3000 Series 37 through 70 with MPE V operating system, version G.902.01 or later (U delta-1 or later).

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

Documentation

30254-61000 HP SNA Server Access User's Guide

Ordering Information

HP 30254A HP SNA Server License to Use.

Select **one** processor option.

310	For Series 37, 37XE, or MICROS
320	For Series 39-58
330	For Series 64-70

Required

30246A SNA Link
30242A LAN 3000/V Link
32344A NS3000/V
30245A SNA NRJE and/or
30247A SNA IMF

HP 30255A HP SNA Server Access License to Use.

Select **one** processor option:

User License Options

310	For Tier 1 SPU, one RTU sublicense
315	For Tier 2 SPU, one RTU sublicense
320	For Tier 3 SPU, one RTU sublicense
330	For Tier 4 SPU, one RTU sublicense
335	For Tier 5 SPU, one RTU sublicense
340	For Tier 6 SPU, one RTU sublicense
350	For Tier 7 SPU, one RTU sublicense

Upgrade Credit Options

OCD	For Processor Option 310
OGJ	For Processor Option 315
OCE	For Processor Option 320
OCF	For Processor Option 330
OGL	For Processor Option 335
OGM	For Processor Option 340

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor option in addition to the new processor option on the same order.

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HP LU 6.2 Application Programming Interface

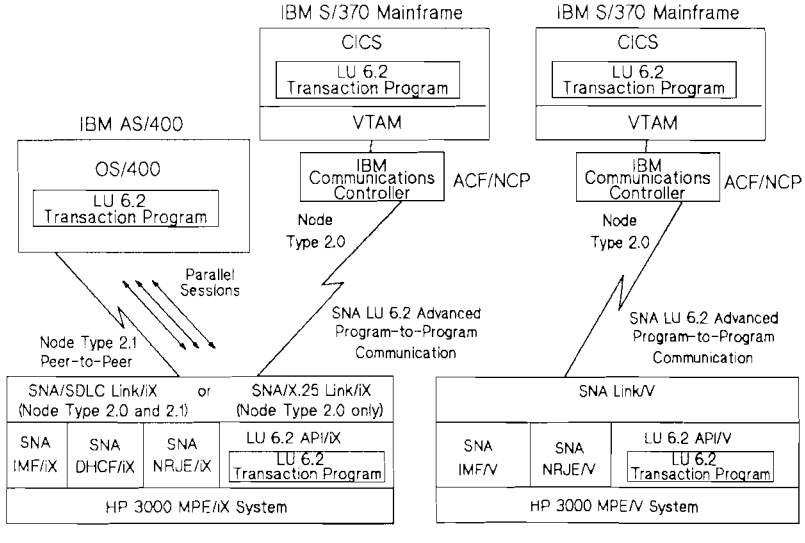
Technical Data

For HP 3000 V or iX Computer Systems Product Numbers HP 30253A and 30294A

This data sheet describes HP LU 6.2 API (Application Programming Interface) for both MPE V and MPE/iX operating systems. The term HP LU 6.2 API is used to refer to both HP LU 6.2 API/V and HP LU 6.2 API/iX products. The terms HP LU 6.2 API/V and HP LU 6.2 API/iX are used when a distinction is necessary.

HP LU 6.2 API/V on an HP 3000 Series 37 through 70 or HP LU 6.2 API/iX on an HP 3000 Series 9xx provides HP 3000 users with a way to program HP 3000 application programs for program-to-program communication in an SNA environment.

HP LU 6.2 API implements the LU 6.2 "mapped conversation verbs" for what IBM has named "advanced program-to-program communications" (APPC). Users may write "transaction programs" that use these verbs (or high-level intrinsics as HP has implemented them) in order to communicate with each other, even though these programs may be executing on different systems within the SNA network.



Features

HP LU 6.2 API provides:

- **High-level Intrinsics:** HP 3000 programmers can use a set of high-level intrinsics to implement program-to-program communication in an SNA network.
- **Support for Major Languages:** Application programs on the HP 3000 can be written in COBOL II, Transact, or Pascal. For LU 6.2 API/iX, C language applications are also supported.

- **Support for IBM Applications**: HP LU 6.2 API supports Mapped Conversations with CICS in an MVS or DOS/VSE environment and Mapped Conversations with VTAM in an MVS environment. With MPE/iX Release 4.0 or later, HP LU 6.2 API/iX supports Mapped Conversations in an OS/400 environment.
- **Multiple Sessions**: An HP 3000 application program using LU 6.2 API/V intrinsics may have up to 8 LU-LU sessions running simultaneously. With MPE/iX Release 4.0 or later, an HP 3000 application program using LU 6.2 API/iX intrinsics may have up to 256 LU-LU sessions running simultaneously. Each session is responsible for a separate communication task or for adding additional bandwidth to a single communication task.
- **Peer-to-Peer Connectivity**: With MPE/iX Release 4.0 or later, LU 6.2 API/iX provides peer-to-peer connectivity to an IBM AS/400 over Node Type 2.1. an HP 3000 may establish LU-LU sessions with an IBM AS/400 over Node Type 2.1 without having to go through a mainframe node.
- **Parallel Sessions**: With MPE/iX Release 4.0 or later, LU 6.2 API/iX provides support for parallel sessions over Node Type 2.1. An HP 3000 may establish multiple, simultaneous LU-LU sessions over a single LU-LU pair over Node Type 2.1.
- **Support for Remote Attach**: Remote Attach is the ability of a remote LU 6.2 application to request an HP 3000 LU 6.2 application to start running and begin communication with it.
- **Compatibility with Other SNA Services**: The HP LU 6.2 API is completely compatible with other SNA services offered for the HP 3000 such as SNA Interactive Mainframe Facility (SNA IMF), SNA Network Remote Job Entry (SNA NRJE), and SNA Distributed Host Command Facility/iX (SNA DHCF/iX). These products may all be running simultaneously over the same SNA Link/V, SNA/SDLC Link/iX, or SNA/X.25 Link/iX to the SNA network. The SNA Link products manage the physical link to the IBM host and implement protocols in the lower three layers of SNA.

  Note: HP LU 6.2 API/iX supports Native-mode HP 3000 applications only.

- **Trace Facility**: An easy-to-use trace facility that allows HP 3000 application programmers to track all LU 6.2 intrinsic calls and executions within applications being developed, serving as a valuable debugging aid during program development.
- **Logging Facility**: A comprehensive logging facility that records all online LU 6.2 API session messages to aid in problem identification and resolution.
- **User Controlled Sessions Management from Program or CI (CNOS)**: With MPE/iX Release 4.0 or later, Programmatic or interactive user-controlled session management allows users to change session limits (over Node Type 2.1).
- **Enhanced Communication Rates**: The maximum datacom line speed between the HP 3000 and the IBM mainframe host is 56 Kbps on MPE V and 64 Kbps on MPE/iX.
- Efficient and easy-to-program problem detection and recovery procedures.
- As with all HP SNA services, customizable error and help facilities are provided.
- **X.25 Connectivity**: HP LU 6.2 API/iX can communicate to an IBM mainframe over an X.25 connection. The SNA/X.25 Link/iX product (HP 30298A) can be used in place of SNA/SDLC Link/iX, but SNA/X.25 Link/iX emulates a Type 2.0 node, not a Type 2.1 node. Therefore if you run LU 6.2 API/iX over SNA/X.25 Link/iX, you cannot communicate, peer-to-peer with a Type 2.1 node like an IBM AS/400.

Functional Description

HP LU 6.2 API provides a set of high-level intrinsics for application programmers to use for program-to-program communication between an HP 3000 application program and an application program running on an IBM host mainframe. HP LU 6.2 API/iX also provides communication to an IBM AS/400. These intrinsics are responsible for initiating LU 6.2 conversations so that data can be sent or received over these conversations on behalf of program pairs needing to communicate to complete a "transaction." Examples of transactions are database updates and file transfers. LU 6.2 API consists of a set of user-callable intrinsics that implement the set of LU 6.2 defined mapped verbs along with the following option sets:

LU 6.2 API intrinsics are summarized in the following table.

LU 6.2 API Intrinsics Summary

Intrinsics	Function
MCALLOCATE	Establishes a mapped conversation between two TPs.
MCCONFIRM	Sends a confirmation request to the remote TP and waits for a reply.
MCCONFIRMED	Sends a confirmation reply to the remote TP in response to receiving a confirmation request.
MCDEALLOCATE	Ends a mapped conversation between TPs.
MCGETALLOCATE	Receives the request from a remote TP to start a conversation and then establishes the conversation.
MCGETATTR	Returns information pertaining to a mapped conversation.
MCFLUSH	Flushes the LU's send buffer.
MCPOSTONRCPT	Causes LU 6.2 API to post the conversation when information arrives.
MCPREPTORCV	Informs the remote TP that the HP 3000 resident TP (the local TP) is ready to receive data over the mapped conversation.
MCRCVANDWAIT	Waits for information to arrive on the mapped conversation and then receives the information. The information can be data, conversation status, or request for confirmation.
MCRCVNOWAIT	Receives any information available on the mapped conversation without waiting.
MCREQTOSEND	Notifies the remote TP that the local TP is requesting to send data for the mapped conversation.
MCSENDDATA	Sends data to the remote TP.
MCSENDERROR	Informs the remote TP that the local TP has detected an error.
MCTEST	Tests the conversation for the receipt of information.
MCWAIT	Waits for the receipt of information on one or more conversations.

Option Sets	IBM-Defined Verbs
• PIP data (both local and remote support)	
• Flush the LU's send buffer	MC_FLUSH
• Prepare to receive (including long locks)	MC_PREPARE_TO_RECEIVE
• Post on receipt	MC_POST_ON_RECEIPT
• Wait for posting to occur	WAIT
• Test for posting or request-to-send received	MC-TEST
• Receive immediate	MC_RECEIVE_IMMEDIATE
• Get conversation attributes	MC_GET_ATTRIBUTES

Product Requirements

Requirements for IBM mainframe hardware and software are the same for both HP LU 6.2 API/V and HP LU 6.2 API/iX.

IBM Mainframe Hardware Requirements:

- An IBM System/370 mainframe. This may be any IBM plug-compatible mainframe that supports 370 architecture.
- A port on an IBM 37xx or compatible communications controller that supports an SNA line. The HP 3000 can also be connected to the Communications Controller via an IBM 3710 Network Controller. (Please check with your HP Sales Representative for specific Communication Controller model support.)

IBM Mainframe Software Requirements:

- Advanced Communication Function for the Virtual Telecommunications Access Method (ACF/VTAM) applications are supported with:
  - Mapped LU 6.2 conversations only
  - ACF/VTAM version 3.2 or later
  - MVS operating system
- Advanced Communication Function for the Network Control Program (ACF/NCP) remote transmission control program version 3.1 or later.
- Customer Information Control System (CICS) applications are supported with:
  - Mapped LU 6.2 conversations only
  - CICS version 1.7 or later
  - ACF/VTAM version 2.1 or later
  - MVS or DOS/VSE operating system

IBM AS/400 Hardware Requirements:

- An IBM AS/400.
- A port on the AS/400 that supports an SNA line.

IBM AS/400 Software Requirements:

- OS/400 Version 1.2 or later.

HP 3000 product requirements:

- For HP LU 6.2 API/V:
  An HP 3000 Series 37-70 computer system, the MPE V operating system, and the SNA Link/V product (HP 30246A).
- For HP LU 6.2 API/iX:
  If connecting to an IBM mainframe: An HP 3000 Series 900 running MPE XL Release 2.2 or MPE/iX Release 4.0 or later operating system. The SNA/SDLC Link/iX product (HP 30291A) or the SNA/X.25 Link/ix product (HP 30298A).

  If connecting to an IBM AS/400: An HP 3000 Series 900 running MPE/iX Release 4.0 or later operating system. The SNA/SDLC Link/iX product (HP 30291A).
- A full- or half-duplex data communications line (switched or leased) between the HP 3000 and the IBM mainframe or IBM AS/400. A pair of synchronous modems.
  - or -
  An X.25 connection to the IBM mainframe (X.25 not supported to IBM AS/400).
- A block mode terminal that is supported by VPLUS/3000 for configuration.
- A COBOL II, PASCAL, C (HP LU 6.2 API/iX only), or Transact compiler.

Installation and Configuration Policy

The customer is responsible for loading the HP LU 6.2 API software onto the system.

Hewlett-Packard will perform minimum configuration of HP LU 6.2 API in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

The customer is responsible for performing the following tasks in order to successfully install and configure HP LU 6.2 API:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.

- Verifying that the necessary host mainframe or AS/400 software is installed and configured to support HP LU 6.2 API. The customer should consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (P/N 5958-8543), the "HP SNA Products: CICS Guide" (P/N 5958-8546), or the "HP SNA Products: AS/400 Guide" (P/N 5960-1629) for details.
- Verifying that SNA Link/V, SNA/SDLC Link/iX, or SNA/X.25 Link/iX is properly installed and configured prior to the installation of HP LU 6.2 API.
- Updating the HP 3000 system to the proper release level and installing the HP LU 6.2 API software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001) for MPE/iX systems or the HP 3000 Software Update Manual (32033-90036) for MPE V systems.
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Configuring HP LU 6.2 API in order to fully integrate HP LU 6.2 API into the existing customer network.

HP Responsibility

Following the installation of HP LU 6.2 API, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring 1 LU with 'Unsolicited Bind' equal to 'Y'.
- Starting the APPC subsystem and verifying that the LU is in a PENDING or ACTIVE state.

These steps complete HP's portion of the installation and minimum configuration of HP LU 6.2 API.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP LU 6.2 API/V:
HP 30253A License to use

Select **one** processor option. Upgrade credits may be used where applicable.

Processor Options:

310	For Series 37, 37XE, or MICROs
320	For Series 39 through 58
330	For Series 64 through 70

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor option in addition to the new processor option on the same order.

Upgrade Credit Options:

OCD	Upgrade credit for Option 310
OCE	Upgrade credit for Option 320

HP LU 6.2 API/iX:

HP 30294A License to use

Select **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options:

OAF	20-user license
UCY	40-user license
UA9	64-user license
UBD	100-user license
UCN	160-user license
UAT	Unlimited user license

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option on the same order.

Upgrade Credit Options:

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
OCD For Processor Option 310
OGJ For Processor Option 315
OCE For Processor Option 320
OCF For Processor Option 330
OGL For Processor Option 335
OGM For Processor Option 340
UEK For Processor Option 350

In order to receive the upgrade credit, customers must order the migration credit option in addition to the new MPE/iX software option on the same order.

Migration Credit Options for MPE V software to MPE/iX software upgrades:

OG1 For MPE V software Option 310
OG2 For MPE V software Option 320
OG3 For MPE V software Option 330

Note: Ordering information for HP 30246A SNA Link/V, HP 30291A SNA Link/iX, and HP 30298A SNA/X.25 Link/iX may be found in this guide under their respective data sheets.

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

Documentation

For both HP LU 6.2 API/V and HP LU 6.2 API/iX:

5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/NCP and ACF/VTAM Guide
5958-8646 HP SNA Products: CICS Guide
30294-61000 HP LU 6.2 API: Application Programmer's Reference Manual

For HP LU 6.2 API/iX:

5960-1629 HP SNA Products: AS/400 Guide
30294-61002 APPC Subsystem on MPE/iX Node Manager's Guide

For HP LU 6.2 API/V:

30253-90002 LU 6.2 API/V Node Manager's Guide
30253-90004 APPC Subsystem on MPE V Node Manager's Guide

For SNA Link/iX:

30291-61000 SNA Link/iX Node Manager's Guide

For SNA Link/V:

30246-90002 Getting Started with SNA Node Management
30246-90003 SNA Link Services Reference Manual

HEWLETT® PACKARD

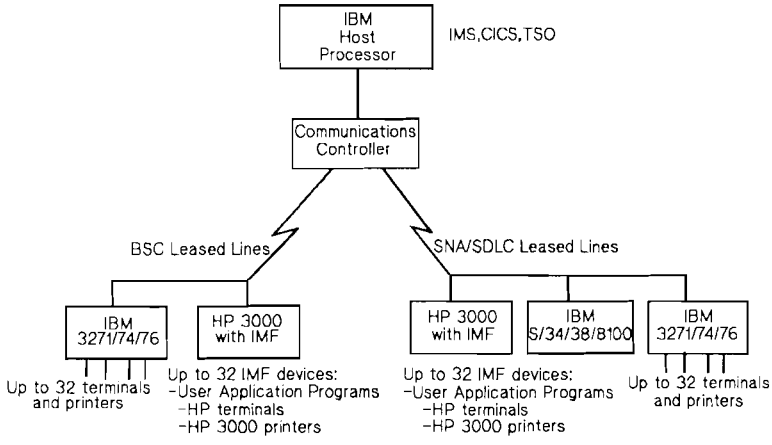
IMF Interactive Mainframe Facility

Technical Data

For HP 3000 MPE V Computer Systems Product Number HP 30250A

IMF Interactive Mainframe Facility and BSC Link allow an HP 3000 to communicate interactively with an IBM System/370-compatible mainframe computer using BSC or SDLC (PU 1) 3270 protocols. IMF allows programs on the HP 3000 to access IBM host program products such as CICS, IMS, and TSO through a set of high-level, easy-to-use intrinsics. User terminals connected to the HP 3000 may also use IMF to send and receive data from the host system.

IMF requires the installation and use of BSC Link. BSC Link manages the data communications protocol and link between the HP 3000 and the IBM System/370 or compatible mainframe and communications controller. It contains software, a hardware interface card, and a cable.



Features

- IMF and BSC Link allow an HP 3000 system to emulate the major features of an IBM 3271 control unit using BSC or SDLC protocol.
- Using the SDLC protocol, IMF allows the HP 3000 to be a Physical Unit type one (PU 1) node in an IBM SNA network.
- IMF allows programs on an HP 3000 to communicate with programs on the host system, through a set of 21 high-level intrinsics. Programs may be written in FORTRAN, COBOL, COBOL II, BASIC, Pascal, or SPL.
- The IMF user interface is transparent to the protocol being used; thus changing from a BSC to SDLC environment requires little or no modification to the HP 3000 application programs.
- The PassThru capability of IMF allows HP 3000 attached printers and terminals to emulate the major features of IBM 3270 printers and terminals.

- IMF takes advantage of the Modified Data Tag feature of terminals such as HP 150, HP 2620, 2624A/B, 2394A, and 700/xx, reducing response time.
- IMF PassThru supports a write optimization feature that limits screen updating to modified rows only, beginning with the first changing character. This feature significantly reduces response time and is supported for the HP 150, HP 2382A, 2392A, 2394A, 700/xx, and 262x terminals.
- IMF provides a "rolling softkeys" feature that allows the user to define and label multiple levels of terminal function keys, to be their most frequently used IBM 3270 program function keys. Users can also define various "menus" of function keys which are clearly displayed on the terminal screen.
- Terminals/printers being used in the PassThru mode do not have to be dedicated. The user may access either the HP 3000 or the remote host from the same terminal.
- In addition to the security features provided by MPE, access of the IMF subsystem is controlled through the ALLOW feature of an IMF configuration file – this allows only designated users, programs, terminals, or printers to use the IMF subsystem.
- The Auto Acquire capability of IMF makes it possible for designated terminals to be turned on in the PassThru mode without any user commands.
- IMF may be accessed remotely via DS/3000.
- Most host application programs designed to work with IBM 3270 terminals can be used without change.

Functional Description

IMF is a software product that allows an HP 3000 to emulate the major facilities and capabilities of the IBM 3271 control unit. IMF requires HP 30251A, BSC Link, which provides communications link management services. These products provide HP 3000 users the ability to communicate interactively with host processors. IMF has two modes of operation: programmatic mode and PassThru mode.

In the programmatic mode user-written programs on the HP 3000 can communicate with programs on the host. HP 3000 programs may be written in FORTRAN, COBOL, COBOL II, BASIC, Pascal, or SPL. Program access is accomplished through use of a set of intrinsics that are powerful procedures that perform the low-level task of decoding the data streams. (Table 1 on the following page provides a list of available intrinsics.) The intrinsics can be used with the intrinsics of other HP 3000 facilities such as IMAGE/3000, VPLUS/3000, KSAM/3000, or DS/3000. The high-level, easy-to-use nature of these intrinsics results in improved programmer productivity.

Because programmatic mode works by exchanging information through screen images, most host applications that have been written for use with the IBM 3270 controllers will work with IMF without modification.

For customers that are in the process of changing from centralized to distributed processing, this feature helps provide a smooth transition.

The PassThru mode of IMF provides users the capability of using HP 3000 attached terminals and printers for interactive access to a host computer. In this mode IMF users can directly access host software such as CICS or IMS, or they can use TSO for program development. Using the PassThru mode does not require the use of dedicated terminals.

NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simple Chinese, and Traditional Chinese.

IMF Intrinsics Summary *Table 1*

Intrinsic	Function
IMF Intrinsics Used with Standard MPE I/O	
ACQUIRE3270	Provides the IMF user the capability to start PassThru on an HP 3000 terminal or printer programmatically.
ATTRLIST	Returns the locations of attribute characters within all or a subsection of a screen.
CLOSE3270	Equivalent to turning off the specified device.
ERR3270	Returns the error message associated with a given intrinsic error number.
FIELDATTR	Returns information about the attributes of the specified field.
OPEN3270	Equivalent to turning on the power of a 3270 Display Station or Printer. It allocates the internal screen buffer used by IMF.
PRINT3270	Prints a copy of the internal screen image to a spool file.
READFIELD	Reads a field of data from the internal screen buffer and returns the data to an HP application program.
READSCREEN	Reads all or part of the internal screen buffer and returns this data to the HP application program.
RECV3270	Allows the user program to receive the screen after modification by the host.
RESET3270	Equivalent to pressing the RESET key on an IBM 3270 Display Station keyboard.
SCREENATTR	Returns information about the attributes of the screen image currently in the internal buffer.
STREAM3270	Equivalent to typing a series of keystrokes on a 3270 Display Station keyboard. Provides a mechanism for performing "special function key" operations from the HP application program. Also allows more than one field of data to be updated in one intrinsic call.
TRAN3270	Equivalent to pressing a transmit key on the 3277 or 3278 Display Station keyboard. It causes modified data to be transmitted to the host the next time the host polls the device.
VERS3270	Returns the number of the version of IMF that is being executed on the HP 3000.
WRITEFIELD	Writes data from the HP application program into an unprotected field of the internal screen buffer.
IMF Intrinsics for transparent data stream transfer with standard wait or MPE no-wait I/O using the SDLC protocol.	
READSTREAM	Allows programs to access uninterpreted data streams from the host.
WRITESTREAM	Allows the programs to create and transmit data streams from the HP 3000 to the host.
IMF Intrinsics used with MPE no-wait I/O	
ABORT 3270	Aborts an outstanding no-wait RECV3270 or TRAN3270 request.
IODONTWAIT	Informs user program that a previous I/O operation has completed, or returns before completing, when using no-wait I/O.
IOWAIT	Waits for completion operations for a previous no-wait I/O request.

Note: IOWAIT and IODONTWAIT are callable only from SPL, COBOL II, Pascal, and FORTRAN programs or procedures.

The PassThru mode of IMF is not intended as a replacement for real IBM 3270 devices.

For HP terminals being used in the PassThru mode the response time will be longer than that of IBM terminals:

- The data transmission rate between the HP 3000 and the terminals is slower than that between the IBM 3270 controller and its attached terminals.
- For terminals not supported by the write optimization feature, the screens on the HP 3000 and PassThru terminals are rewritten any time a change is made. For small changes this contributes to an increase in response time.
- IMF takes advantage of the Modified Data Tag feature of HP 150, HP 2624A/B, 2625A, 2394A, 700/94, 700/98, and 2628A terminals. This may result in improved response time when compared to other HP terminals.

For applications where response time is critical, please consult your HP sales representative for more information.

Although the principal functions of IBM 3270 terminal keyboards are implemented – including Program Function (PF) keys and Program Attention (PA) keys – there are some differences:

- Some keys are in different positions; some keys have different labels, and some keys are not implemented. Table 2

(below) lists the major differences between IBM 3270 terminals and HP 2392 terminals.

There are minor logical differences in the way HP terminals and IBM 3270 terminals behave. Differences include:

1. With PassThru mode, only unprotected fields in which one or more characters have actually been changed are transmitted to the host. If a PassThru user "modifies" an unprotected field by replacing the field with exactly the same characters as it had previously, the field would NOT be transmitted to the host with IMF, since no characters had changed. A real 3270-type terminal will transmit such modified fields whether or not any characters are actually changed. This minor difference will be of no consequence for most customers' applications.
2. Leading blanks can be converted to nulls based on a configuration option at PassThru startup.
3. Trailing blanks can be converted to nulls based on a configuration option at PassThru startup.
4. Trailing nulls can be converted to blanks based on a configuration option at PassThru startup.
5. Magnetic card reader, auxiliary card reader, and light pen are not provided on HP terminals using PassThru mode.
6. Only 1920 or 480 character screen sizes are allowed with IMF.
7. When using PassThru mode with the Multipoint Terminal Software capability, activities that require knowledge of the cursor position (such as IBM's TSO/Structured Programming Facility in the split screen mode, or VSPC) cannot be performed except with the 2625A or terminals connected to a 2333A Cluster Controller.
8. IMF does not support the numeric lock feature.

Keyboard Differences Between HP Terminals Using PassThru and IBM 3270 Terminals *Table 2*

IBM 3270 Terminal Keyboard	HP 2392A Keyboard
Program Function Keys	User specifies by typing program function number or through user-defined configuration of HP function keys.
FIELD MARK, TEST REQ, CURSOR BLINK, ALT CURSOR IDENT, DEV CNCL, DUP, CLICK, PRINT and CURSOR SELECT Keys	No equivalent on HP terminals.
PA1, PA2, PA3, CLEAR, SYSTEM REQUEST	Keys are in different locations(Softkeys are used).
SYSTEM AVAILABLE, INSERT MODE, INPUT INHIBITED Indicators	Indicators not provided.
ERASE INPUT, ERASE EOF, TAB, BACKTAB, NEWLINE, RESET INSERT Keys	Equivalent functions provided
3270 Characters	Corresponding HP Terminal Characters
cent sign ¢	[
!	]
solid vertical bar |	!
"NOT" sign	^

Functional Specifications

- The following terminals are supported in PassThru mode with the Multipoint Terminal Software:

  HP 2624B, HP 2625A, HP 2626A, HP 2628A, HP 2645A, HP 2647A, HP 2648A

- The following terminals are supported in PassThru mode via ADCC or ATP attachment:

  HP 120, HP 125, HP 150, HP 2344A, HP 2382A, HP 2392A, HP 2622A, HP 2623A, HP 2624A/B, HP 2625A, HP 2626A/W, HP 2627A, HP 2628A, HP 700/94, HP 700/96, HP 700/98, HP 2640A, HP 2641A, HP 2642B, HP 2645A, HP 2647A, HP 2648A, HP 2649A with emulator program HP 98x6 with emulator program, HP 700/92

- The write optimization feature is supported for the following terminals:

HP 150	2382A
2392A	2394A
262x	700/xx

- In general, HP terminals that support block mode operation are supported by IMF. Your HP Sales Representative can help you determine supportability of your particular terminal configuration. The 2621B terminal does not support block mode and is not supported by IMF.
- The 2392A, 2394A, 700/92, 700/94, 700/96, 700/98, and the HP 150 terminals support a 19.2 Kbps connection to the HP 3000. This significantly improves performance relative to slower terminal connections.
- The following terminals have the modified data tags feature and as a consequence provide 10-50% performance improvement over other terminals, depending on the application:

HP 150	HP 2624A/B
HP 2394A	HP 700/94
HP 2620A	HP 700/98

- The following terminals support multiple levels of "rolling softkeys" allowing up to 8 levels of 16 user-definable/labeled function keys:

HP 150	HP 2628A
HP 2624A	HP 2394A
HP 2625A	

- HP 264x terminals running PassThru must have at least 8K of memory.
- IMF PassThru supports any HP system printer. (IMF does not support printers connected directly to terminals or PCs.)
- IBM BSC control units emulated:
  - IBM 3271 Models 1 and 2
- IBM SDLC controllers emulated:
  - IBM 3271 Models 11 and 12
- Message Encoding:
  - IMF uses the NRZ (Non-return to Zero) encoding
  - IMF does not permit NRZI (Non-return to Zero Inverted) encoding.

Product Requirements

- An HP 3000 running the current version of the MPE VE Operating System.
- Minimum of 512 Kbytes of memory.
- HP 30251A BSC Link.
- A data communications line – must be a nonswitched (leased) line.

Installation and Configuration Policy

The customer is responsible for loading the IMF/V software onto the system.

Hewlett-Packard will perform minimum configuration of IMF/V in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel onsite to perform minimum configuration of IMF/V, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Verifying that the necessary host mainframe software is installed and configured to support IMF/V.
- Updating the HP 3000 system to the proper release level and installing the IMF/V software using AUTOINST. Refer to the HP 3000 Software Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the IMF Manager command MCHECK
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of IMF/V.

The customer is also responsible for completing the configuration in order to fully integrate IMF/V into the existing customer network after HP has completed the minimum configuration of IMF/V.

HP Responsibility

Following the installation of IMF/V, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the IMF/V product to a minimum configuration in order to verify software and hardware functionality.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

IMF is available on the entire HP 3000 product line running MPE V.

Note: IMF requires installation and operation of HP 30251A BSC Link.

Ordering Information

HP 30250A IMF Interactive Mainframe Facility Requires HP 30251A BSC Link

Select **one** Processor Option. An upgrade credit may also be selected where applicable.

Processor Options

310	For Series 37, 37XE or MICROs
320	For Series 39-58
320	For Series 64-70

Upgrade Credit Options

OCD	Upgrade Credit for Option 310
OCE	Upgrade Credit for Option 320

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP sales representative, or refer to the HP data sheets for specific support services.

Documentation

30250-90001 IMF/3000 User/Programmer Reference Manual

Technical information in this document is subject to change without notice.

Printed in the U.S.A.

HEWLETT® PACKARD

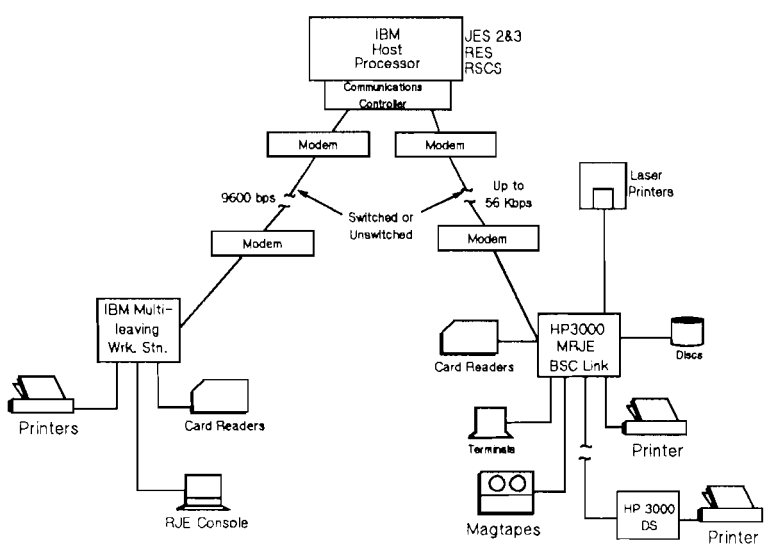
MRJE Multileaving Remote Job Entry

Technical Data

For HP 3000 MPE V Computer Systems Product Number HP 30249A

MRJE/Multileaving Remote Job Entry and BSC Link allow multiple users to submit batch jobs to or receive output from a host. With the MRJE facility, the HP 3000 emulates workstations that work with one of the following job entry systems on the host: JES2, JES3, RSCS, or RES.

MRJE requires the installation and use of BSC Link. BSC Link manages the data communications protocol and link between the HP 3000 and the IBM System/370-compatible mainframe. It contains software, a hardware interface card, and a cable.



Features

- Allows multiple HP 3000 users simultaneous batch access to the host.
- Provides for automatic management of job output.
- Allows for concurrent use of all the processing facilities of the HP 3000 such as Program Development, Database Management, and Transaction Processing.
- Allows any supported I/O device on the HP 3000 to be used for I/O including the HP 2680 Laser Printer.
- Allows MRJE or IBM host users to specify output spool file characteristics.
- Allows routing of unsolicited output to any destination device or file.
- Allows host console commands to be issued from any session.
- Has easy-to-use commands for job control.
- Allows users to schedule jobs even while the communications lines are down.
- Allows specification of Native Language Support for data transmission.

- NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simple Chinese, and Traditional Chinese.

Functional Description

MRJE and BSC Link allow an HP 3000 system to emulate a workstation operating with JES2 or JES3 Job Entry Systems on the host. With this facility, multiple HP 3000 users can submit batch jobs to or receive output from a host system simultaneously.

Use of the MRJE facility does not require the dedication of the entire system; all other processing facilities of the HP 3000 such as Database Management and Transaction Processing can be used concurrently with MRJE and BSC Link.

An HP 3000 and an HP 2680 or 2688 Laser Printer can use MRJE and BSC Link to act as a print station for a host computer. Remote sites with an HP 3000 Series 40 through 70 can get the maximum printer output by using a 56 Kbps Dataphone Digital Service (DDS) line with an external 56 Kbps clock signal.

Both MRJE and IBM host users can direct their output to HP 2680 and 2688 laser printers and specify spool file output characteristics including: output priority, number of copies, output device class, and environment file. Environment files define special predefined forms, character fonts, and formats.

MRJE allows for automatic job management under a standard IBM Job Entry System; users can, at the time of job submittal, specify the particular device to which their job outputs are to be directed. No further user intervention is required.

Output can be received on any standard output device on the HP 3000 such as tape units, disks, and printers. Similarly, jobs can be input through any standard input device such as terminals, card readers, or disk.

Unsolicited output can be routed via host "Special Forms" names to any destination device or file (such as a disk file or a deferred spool file).

With MRJE, users can issue host console commands for controlling job activity. Host console commands can be entered interactively or may be issued as part of an IBM Job Control Language (JCL) deck; the commands must conform to the formats specified by the host system. Through the configuration file the MRJE manager can control the set of commands that a particular user can issue.

As an example of the host console command, the JES2 $DA command can be issued to display active jobs, or a $DQ command may be issued to display job queues.

In addition to the host console commands, MRJE has easy-to-use commands for job control. These commands may be used for canceling jobs, displaying job status, and submitting jobs. All such commands may be issued either interactively through a terminal or through a batch job. A list of such commands is provided in table 1.

With MRJE, jobs can be submitted whether the communication line between the host and the HP 3000 is open or closed. Jobs submitted when the line is closed are spooled on the HP 3000 and automatically transmitted when the connection is made. Output from the host is also automatically sent to the HP 3000 and directed to the user-specified output device.

Functional Specifications

- MRJE and BSC Link operate with the following IBM Job Entry Systems:
  - JES2
  - JES3
- For the following IBM Job Entry Systems automatic output routing via the SUBMIT command is not supported:
  - RES
  - VM/RSCS*

- The MRJE product is compatible with only the standard (default) generation of IBM Job Entry Systems. When in doubt, confirm MRJE support of your Job Entry System through your local Hewlett-Packard representative. There can be 22 devices configured on the HP 3000. (However, the host will only support a total of 8 printers and punches at any one time.)
  - 7 card readers
  - 7 printers
  - 7 card punches
  - 1 console

Product Requirements

- An HP 3000 running the current version of the MPE Operating System.
- HP 30251A BSC Link.
- A data communications line
  - either switched or leased
  - between the HP 3000 and the IBM host.
- The IBM host must support one of the following job entry systems:
  - JES2
  - JES3
  - RES
  - RSCS

* However, automatic output routing can be performed through a mapping of the IBM host "Special Forms" name to an MPE "FILE" equation.

Summary of MRJE User Commands

Table 1

Command			Function
C[ANCEL][JOB]]	job jobname joblist		Cancels one or more jobs
D[ISPLAY]	H[OST]] J[OBLOG] S[TATUS] C[ONFIG]	job# jobname joblist ,item# ,itemlist	Displays job status, host machine configuration information, and line status (connected or disconnected).
E[XIT]			Terminates MRJE and returns control to MPE.
H[OST][hostid]			Specifies the host machine that will be referenced by subsequent commands.
S[UBMIT] infile 1	(N)][,infile2[(N)]]...[infile 5[(N)] [;R[EADER] = pseudo reader] [;PR[INT] = printfile[(N)]] [;PU[NCH] = punchfile[(N)]] [;F[ORMS] = formfile [(N)]]		Enters a job for transmission to the current host. (N) specifies "no translation."

Installation and Configuration Policy

MRJE/V is customer installable. However, Hewlett-Packard will perform minimum configuration of MRJE/V in order to verify minimum product functionality. This task, performed by HP, is included in the product purchase price.

For product configuration tailored to the customer's specific needs, or for a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer Responsibility

Prior to having HP personnel onsite to perform minimum configuration of MRJE/V, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - system configurations
  - logical network map identifying relevant traffic flow
  - physical network map identifying relevant network hardware components.
- Verifying that the necessary remote system software is installed and configured to support MRJE/V.

- Updating the HP 3000 system to the proper release level and installing the MRJE/V software using AUTOINST. Refer to the HP 3000 Software Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the MRJECONTROL CHECK command.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of MRJE/V.

The customer is also responsible for completing the configuration in order to fully integrate MRJE/V into the existing customer network after HP has completed the minimum configuration of MRJE/V.

HP Responsibility

Following the installation of MRJE/V, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the MRJE/V product to a minimum configuration in order to verify software and hardware functionality. This includes configuring MRJESTR, MRJECON, and MRJETABL for the default host.
- Verifying the MRJE/V configuration by issuing the MRJECONTROL START command and ensuring MRJE starts without problems.

These steps complete HP's portion of the installation and minimum configuration of MRJE/V.

HP effort spent on problems which are not caused by HP installation and configuration activities is considered HP Consulting Support and is billable to the customer at normal HP time-and-materials rates.

System Environment

MRJE and BSC Link are available on the entire HP 3000 product line running MPE V.

Ordering Information

HP 30249A MRJE
Multileaving Remote Job Entry
Requires HP 30251A BSC Link

Select **one** processor option. Upgrade credits may be used where applicable.

Processor Options

310 For Series 37, MICROs
320 For Series 39–58
330 For Series 64–70

Upgrade Credit Options

OCD Upgrade credit for option 310
OCE Upgrade credit for option 320

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP sales representative, or refer to the HP data sheets for specific support services.

Documentation

30249-90001 MRJE User/Programmer Reference Manual

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RJE Remote Job Entry

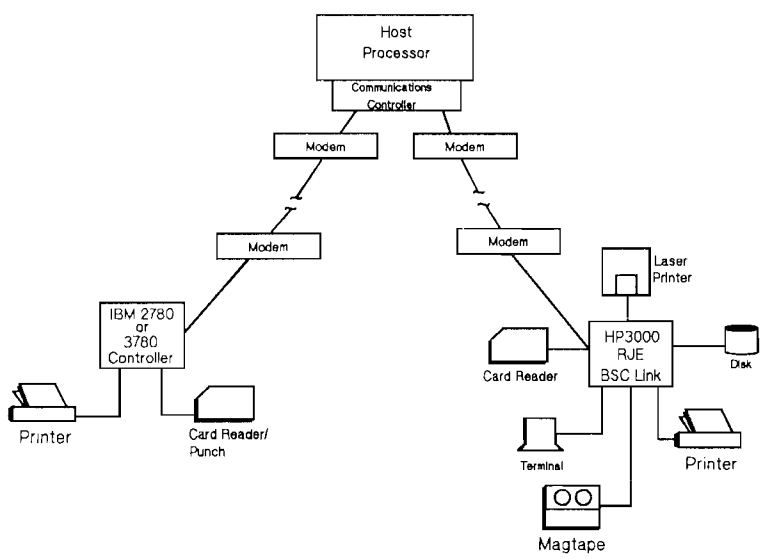
Technical Data

For HP 3000 MPE V Computer Systems Product Number HP 30248A

RJE Remote Job Entry and BSC Link allow an HP 3000 system to emulate the major functions of an IBM 2780 or IBM 3780 workstation. RJE can transmit batch jobs to, and receive output from, a host processor that can support standard IBM 2780/3780 devices.

Additionally, RJE can exchange files between an HP 3000 and many other processors that emulate standard IBM 2780/3780 devices.

RJE requires the installation and use of BSC Link. BSC Link manages the data communications protocol and link between the HP 3000 and the IBM System/370-compatible mainframe. It contains software, a hardware interface card, and a cable.



Features

- Allows the HP 3000 to emulate an IBM 2780 or 3780 workstation, using a point-to-point connection to the host.
- Provides a way of exchanging files between HP 3000s and many other systems that emulate standard IBM 2780 or 3780 devices.
- Allows users to submit jobs and receive output programmatically.
- Provides flexibility with regard to the devices used for input and output; any HP 3000 I/O device may be used.
- Can be used concurrently with other HP 3000 applications.
- Works over X.21 circuit-switched networks in Europe.
- Optionally performs data compression.
- Optionally allows transparent mode transmission, thus allowing transmission of any arbitrary binary data stream.
- Allows specification of Native Language Support for data transmission. NLS 16-bit character mapping; interactive and programmatic access; and

data integrity are not supported for languages such as Japanese, Korean, Simple Chinese, and Traditional Chinese.

Functional Description

RJE and BSC Link allow an HP 3000 system to emulate the major features of an IBM 2780 or IBM 3780 workstation. Using RJE, one can transmit batch jobs to, and receive output from, a host processor that can support standard IBM 2780/3780 devices. Additionally, one can use RJE and BSC Link to exchange files between an HP 3000 and many other processors that emulate standard IBM 2780/3780 devices.

An HP 3000 and an HP 2680 Laser Printer can use RJE and BSC Link to act as a high-speed print station for a host computer. Remote sites with an HP 3000 Series 40, or newer model, can get the maximum printer output by using a 56 Kbps Dataphone Digital Service (DDS) line and an external 56 Kbps clock signal.

RJE makes it possible for multiple users to submit jobs and receive output programmatically. Users can create files consisting of a set of commands; a user-written program can then submit the names of these command files to a message file. The RJE Subsystem sequentially scans the message file and executes commands encountered in each of the command files. The RJE Subsystem can be set up to go into a continuous receive mode after it has finished executing all the command files.

Users can continue to use the RJE Subsystem in a single-user-at-a-time manual mode, if desired.

RJE and BSC Link can operate concurrently with all the other processing facilities of the HP 3000. This allows HP 3000 users to perform such functions as the Database Management, Transaction Processing, Data Collection, and program development locally, while being able to transmit collected data (orders, payroll, etc.) or large CPU bound jobs, to a remote host for further processing.

By setting appropriate parameters, RJE allows transmission of binary data streams (including control characters) and compression of successive and trailing blanks. Successive blanks are replaced by a 2-byte sequence, a control character, and the number of blanks. This makes job transmission more efficient, particularly at a lower speed.

In an IBM 2780 system an end of medium (EM) mark is required before the trailing blanks in each record. RJE truncates trailing blanks when the truncate option is specified, no EM marks are required. However, when EM marks are present they perform the intended function.

RJE accepts both horizontal tabulation and vertical form control codes. It recognizes host carriage control characters and translates them to the corresponding characters for the HP 3000 printers. This makes it possible to print specially formatted forms. However, when special forms are used, output must be manually directed to the printer on which the appropriate form is mounted.

Product Requirements

- An HP 3000 running the current version of the MPE Operating System.
- HP 30251A BSC Link.
- An IBM System/370-compatible host running a job entry subsystem that supports 2780/3780 (RJE) protocols.
- A data communications line between the HP 3000 and the IBM host that can be either nonswitched (leased) or switched (dial-up).

Functional Specifications

RJE emulates all standard features of the IBM 2780/3780 systems except that it does not accept the six-bit transcode.

RJE has a set of high-level user commands that make it easy to use. The following is a list of these commands:

Command	Function
#:MPE Command	Enables the user to execute many MPE V commands from RJE by preceding the command with a colon.
#RJCMDFILE	Causes RJE to take its commands from another file.
#RJCOMMENT	Provides a method for inline comments.
#RJCONTINUE	Enables user to provide a procedure to evaluate errors and provide limited direction for error handling.
#RJHELP	Displays a help screen showing the RJE/V commands and each command's description and syntax.
#RJLINE	Defines the characteristics of the communications line.
#RJIN	Transmits input data from your HP 3000 Computer System to the remote processor.
#RJOUT	Requests and processes routed output from the remote processor.
#RJIO	Initiates transmission of a one-line message to the remote processor.
#RJINFO	Initiates a file display printing of the communications lines.
#RJLIST	Requests and processes unrouted list output from the remote processor.
#RJPUNCH	Requests and processes unrouted punched output from the remote processor.
#RJEOD	Transmits an EOT control character (end-of-file) to the remote processor after sending the last buffer from an RJIN command.
#RJEND	Terminates the HP RJE subsystem.
#RJSTAT	Provides statistical information on frequency of subsystem command use, elapsed times, and tallies of data transmitted and received.

Installation and Configuration Policy

RJE/V is customer installable. However, Hewlett-Packard will perform minimum configuration of RJE/V in order to verify minimum product functionality.

This task, performed by HP, is included in the product purchase price.

For product configuration tailored to the customer's specific needs, or for a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer Responsibility

Prior to having HP personnel onsite to perform minimum configuration of RJE/V, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations.
  - Logical network map identifying relevant traffic flow.
  - Physical network map identifying relevant network hardware components.
- Verifying that the necessary remote system software is installed and configured to support RJE/V.

- Updating the HP 3000 system to the proper release level and installing the RJE/V software using AUTOINST. Refer to the HP 3000 Software Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels by entering the RJE command and observing the version stamp in the RJE/V banner.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of RJE/V.

The customer is also responsible for completing the configuration in order to fully integrate RJE/V into the existing customer network after HP has completed the minimum configuration RJE/V.

HP Responsibility
Following the installation of RJE/V, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the RJE/V product to a minimum configuration in order to verify software and hardware functionality.
- Verifying the RJE/V configuration by sending a sign-on card when communicating with a host mainframe or issuing the RJLINE command when communicating with other systems.

These steps complete HP's portion of the installation and minimum configuration of RJE/V.

HP effort spent on problems that are not caused by HP installation and configuration activities is considered HP Consulting Support and is billable to the customer at normal HP time-and materials rates.

System Environment

RJE and BSC Link are available on the entire HP 3000 product line running MPE V.

Ordering Information

HP 30248A RJE Remote Job Entry requires HP 30251A BSC Link

Select **one** processor option. Upgrade credits may be used where applicable.

Processor Options

310 For Series 37, MICROs
320 For Series 39–58
330 For Series 64–70

Upgrade Credit Options

OCD Upgrade Credit for Option 310
OCE Upgrade Credit for Option 320

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP sales representative, or refer to the HP data sheets for specific support services.

Documentation

30248-90002 RJE/V Node Manager's Guide
30295-61001 RJE User/Programmer Reference Manual

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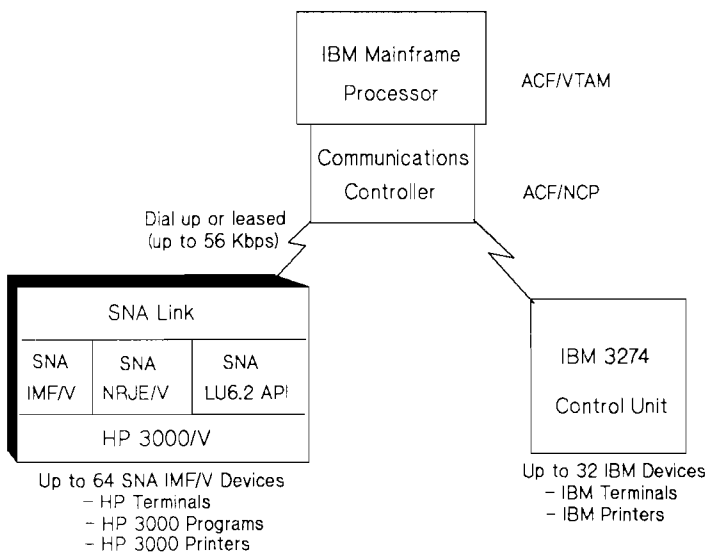
SNA IMF/V Interactive Mainframe Facility

Technical Data

For HP 3000 MPE V Computer Systems Product Number HP 30247A

The SNA Interactive Mainframe Facility/V (SNA IMF/V) product provides IBM 3270 device emulation for Hewlett-Packard terminals, printers, and HP 3000 MPE V systems. (SNA IMF/iX, P/N 30293A, provides similar functionality for MPE/iX systems.)

SNA IMF/V on an HP 3000 Series 37-70 allows interactive communications between the HP 3000 and an IBM System/370-compatible mainframe using SNA 3270 protocols. SNA IMF/V emulates the base function set of an IBM 3270 control unit using SNA Physical Unit Type 2 (PU2), Logical Unit Types 1,2,3 (LU1,2,3) protocols. HP terminals, printers, and applications on the HP 3000 running SNA IMF/V emulate IBM terminal and printer functions.



SNA IMF/V allows access to 3270 subsystems on the mainframe (such as TSO, CICS, and IMS) through a set of high-level intrinsics. There are two modes of operation. In programmatic mode, application programs on the HP 3000 emulate IBM 3270 terminals and printers, exchanging data with the host applications via intrinsics. In PassThru mode, users of HP terminals and printers can access 3270 subsystems on the host as if they were using IBM 3270 devices.

SNA IMF/V requires SNA Link/V (HP 30246A). SNA Link/V manages the physical link to the host and implements protocols in the lower three layers of SNA. It contains software, a hardware interface card, and a cable.

Features

- SNA IMF/V and SNA Link/V allow the HP 3000 to emulate the major features of an IBM 3270 control unit using SNA (PU2, LU1,2,3) protocols.

- SNA IMF/V, SNA NRJE/V, and LU6.2 API/V can all be supported simultaneously over one SNA Link/V. The maximum datacom line speed is 56 Kbps.
- SNA IMF/V supports up to 64 devices (terminals, printers, and application programs) concurrently per system.
- The PassThru capability of SNA IMF/V allows HP 3000-attached printers and terminals to emulate the major features of IBM 3270 printers and terminals.
- SNA IMF/V PassThru takes advantage of the Modified Data Tag feature of selected HP terminals (such as the HP 700/94) and supports a write optimization feature that limits screen updating to modified rows only. These features significantly reduce response time.
- SNA IMF/V provides a "rolling softkeys" feature that allows the user to define and label multiple levels of terminal function keys to be their most frequently used IBM 3270 program function keys. Users can also define various "menus" of function keys that are clearly displayed on the terminal screen. The SNA IMF Programmer's Reference Manual documents the terminals supporting this feature, some of which provide up to 16 softkeys.
- Terminals/printers being used in the PassThru mode do not have to be dedicated. The user may access either the HP 3000 or the remote host from the same terminal.
- SNA IMF/V allows programs on an HP 3000 to communicate with programs on the host system through a set of high-level intrinsics. Programs may be written in FORTRAN, COBOL, COBOL II, BASIC, Pascal, or SPL.
- Most host application programs designed to work with IBM 3270 terminals can be used with minimal change.
- SNA IMF/V runs concurrently with other HP 3000 applications and can be accessed from other systems via HP's proprietary network services.
- SNA IMF/V supports HP's Native Language Support, which allows application programmers to create local language applications for end users. NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simple Chinese, and Traditional Chinese.
- SNA IMF/V supports IBM applications with 480, 1920, or 3440 character screen sizes.

Functional Description

SNA IMF/V is a software product that allows an HP 3000 and attached devices to emulate the major features of an IBM 3270 control unit and attached devices. Specifically, SNA IMF/V emulates the base function set of the IBM 3274, which does not include graphics, programmed symbols, or color.

SNA IMF/V requires SNA Link/V. SNA Link/V manages the communications link and implements lower-level SNA (PU2) protocols. SNA IMF/V provides interactive and programmatic 3270 communications with a mainframe and can run simultaneously along with other SNA services such as SNA NRJE/V and LU6.2 API/V.

In the programmatic mode, user-written programs on the HP 3000 can communicate with programs on the host. HP 3000 programs may be written in FORTRAN, COBOL, COBOL II, BASIC, Pascal, or SPL. Program access is accomplished through use of a set of intrinsics that are powerful procedures that perform the low-level task of decoding the data streams. (Table 1 provides a list of available intrinsics.) The intrinsics can be used with the intrinsics of other HP 3000 facilities such as IMAGE/3000, VPLUS/3000, KSAM/3000, or NS/3000. The high-level, easy-to-use, nature of these intrinsics results in improved programmer productivity.

SNA IMF/V Intrinsics Summary *Table 1*

Intrinsic	Function
ABORT3270	Aborts an outstanding no-wait RECV3270 or TRAN3270 request.
ACQUIRE3270	Provides the SNA IMF/V users the capability to start PassThru on an HP 3000 terminal or printer programmatically.
ATTRLIST	Returns the locations of attribute characters within all or a subsection of a screen.
CLOSE3270	Equivalent to turning off the specified device.
ERR3270	Returns the error message associated with a given intrinsic error number.
FIELDATTR	Returns information about the attributes of the specified field.
OPEN3270	Equivalent to turning on the power of a 3270 Display Station or Printer. It allocates the internal screen buffer used by SNA IMF/V.
PRINT3270	Prints a copy of the internal screen image to a spool file.
READFIELD	Reads a field of data from the internal screen buffer and returns the data to an HP application program.
READSCREEN	Reads all or part of the internal screen buffer and returns the data to an HP application program.
RECV3270	Allows the user program to receive the screen after modification by the host.
RESET3270	Equivalent to pressing the RESET key on an IBM 3270 Display Station keyboard.
SCREENATTR	Returns information about the attributes of the screen image currently in the internal buffer.
STREAM3270	Equivalent to typing a Series of keystrokes on a 3270 Display Station keyboard. Provides a mechanism for performing "special function key" operations from the HP application program. Also allows more than one field of data to be updated in one intrinsic call.
TRAN3270	Equivalent to pressing a transmit key on the 3277 or 3278 Display Station keyboard. It causes modified data to be transmitted to the host the next time the host application requests data.
VERS3270	Returns the number of the version of SNA IMF/V that is being executed on the HP 3000.
WRITEFIELD	Writes data from the HP application program into an unprotected field of the internal screen buffer.
READSTREAM	Reads all or part of the untranslated host data stream.
WRITESTREAM	Creates the data stream that an HP application program sends to the IBM host.

Because programmatic mode works by exchanging information through screen images, most host applications that have been written for use with IBM 3270 controllers will work with SNA IMF/V with little or no modification. For customers who are in the process of changing from centralized to distributed processing, this feature helps provide a smooth transition.

The PassThru mode of SNA IMF/V provides users the capability of using HP 3000 attached terminals and printers for interactive access to a host computer. In this mode, SNA IMF/V users can directly access host software such as CICS or IMS or they can use TSO for program development. Using the PassThru mode does not require the use of dedicated terminals.

The PassThru mode of SNA IMF/V is not intended as a replacement for real IBM 3270 devices.

For HP terminals being used in the PassThru mode, the response time will be longer than that of IBM terminals: The data transmission rate between the HP 3000 and the terminals is slower than that between the IBM 3270 controller and its attached terminals.

- For terminals not supported by the write optimization feature, the screens on the HP 3000 and PassThru terminals are rewritten any time a change is made. For small changes, this contributes to an increase in response time.
- SNA IMF/V uses the modify data tag feature of the HP 700/94, HP 2394A, and HP 150 terminals in order to accurately and flexibly handle null and blank characters. In addition, this may result in improved response time when compared to other HP terminals.

  For applications where response time is critical, please consult your HP Sales Representative for more information.

  Although the principal functions of IBM 3270 terminal keyboards are implemented—including Program Function (PF) keys and Program Attention (PA) keys—there are some differences:

- Some keys are in different positions, some keys have different labels, and some keys are not implemented. Table 2 lists the major differences between IBM 3270 terminals and HP 2392 terminals.

  There are minor logical differences in the way HP terminals and IBM 3270 terminals behave. Differences include:

1. With PassThru mode, only unprotected fields in which one or more characters have actually been changed are transmitted to the host. If a PassThru user "modifies" an unprotected field by replacing the field with exactly the same characters as it had previously, the field would NOT be transmitted to the host with SNA IMF/V, since no characters had changed. A real 3270-type terminal will transmit such modified fields whether or not any characters are actually changed.
2. Leading blanks can be converted to nulls based on a configuration option at PassThru startup.
3. Trailing blanks can be converted to nulls based on a configuration option at PassThru startup.
4. Trailing nulls can be converted to blanks based on a configuration option at PassThru startup.
5. Magnetic card reader, auxiliary card reader, and light pen are not provided on HP terminals using PassThru mode.
6. When using PassThru mode with the Multipoint Terminal Software capability, activities that require knowledge of the cursor position (such as IBM's TSO/Structured Programming Facility in the split screen mode, or VSPC) cannot be performed except with the 2625A or terminals connected to a 2333A Cluster Controller.
7. SNA IMF/V does not support the numeric lock feature.

Keyboard Differences Between HP Terminals Using PassThru and IBM 3270 Terminals ***Table 2***

3270 Typewriter Keyboard	HP 2392A Keyboard
Program Function Keys	User specifies by typing desired program function number or thru user-defined configuration of HP function keys.
FIELD MARK, TEST REQ, CURSOR BLINK, ALT CURSOR, IDENT, DEV CNCL, DUP, CLICK, PRINT, and CURSOR SELECT Keys	No equivalent on HP terminals.
PA1, PA2, PA3, CLEAR, SYSTEM REQUEST	Keys are in different locations (Softkeys are used)
SYSTEM AVAILABLE, INSERT MODE, INPUT INHIBITED Indicators	Indicators not provided
ERASE INPUT, ERASE EOF, TAB, BACKTAB, NEWLINE, RESET INSERT Keys	Equivalent functions provided
3270 Characters	Corresponding HP Terminal Characters
cent sign ¢	[
!	]
solid vertical bar |	!
"NOT" sign	^

Functional Specifications

- SNA IMF/V emulates the base function set of the IBM 3274 terminal controller; the base set does not include color, graphics, programmed symbols, or extended attributes.
- SNA IMF/V supports communications to an IBM System/370 (or compatible) mainframe running either the MVS/SP, MVS/XA, DOS/VSE, or VM operating systems with ACF/VTAM through an IBM 37xx communications processor running ACF/NCP.
- SNA IMF/V supports communications with an IBM S/36 running SSP or an IBM S/38 running CPF or an IBM AS/400 running OS/400.
- The SNA Link/V product supports Physical Unit Type 2 protocols; SNA IMF/V provides Logical Unit Type 1, 2, and 3 emulation over the link. The SNA Link/V can support interactive (SNA IMF/V), batch (SNA NRJE/V), and programmatic (LU6.2 API/V) communications simultaneously over a single link to an IBM host.
- In PassThru mode, SNA IMF/V emulates the IBM 3278-2, 3278-3, and 3278-4 display stations and IBM 3287 printers.
- SNA IMF/V supports up to 64 devices (terminals, printers, or application programs) concurrently per system.
- The HP 700/94 or HP 700/98 terminal is recommended for use with SNA IMF/V in PassThru mode as it offers the greatest performance and functionality.
- The following terminals support Modified Data Tags and, consequently, provide a 10-50% performance improvement in PassThru mode and greater functionality over other terminals:
  - HP Vectra PC with Reflection 7 PLUS™ Version 3.3 (or greater)
  - HP 150
  - HP 2394A
  - HP 2624A,B
  - HP 2625A
  - HP 2628A
  - HP 700/94
  - HP 700/98
- In PassThru mode, non-MDT terminals are not supported with all host applications that are sensitive to nulls and blanks. In these circumstances, an MDT terminal will function properly and should be the terminal of choice.
- The following terminals are supported with HP 3000 MPE V systems in PassThru mode via either an ATP or ADCC attachment.
  - HP Vectra PC with Reflection 7 PLUS Version 3.3 (or greater)
  - HP Vectra PC with AdvanceLink 2392
  - HP 150
  - HP 700/92
  - HP 700/94
  - HP 700/96
  - HP 700/98
  - HP 2382A
  - HP 2392A
  - HP 2394A
  - HP 2397A
  - HP 2622A
  - HP 2623A
  - HP 2624A, B
  - HP 2625A
  - HP 2627A
  - HP 2628A
- The following terminals are supported with HP 3000 MPE V systems in PassThru mode with the Multipoint Terminal Support Service product (P/N 32025A/R).
  - HP 2624B
  - HP 2625A
  - HP 2628A
- SNA IMF/V supports the write optimization feature for improved performance in Pass-Thru mode with the following terminals:
  - HP 150
  - HP 2392A
  - HP 2394A
  - HP 700/92
  - HP 700/94
  - HP 700/96
  - HP 700/98
- With the HP NS X.25 3000/V Network Link (HP 24405A) and NS 3000/V Network Services (HP 32344A), SNA IMF/V supports these terminals when they are directly attached to an HP 2334A Plus or HP 2335 PAD:
  - HP 700/9X
  - HP 2392A
  - HP 2394A
  - HP 150A

  This feature is supported on SNA IMF/V or SNA IMF/iX (HP 30293A) only and is NOT supported on the IMF/V (HP 30250A) product. Other PassThru-supported terminals configured to be one of the terminals listed above are NOT supported.
- The HP 700/94, HP 700/96, HP 700/98, HP 2394A, HP 150, HP 700/92, and HP 2392A terminals support a 19.2 Kbps connection to the HP 3000.

- The following terminals support multiple levels of "rolling soft-keys" allowing up to 96 user-definable function keys.
  - HP 150
  - HP 2624B
  - HP 700/94
  - HP 700/98
  - HP 2625A
  - HP 2394A
  - HP 2628A
- SNA IMF/V supports any HP system printer.
- The HP 150 does not support the 43-line feature of SNA IMF/V.
- The HP 2392 terminal running in PassThru mode must have at least 8 Kbytes of memory.
- Link Level Message encoding
  - SNA IMF/V supports only NRZ (Non-Return to Zero) encoding.
- SNA IMF/V and SNA Link/V may require occasional IBM operator intervention when connected to the IBM S/38.

Product Requirements

- SNA IMF/V requires an IBM System/370 or compatible mainframe (models 370, 30xx or 43xx) with an IBM 37xx communications controller. The following software must be running on the IBM host and communications controller:
  - MVS/SP, MVS/XA, DOS/VSE, or VM
  - ACF/VTAM
  - ACF/NCP
- For communication to an IBM S/36, IBM S/38, or IBM AS/400 minicomputer, the following software must be running on the IBM system:
  - SSP (S/36) Release 5
  - CPF (S/38) Release 7.0
  - OS/400 (AS/400) Release 2
- HP will support certain versions, releases, modifications, and PTF levels of the above software. Your HP Sales Representative or Systems Engineer can determine whether SNA IMF/V can be supported with your particular configuration. The Network Implementation Support Plan (NISP) will help the customer engineer determine support requirements in advance of the installation of SNA IMF/V in a particular network.
- SNA IMF/V HP Product Requirements
  - HP 3000 MICRO LX/GX/XE or S/37-S/70 system
  - HP 30246A SNA Link/V

Installation and Configuration Policy

The customer is responsible for loading the SNA IMF/V software onto the system.

Hewlett-Packard will perform minimum configuration of SNA IMF/V in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel onsite to perform minimum configuration of SNA IMF/V, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP), including:
  - system configurations
  - logical network map identifying relevant traffic flow
  - physical network map identifying relevant network hardware components.
- Verifying that the necessary host mainframe software is installed and configured to support SNA IMF/V. The customer should contact their HP representative for typical host parameter values or consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (5958-8543) for details.
- Verifying that SNA Link/V is properly installed and configured prior to the installation of the SNA IMF/V unless SNA Link/V will be installed at the same time.
- Updating the HP 3000 system to the proper release level and installing the SNA IMF/V software using AUTOINST. Refer to the HP 3000 Software Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the minimum configuration of SNA IMF/V. The customer is also responsible for completing the configuration in order to fully integrate SNA IMF/V into the existing customer network after HP has completed the minimum configuration of SNA IMF/V.

HP Responsibility

Following the installation of SNA IMF/V, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the SNA IMF/V product to a minimum configuration (1 LU) in order to verify software and hardware functionality.

These steps complete HP's portion of the installation and minimum configuration of SNA IMF/V.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis. Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

SNA IMF/V and SNA Link/V are available on all HP 3000 MPE/VE systems.

Note: SNA IMF/V requires installation and operation of HP 30246A, SNA Link/V.

Ordering Information

HP 30247A SNA IMF/V License to use

Select **one** processor option. Upgrade credits may be used where applicable.

Processor Options

310 For Series 37, 37XE, or MICROs
320 For Series 39-58
330 For Series 64-70

Upgrade Credit Options

OCD Upgrade Credit for Option 310
OCE Upgrade Credit for Option 320

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle. For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

Documentation

The following documentation is for SNA IMF/V:

30247-90002 Installing and Troubleshooting SNA IMF
30293-61005 SNA IMF Programmer's Reference Manual
30293-61008 Using SNA Pass Thru
5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/NCP and ACF/VTAM Guide
5958-8545 HP SNA Products: IMS Guide
5958-8546 HP SNA Products: CICs Guide

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SNA NRJE Network Remote Job Entry

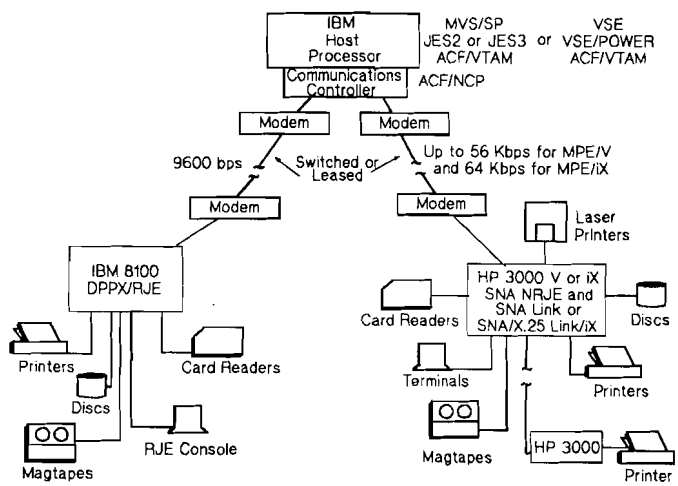
Technical Data

For HP 3000 V or iX Computer Systems Product Numbers HP 30245A and 30292A

This data sheet describes System Network Architecture Network Remote Job Entry (SNA NRJE) for both the MPE V (SNA NRJE/V) and MPE/iX (SNA NRJE/iX) operating systems. The term SNA NRJE is used to refer to both SNA NRJE/V and SNA NRJE/iX. The terms SNA NRJE/V and SNA NRJE/iX are used when a distinction is necessary.

SNA NRJE/V on the HP 3000 Series 37-70 or SNA NRJE/iX on the HP 3000 Series 900 provides enhanced batch data communications between the HP 3000 and an IBM System/370-compatible mainframe in a System Network Architecture (SNA) environment. SNA NRJE emulates the major features of an IBM 8100 DPPX/RJE workstation using an SNA Physical Unit Type 2 (PU 2), Logical Unit Type 1 (LU 1) device.

SNA NRJE/iX requires the installation and use of SNA/SDLC Link/iX (30291A) or SNA/X.25 Link/iX (30298A), SNA NRJE/V requires SNA Link/V (30246A). SNA/SDLC Link/iX, SNA X.25 Link/iX, and SNA Link/V (referred to jointly as SNA Link) manage the physical link to the host and implement protocols in the lower three layers of SNA. Each link product contains software, a hardware interface card, and a cable. SNA NRJE can run simultaneously with other HP SNA services (for example, SNA IMF) on both the MPE V or MPE/iX systems. In addition, all SNA services can run simultaneously over the same SNA Link.



Features

- SNA NRJE is able to communicate with JES2, JES3, and VSE/POWER host job entry subsystems.
- Automatically route job output based on destinations selected by the user at the time of job submittal – "Job Management"
- Automatically route output based on user-selected IBM host forms – "Output Management"
- Process batch jobs originated by a user on an IBM mainframe – "Reverse NRJE"

- Provide Native Language Support – for data only. NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simplified Chinese, and Traditional Chinese.
- Host output can be sent to any supported output device on an HP 3000 such as disk files, tape files, printers, or user-written programs.
- Multiple HP 3000 users can concurrently access the host for batch processing.
- Jobs are submitted into the transmission queue independent of the line status.
- Users can submit jobs and receive output without operator intervention.
- Other HP 3000 applications run concurrently with SNA NRJE.
- SNA NRJE can share an SNA link with other HP SNA service products.
- Customizable error and help message facilities are provided.
- Host console commands can be sent and host console data can be received.
- Data compression and character code translation are configurable.
- SNA NRJE and SNA Link support leased line communications at up to 56 Kbps on MPE V and 64 Kbps on MPE/iX.
- SNA NRJE can take advantage of SNA/SDLC Link's Auto-dial capability.

Functional Description

SNA NRJE must be used with the SNA Link, which implements protocols in the lower three layers of SNA and provides physical connectivity to the IBM host via leased or dial-up lines. SNA Link supports line speeds up to 56 Kbps on MPE V and 64 Kbps on MPE/iX as well as simultaneous batch and interactive communications to an IBM host over a single line.

SNA NRJE supports up to eight workstations on an HP 3000. When these workstations are used to communicate with different hosts, each workstation must use a different SNA Link.

The SNA NRJE user interface has commands for submitting jobs, directing the output to specific devices, directing the output to specific predefined file equations, displaying job status, and canceling jobs (see table of Selected User Commands on next page for other commands). These commands can be issued interactively through a terminal, or issued as part of an HP 3000 program executing NRJE intrinsics. MPE commands can be executed in the middle of SNA NRJE operations. The HP 3000 will concurrently process user applications and data communications with an IBM mainframe.

In addition to SNA NRJE user commands, an operator with Node Manager (NM) capability has commands to start and stop the batch workstations, obtain the host remote console, start and stop tracing and other functions. These commands may be issued either interactively or through a batch job.

Operation of the user or operator interface is independent of the status of the data communications line. Submitted jobs are held in a transmission queue and automatically sent to the host when the line becomes available.

Similarly, job output is held at the host and sent to the HP 3000 when the line connection is made.

The Job Management feature of SNA NRJE allows users, at time of submittal, to specify the particular device to which their job output is to be directed. If no device is specified, output is directed to a default destination, according to the configuration of SNA NRJE by the NodeManager. No further user intervention is required.

Note: Job Management is not available to anyone communicating with a host using the VSE/POWER job entry subsystem.

Output can be received on any standard output device on the HP 3000 such as tape units, disks, and printers. Similarly, jobs can be input through any standard input device such as terminals, card readers, or disk.

The Output Management feature of SNA NRJE allows users to have job output routed based on the form selected by the user's host JCL and a Lookup Table which provides a mapping between host form names and HP 3000 file equations. Again default forms will be used if none are indicated.

Reverse NRJE allows a user connected to an IBM mainframe (or a user on a separate HP 3000 attached to the IBM) to start a job on an HP 3000 if SNA NRJE on the HP 3000 is active.

Note: The user must use the special form CMD that causes SNA NRJE to stream a received data set rather than route the data set using file equation attributes.

Using SNA NRJE and SNA Link, an HP 3000 with an HP 2680 Laser Printer can act as a remote or local (though still requiring a 37xx communications controller) print station for an IBM host. HP 3000 users can direct print output data sets to the laser printer. Users can specify an environment file that indicates predefined forms, character fonts and formats – data set by data set.

Selected User Commands

Command	Function
ALTER*	Revises the priority of a submitted job, or jobs.
CANCEL*	Cancels previously submitted jobs and causes data sets returning from transmitted jobs to be deleted.
DISPLAY	Provides information about a workstation.
EXIT	Causes the user to exit from the NRJE command interpreter (CI), and returns control to the process from which the CI was run.
##FD	"File Definition" used within a job to include the contents of the file specified in the command.
HELP	Provides you with information about subsystem commands.
NRJE	Invokes the subsystem command interpreter. It is also an NRJE subsystem command, so that you can switch to a different default workstation.
REDO	Modifies and executes the previous NRJE subsystem command.
RUN	Executes a prepared program.
SHOW*	Provides information about jobs you have submitted.
SUBMIT	Prepares a batch input job stream for transmission to a host system.

* This command has NRJE Manager extensions.

Native Language Support allows users to select alternative Native Language IDs for translation of user data. Only data going to the host or coming from the host will be translated, commands and messages will still be in native 3000. Each reader, printer, and punch can be configured with a different language. NLS 16-bit character mapping; interactive and programmatic access; and data integrity are not supported for languages such as Japanese, Korean, Simplified Chinese, and Traditional Chinese.

Product Requirements

- Both SNA NRJE/iX and SNA NRJE/V require an IBM System/370-compatible mainframe (Model 370, 30xx or 43xx) with an IBM 37xx communications controller. The following software must be running on the host and communications controller:
  - Job Entry Subsystem: JES2 or JES3 running under
  - Operating System: MVS or
  - Job Entry Subsystem: VSE/POWER running under
  - Operating System: VSE
  - ACF/VTAM
  - ACF/NCP

HP will support certain versions, releases, modifications, and Product Temporary Fix (PTF) levels of the above software. The Network Implementation Support Plan (NISP) will help the customer engineer determine support requirements in advance of SNA NRJE in a particular network.

SNA NRJE/iX Product Requirements:

- An HP 3000 Series 900 computer system running MPE XL Release 2.2 or MPE/iX Release 4.0 or later operating system
- HP 30291A SNA/SDLC Link/iX or HP 30298A SNA/X.25 Link/iX

SNA NRJE/V Product Requirements:

- An HP 3000 Series 37-70 and MPE V operating system
- HP 30246A SNA Link/V

Functional Specifications

SNA NRJE and SNA Link provide the HP 3000 with the major functions of an IBM 8100 DPPX/RJE workstation operating as a remote node in an SNA network.

The maximum RU size supported by NRJE is 768 bytes.

SNA NRJE supports a record length up to 252 bytes (or characters) for JES2 and JES3 and 128 bytes (or characters) for VSE/POWER when sending data from the HP 3000 to an IBM host. Records up to 255 bytes in length may be received from the host.

NRJE supports up to eight workstations, each of which may support up to 16 LU-LU sessions, with a maximum of 64 total LU-LU sessions.

Installation and Configuration Policy

SNA NRJE is customer installable. However, Hewlett-Packard will perform minimum configuration of SNA NRJE in order to verify minimum product functionality. These tasks, performed by HP, are included in the product purchase price.

For product configuration tailored to the customer's specific needs, or for a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer Responsibility
Prior to having HP personnel onsite to perform minimum configuration of SNA NRJE, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Verifying that the necessary host mainframe software is installed and configured to support SNA NRJE. The customer should contact their HP Sales Representative for typical host parameter values or consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (5958-8543) and "HP SNA Products: Job Entry Subsystems Guide" (5958-8544) for details.
- Verifying that SNA Link/V, SNA/SDLC Link/iX, or SNA/X.25 Link/iX is properly installed and configured prior to the installation of SNA NRJE unless SNA Link will be installed at the same time.
- Updating the HP 3000 system to the proper release level and installing the SNA NRJE software using AUTOINST. Refer to the HP 3000 MPE/iX Installation and Update Manual (36123-90001) for MPE/iX systems or the HP 3000 Software Update Manual (32033-90036) for MPE V systems.
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the INP card installation and minimum configuration of SNA NRJE.

The customer is also responsible for completing the configuration in order to fully integrate SNA NRJE into the existing customer network after HP has completed the minimum configuration of the SNA NRJE.

HP Responsibility
Following the installation of SNA NRJE, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the SNA NRJE product to a minimum configuration (1 LU) in order to verify software and hardware functionality.
- Verifying the SNA NRJE configuration by issuing the NRJECONTROL START command and ensuring that the LU to LU session becomes active.

These steps complete HP's portion of the installation and minimum configuration of SNA NRJE.

HP effort spent on problems that are not caused by HP installation and configuration activities is considered HP Consulting Support and is billable to the customer at normal HP time-and-materials rates.

System Environment

SNA NRJE/iX, SNA SDLC Link/iX, and SNA/X.25 Link/iX are available on the HP 3000 Series 900 with currently supported releases of the MPE XL or MPE/iX operating system. SNA NRJE/V and SNA Link/V are available on the HP 3000 Series 37-70 computers with the MPE V operating system.

Ordering Information

SNA NRJE/iX Ordering Information

HP 30292A SNA NRJE/iX License to use

Select **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
OCD Credit for Processor Option 310
OGJ Credit for Processor Option 315
OCE Credit for Processor Option 320
OCF Credit for Processor Option 330
OGL Credit for Processor Option 335
OGM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select, on the same order, the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option.

Migration Credit Options for NRJE/V or MRJE/V to NRJE/iX

OG1 Purchase Credit for NRJE/V Option 310
OG2 Purchase Credit for NRJE/V Option 320
OG3 Purchase Credit for NRJE/V Option 330
OG6 Purchase Credit for MRJE/V Option 310
OG7 Purchase Credit for MRJE/V Option 320
OG8 Purchase Credit for MRJE/V Option 330

SNA NRJE/V Ordering Information

HP 30245A License to use

Select **one** processor option. Upgrade credits may be used where applicable.

310 For Series 37, 37XE, or MICRO 3000
320 For Series 39-58
330 For Series 64-70

Upgrade Credit Options

OCD Upgrade credit for Option 310
OCE Upgrade credit for Option 320

Support Products

HP offers a spectrum of support services to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

Documentation

The following documentation is for both SNA NRJE/V and SNA NRJE/iX:

30292-61001 SNA NRJE User/Programmer Reference Manual
30292-61000 SNA NRJE Node Manager's Guide
5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/NCP and ACF/VTAM Guide
5958-8544 HP SNA Products: Job Entry Subsystem (JES) Guide

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BSC Link/iX

Technical Data

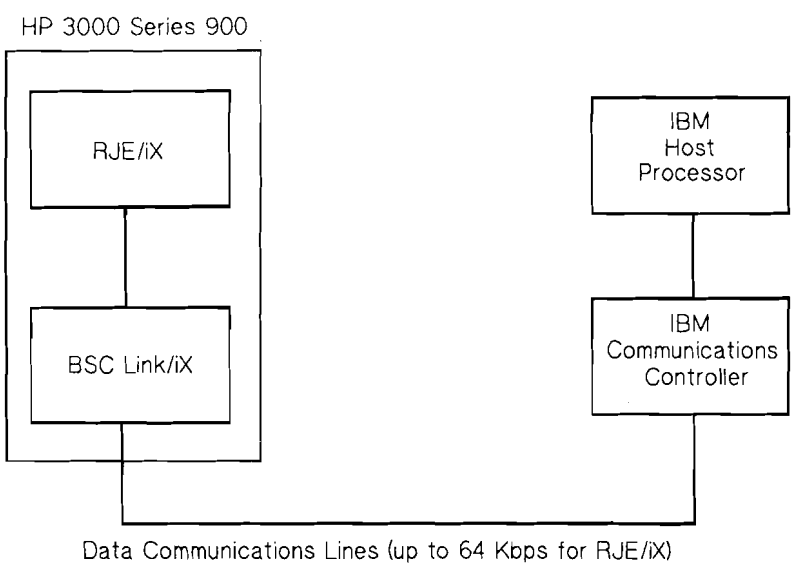
For HP 3000 Series 900 Computer Systems Product Number HP 32007A

BSC Link/iX provides the network connection to an IBM System/370-compatible host processor using bisynchronous (BSC) protocol. BSC Link/iX provides the lower level network connection, including the protocol management software, a hardware interface card, and a cable.

BSC Link/iX supports operation of HP 30295A RJE/iX.

Features

- BSC Link/iX consists of software, a hardware interface card, and a cable; and provides the network connection to the IBM Host processor.
- The hardware interface in BSC Link/iX reduces CPU overhead.
- User applications run concurrently with BSC data communications.
- Each BSC Link/iX connects to a separate data communications line, either dial-up or leased.
- Multiple BSC Links allow concurrent connection to multiple hosts, or multiple lines to a single host.
- A maximum data communications line speed of 64 Kbps is supported with an HP 3000 Series 900.



Functional Description

BSC Link/iX provides the network connection to an IBM System/370-compatible mainframe using bisynchronous protocol. The BSC Link/iX interface card and cable connect to an IBM 37xx communications controller on the host, through a pair of synchronous modems.

Each BSC Link/iX connects to a single switched or nonswitched data communications line. The HP 3000 Series 900 supports multiple BSC Links for connection to multiple IBM mainframes, or multiple data communications lines to a single mainframe.

Functional Specifications

BSC Link/iX provides the network connection between an HP 3000 Series 900 and an IBM System/370-compatible host processor. It manages the bisynchronous protocol for a switched or leased data communications line through synchronous modems. A maximum line speed of 64 Kbps is supported.

The following modems have been tested with BSC Link/iX:

- HP 32730A (up to 19.2 Kbps)
- Bell 201C (2400 bps)
- Bell 208A/B (4800 bps)
- Bell 209A (9600 bps)
- Bell 2024A (2400 bps)
- Bell 2048A (4800 bps)
- Bell 2096A (9600 bps)
- Bell 500B (up to 56 Kbps)
- Bell Dataphone 4800 (4800 bps)
- AT&T 2248 (4800 bps)
- AT&T 2296 (9600 bps)
- AT&T Digital 2500 (56 Kbps)
- CODEX 5208R with 2207 auto-dial (4800 bps)
- CODEX 2620 (4800 bps)
- CODEX 2640 (19.2 Kbps)
- Dynatech LDM 22 (19.2 Kbps)
- AJ 9631-3A (9600 bps, dial)

Link Contents

The BSC Link/iX consists of protocol handling software, an interface card, and modem cable.

Interface Card

The interface card for BSC Link/iX is the Programmable Serial Interface (PSI) Card. The PSI has a 68000 Family microprocessor.

The Central Bus PSI is designed with LSI circuitry, and the Precision Bus PSI is designed with LSI and VLSI circuitry, both supporting the HP 3000 Series 900 architecture. Reference the individual HP 3000 processor data sheets for specific information regarding the appropriate PSI card.

PSI Features

- Link level (BSC) data communications protocol handling
- Character handling and buffer storage capability
- Built-in diagnostics and self-test
- Online diagnostics run under MPE/iX
- Collects data volume and error statistics
- Modem and hardwired interfaces up to 64 Kbps
- Compatible with HP and common Telco/PTT modems in full- and half-duplex modes
- Bisync protocol compatible
- Error checking
- EIA RS-232-C and CCITT V.24 and V.35 interfacing standards
- Auto-call capability, compatible with EIA RS-366 and CCITT V.24 standards

The Direct Memory Access (DMA) controller on the PSI provides channels that link data buffers in onboard RAM with the HP 3000 interface and data communication devices. DMA moves data between external devices and onboard RAM concurrent with microprocessor operation. This ability to transfer data concurrently with instruction execution enables the PSI to achieve high throughput rates. Also contributing to the high throughput rate is the PSI's ability to transfer the last correctly received block of data to the HP 3000 Series 900 CPU as it is also processing and buffering the next block of data coming from the communications channel.

Frees the HP 3000/iX for Other Tasks

The PSI microprocessor performs all of the communication data link protocol management. Specifically, serialization, BSC protocol management, frame/block management, and data buffering are all performed by the PSI. The PSI frees the HP 3000/iX to perform other tasks, making it a more efficient resource.

Note: The HP 3000/iX CPU must still process message formats and higher level procedures.

Additional flexibility is achieved with auto-call capability. By connecting a PSI to a modem and auto-call unit and adding a phone number to the link configuration file, a remote connection in a dial-up environment can occur anytime without the intervention of a human operator.

High Data Integrity

When the BSC Link/iX is initialized, the PSI performs a hardware self-test. This ensures the hardware is functional and will perform the job properly. When data is transmitted, parity checking is enabled. If data is transmitted incorrectly, retransmission occurs.

Product Requirements

- An HP 3000 Series 900 running MPE XL Release 2.2 or MPE/iX Release 4.0 or later operating system.
- A switched or leased data communications line is required between the BSC Link/iX and the host communications controller.
- A modem with an external clock signal must be provided for operation.
- BSC Link/iX requires an IBM System/370 or compatible mainframe (Model 370, 30xx, 43xx) with an IBM 37xx or compatible communications controller.
- Because of the symmetrical nature of RJE communications, BSC Link/iX with RJE/iX can support communications (simple file transfer) with many other systems running RJE emulators, eg, other minicomputers. Your HP System Engineer can help you determine whether RJE/iX and BSC Link/iX will support your application.

Installation and Configuration Policy

The software component of BSC Link/iX is customer installable. Hewlett-Packard will install the PSI card and perform minimum configuration of BSC Link/iX in order to verify minimum product functionality. These tasks, performed by HP, are included in the product purchase price.

For product configuration tailored to the customer's specific needs, or for a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer Responsibility

Prior to having HP personnel onsite to install the PSI card and perform minimum configuration of BSC Link/iX, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Installing a switched or leased line between the HP 3000 system and the communications controller on the host system – with a matched pair of synchronous modems that are certified for use with HP 3000 systems at each end of the line.
- Conducting the appropriate tests to ensure that the line and modems are functioning properly.
- Verifying that the necessary remote system software is installed and configured to support BSC Link/iX.
- Updating the HP 3000 system to the proper release level and installing the BSC Link/iX software using AUTOINST. Refer to the HP MPE/iX Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the PSI card installation and minimum configuration of BSC Link/iX.

The customer is also responsible for completing the configuration in order to fully integrate BSC Link/iX into the existing customer network after HP has completed the minimum configuration of the BSC Link/iX.

HP Responsibility

Following the installation of BSC Link/iX, HP is responsible for the following:

- Installing and verifying the PSI card for BSC Link/iX.
- Connecting the BSC Link/iX hardware to the customer's communication line (only if available at installation time).
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the BSC Link/iX product to a minimum configuration (1 link name) in order to verify software and hardware functionality.

These steps complete HP's portion of the installation and minimum configuration of BSC Link/iX.

HP effort spent on problems that are not caused by HP installation and configuration activities is considered HP Consulting Support and is billable to the customer at normal HP time-and-materials rates.

System Environment

RJE/iX and BSC Link/iX are available on all HP 3000 Series 900 systems with currently supported releases of the MPE XL or MPE/iX operating system.

Note: BSC Link/iX requires HP 30295A RJE/iX. BSC Link/iX does not support user access to its intrinsics.

Ordering Information

HP 32007A BSC Link/iX For use with 30295A RJE/iX. Requires service contract for hardware.

Select **one** PSI option and **one** cable option and **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

PSI Options

001	Central Bus PSI (For Series 925, 925LX, 935, 949, 950, 955, 960, 980)
002	Precision Bus PSI (for Series 920, 922, 922LX, 922RX, 932, 948, 958)
090	No PSI (software only)

Cable Options

010	RS-232 connection
020	V.35 connection
025	RS-232 auto-dial connection
099	No cable (software only)

User License Options

OAF	20-user license
UCY	40-user license
UA9	64-user license
UBD	100-user license
UCN	160-user license
UAT	Unlimited user license

Upgrade Credit Options

UD8	Credit for 20-user license
UCZ	Credit for 40-user license
UB9	Credit for 64-user license
UD9	Credit for 100-user license
UDV	Credit for 160-user license
UBP	Credit for Unlimited user license
0CD	Credit for Processor Option 310
0CE	Credit for Processor Option 320
0CF	Credit for Processor Option 330
0GJ	Credit for Processor Option 315
OGL	Credit for Processor Option 335
0GM	Credit for Processor Option 340
UEK	Credit for Processor Option 350

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option on the same order.

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

HEWLETT® PACKARD

SNA/X.25 Link/iX

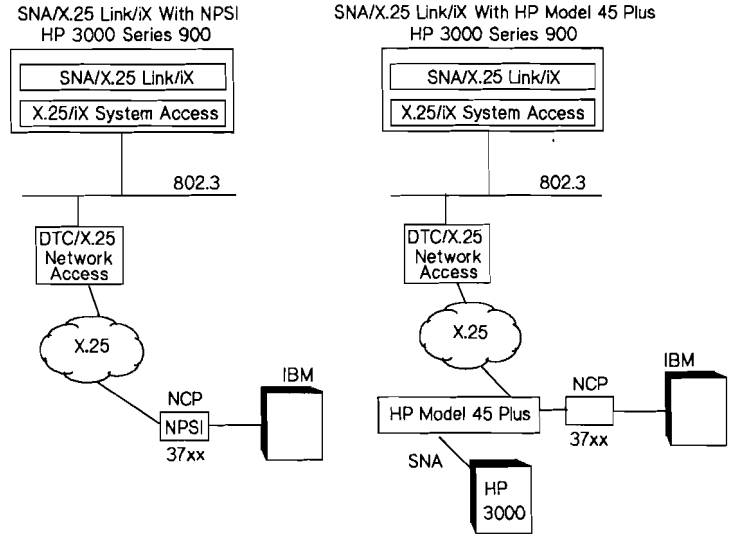
Technical Data

For HP 3000 Series 900 Computer Systems Product Number HP 30298A

SNA/X.25 Link/iX allows standardization on a single X.25 backbone network for multivendor communications, specifically, HP 3000-to-HP 3000 and HP 3000-to-IBM communications.

SNA/X.25 Link/iX is a software product that enables HP SNA Services to be supported over an X.25 network. The HP 3000 Series 900 system running SNA/X.25 Link/iX communicates with IBM systems via an HP Model 45 Plus Multiprotocol X.25 Switch as a host PAD or via IBM X.25 NCP Packet Switching Interface (NPSI). SNA/X.25 Link/iX allows communications between an HP 3000 and an IBM system to occur simultaneously with NS traffic to another HP 3000 over a single X.25 link.

SNA/X.25 Link/iX requires the installation and use of the X.25/iX Network Link hardware and software components. X.25/iX Network Link provides access to public or private X.25 packet-switching networks.



Benefits and Features

With SNA/X.25 Link/iX, network costs are reduced and management and control of the network is simplified with the following features:

- A single link is shared by both NS and SNA services.
- An HP 3000 Series 900 system accesses multiple hosts with one card, one access line, one X.25 connection.
- All HP SNA Services (LU 6.2 API/iX, NRJE/iX, IMF/iX, DHCF/iX) are supported.
- Connections may be established via permanent virtual circuits (PVC) or switched (incoming and outgoing) virtual circuits (SVC).
- Error codes, tracing records, and logging records are provided to facilitate troubleshooting and diagnosis of problems.
- Packet sizes of 4096 bytes are supported at a maximum line speed of 64 Kbps.

- Configuration is consistent with HP network products – via NMMGR.

Functional Description

SNA/X.25 Link/iX allows an HP 3000 Series 900 computer to communicate to an IBM system over a public or private X.25 network. SNA/X.25 Link/iX is a psuedo-link product that supports a link-level protocol (QLLC) but does not actually control the hardware. The true link level product that operates in conjunction with SNA/X.25 Link/iX is the X.25/iX Network Link.

SNA/X.25 Link/iX supports the Qualified Logical Link Control (QLLC) protocol. QLLC is a special protocol developed by IBM to resolve the differences between SDLC and X.25. It uses qualified X.25 packets to send link control messages in a format similar to SDLC link control messages.

SNA/X.25 Link/iX enables the HP SNA Services (LU 6.2 API, NRJE, IMF, DHCF) running on an HP 3000 to communicate with an IBM system through an IBM 37xx communications controller running NPSI. Alternatively, an HP Model 45 Plus Multiprotocol X.25 Switching Node can be used as an SNA/SDLC PAD, eliminating the need for NPSI.

SNA/X.25 Link/iX supports the simultaneous operation of two or more SNA services. With an SNA service, SNA/X.25 Link/iX allows the HP 3000 to appear as a Node Type 2.0 device. SNA/X.25 Link/iX does **not** support Node Type 2.1. Depending upon the SNA service, SNA/X.25 Link/iX can support several logical unit types that include LU 1, LU 2, LU 3, and LU 6.2.

SNA/X.25 Link/iX encapsulates SNA data inside X.25 packets on the HP 3000. These packets are sent to the X.25/iX Network Link to access the X.25 network. The destination IBM communications controller or the HP Model 45 Plus removes the X.25 packet information, and the original SNA data is sent to the IBM host.

Product Requirements

HP Hardware and Software Requirements

- An HP 3000 Series 900 computer system running MPE XL Release 2.2 or MPE/iX Release 4.0 or later operating system.
- The X.25/iX Network Link hardware and software components.
- An HP Model 45 Plus Multiprotocol X.25 Switch or IBM NPSI.
- A block mode terminal supported by VPLUS for Node Management configuration.
- One or more HP SNA Services (LU 6.2 API, NRJE, IMF, DHCF)

Host Hardware and Software Requirements

- An IBM System/370 compatible host (ie, Model 370, 308x, 43xx) with an IBM 37xx communications controller. The following software must be running on the host and communications controller:
  - MVS/SP, MVS/XA, MVS/ESA, VSE or VM
  - ACF/NCP Network Control Program
  - ACF/VTAM Telecommunications Access Method
  - NPSI NCP Packet Switching Interface (Version 2 Release 1 or later for the IBM 3725, and Version 3 or later for the IBM 3745) or an HP Model 45 Plus Multiprotocol X.25 Switch

Installation and Configuration Policy

The customer is responsible for loading the SNA/X.25 Link/iX software onto the system.

Hewlett-Packard will perform minimum configuration of SNA/X.25 Link/iX in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel Onsite to perform minimum configuration of SNA/X.25 Link/iX, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - system configurations
  - logical network map identifying relevant traffic flow
  - physical network map identifying relevant network hardware components.
- Verifying that the necessary host mainframe software is installed and configured to support SNA/X.25 Link/iX.

  The customer should contact their HP Sales Representative for typical host parameter values or consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (5958-8543) for details.

- Verifying that the DTC/X.25 Network Access option (P/N HP 2340A #310, 2345A #3XX, 2343D, 2346D, 2346E, J2070A #1CX, J2070A #1CW, or J2079A) is installed, configured, and verified to include accommodation for the installation of SNA/X.25 Link/iX.
- Verifying that the X.25/iX System Access product (P/N HP 36939A) is installed, configured, and validated for proper operation prior to the installation of SNA/X.25 Link/iX.
- Updating the HP 3000 system to the proper release level and installing the SNA/X.25 Link/iX software using AUTOINST. Refer to the HP 3000 Installation and Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary, and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is Onsite to complete the installation/minimum configuration of SNA/X.25 Link/iX.

  The customer is also responsible for completing the configuration in order to fully integrate SNA/X.25 Link/iX into the existing customer network after HP has completed the minimum configuration of SNA/X.25 Link/iX.

HP Responsibility

Following the installation of SNA/X.25 Link/iX, HP is responsible for the following:

- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the SNA/X.25 Link/iX product to a minimum configuration (1 PU and 1 LU) necessary to verify software and hardware functionality.
- Verifying the SNA/X.25 Link/iX configuration by issuing the SNACONTROL STATUS command and ensuring that the PU activates when the SNA/X.25 Link/iX subsystem is started.

These steps complete HP's portion of the installation and minimum configuration of SNA/X.25 Link/iX.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

Ordering Information

HP 30298A SNA/X.25 Link/iX License to use

Must order **one** User License Option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
0CD Credit for Processor Option 310
0GJ Credit for Processor Option 315
0CE Credit for Processor Option 320
0CF Credit for Processor Option 330
0GL Credit for Processor Option 335
0GM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select, on the same order, the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option.

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets in this Guide for the specific support services.

Documentation

30291-61000 SNA Link/iX Node Manager's Guide
5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/VTAM and ACF/NCP Guide

Related Products

Reference data sheets in this Guide for the following related products:

- X.25/iX Network Link (P/N 2340A #310, 2345A #3XX, 2343D, 2346D/E, J2079A, J2070A #1CX, J2070A #1CW, 36939A)
- HP Model 45 Plus Multiprotocol X.25 Switch (P/N J2000B, J2001B)
- SNA DHCF/iX (P/N 36935A)
- SNA IMF/iX (P/N 30293A)
- SNA NRJE/iX (P/N 30292A)
- LU 6.2 API/iX (P/N 30294A)

HEWLETT® PACKARD

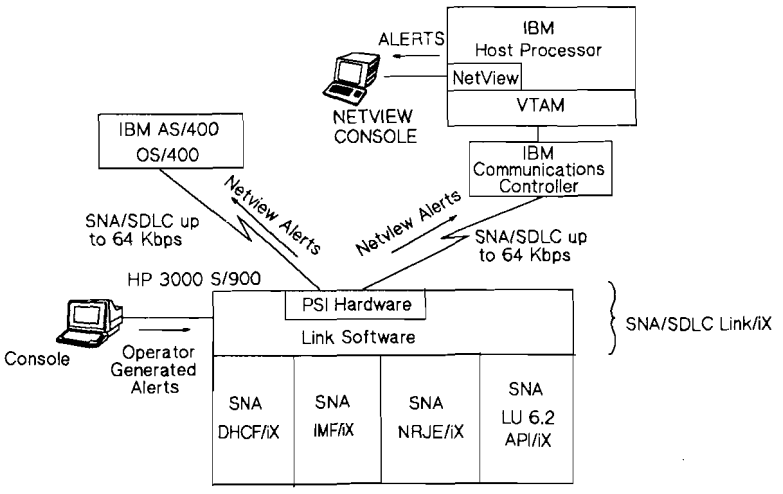
SNA/SDLC Link/iX

Technical Data

For HP 3000 Series 900 Computer Systems Product Number HP 30291A

SNA/SDLC Link/iX provides the network connection for SNA services running on an HP 3000 Series 900, such as SNA IMF/iX, SNA NRJE/iX, LU 6.2 API/iX, and SNA DHCF/iX. System Network Architecture (SNA) is IBM's comprehensive specification for distributed data processing networks. SNA/SDLC Link/iX emulates the functions of SNA's Transmission Control, Path Control, and Data Link Control layers on an HP 3000.

SNA/SDLC Link supports the simultaneous operation of two or more SNA services. SNA/SDLC Link allows the HP 3000 to appear as a Node Type 2.0 or Node Type 2.1 device when connected to an IBM mainframe or a Node Type 2.1 device when connected to an IBM AS/400. SNA/SDLC Link can support several logical unit types that include LU 1, LU 2, LU 3, and LU 6.2, depending upon the SNA service running. SNA/SDLC Link also provides link level alerts to IBM's network management product, NetView.



Features

- The SNA/SDLC Link emulates the functions of the lower three SNA layers and can support several SNA services running on the same HP 3000.
- SNA/SDLC Link consists of software, a hardware interface card, and a cable.
- Delayed alert reporting of link errors to NetView console.
- Operators on the HP node can send operator generated alerts to the NetView console.
- The hardware interface card in SNA/SDLC Link reduces CPU overhead.
- User applications run concurrently with SNA data communications.
- Each SNA/SDLC Link connects to a separate data communications line, either dial-up or leased.
- Multiple SNA/SDLC Links allow concurrent connection to multiple hosts, or multiple lines to a single host.
- A maximum data communications line speed of 64 Kbps is supported.

- Node management provides a friendly interface for configuration, event tracing, and logging.
- Supports EIA RS-366 and CCITT V.25 Auto Call.

Functional Description

SNA/SDLC Link provides the connection to an IBM System/370-compatible mainframe in an SNA network, through an IBM 37xx communications controller or to an IBM AS/400 in an SNA network. SNA/SDLC Link allows the HP 3000 to emulate the functions of the Transmission Control, Path Control, and Data Link Control SNA layers.

Each SNA/SDLC Link connects to a single switched or nonswitched data communications line. The HP 3000 supports multiple SNA/SDLC Links for connection to multiple IBM mainframes and/or IBM AS/400s, or multiple data communications lines to a single mainframe or AS/400. The maximum line speed supported is 64 Kbps for SNA/SDLC Link/iX.

The Node Management interface provides the Network Manager with an easy-to-use tool for configuration, event logging, and event tracing. SNA/SDLC Link provides support for IBM's NetView product. This enables the HP 3000 Series 900 to act as an Entry Point in IBM's NetView environment. If an HP node's link goes down, SNA/SDLC Link will send a delayed link-level alert to the NetView console when the link comes back up. This feature also allows an operator on the HP node to send operator generated alerts to the NetView console.

Functional Specifications

SNA/SDLC Link provides the connection between an HP 3000 and an IBM System/370 or compatible host processor in an SNA network or between an HP 3000 and an IBM AS/400 in an SNA network. It manages the SNA/SDLC protocol for a switched or nonswitched data communications line, through synchronous modems.

SNA/SDLC Link/iX supports synchronous modem speeds up to 64Kbps as described below. SNA/SDLC Link requires synchronous modems that support the following handshake signals: DTR, DSR, RTS, CTS, CD, RI. Modems must also provide transmit and receive clocks for the SDLC interface and ensure ground isolation between the communication systems. Some examples of modems that are supported for SNA/SDLC Link are:

HP 37230A

AT&T 201C
AT&T 208 BR
AT&T 209A
AT&T 500B
AT&T 2024A
AT&T 2048A
AT&T 2096A
AT&T 2248A
AT&T 2556 DSU
AT&T 2596 DSU
CODEX 2640
CODEX 2660
CODEX 2680
CODEX 2260

GTE LENKURT 56K

DYNATECH LDM 22

Link Contents

SNA/SDLC Link consists of protocol handling software, an interface card, and a modem cable.

The Interface Card

The interface card for SNA/SDLC Link/iX is the Programmable Serial Interface (PSI) card. The PSI has a 68000 family microprocessor.

The Central Bus PSI is designed with LSI circuitry, and the Precision Bus PSI is designed with LSI and VLSI circuitry, both supporting the HP 3000 Series 900 architecture. Reference the individual HP 3000 processor data sheets for specific information regarding the appropriate PSI card.

PSI/Features

- Data communications protocol handling
- Character handling and buffer storage capability
- Built-in diagnostics and self-test
- Online diagnostics run under MPE/iX
- Collects data volume and error statistics
- Modem interface up to 64 Kbps
- Compatible with HP and common Telco/PTT modems in full- and half-duplex modes
- SDLC protocol compatible
- EIA RS-232-C and CCITT V.24 and V.35 interfacing standards
- Auto Call capability, compatible with EIA RS-366 and CCITT V.25 standards

The Direct Memory Access (DMA) controller on the PSI provides channels that link data buffers in onboard RAM with the HP 3000 interface and data communications devices. DMA moves data between external devices and onboard RAM concurrent with microprocessor operation. This ability to transfer data concurrently with instruction execution enables the interface card to achieve high throughput rates. Also contributing to the high throughput rate is the interface card's ability to transfer the last correctly received block of data to the HP 3000 CPU as it is also processing and buffering the next block of data coming from the communication channel.

Frees the HP 3000 for Other Tasks

Since the interface card microprocessor performs all of the communication data link protocol management, the HP 3000 is relieved of the task. Specifically, serialization, SDLC protocol management, frame/block management, and data buffering are all performed by the interface card. The interface card frees the HP 3000 to perform other tasks, making it a more efficient resource.

Note: The HP 3000 CPU must still process message formats and higher level procedures.

Additional flexibility is achieved with auto call capability. By connecting an interface card to a modem and auto call unit and adding a phone number to the link configuration file, a remote connection in a dial-up environment can occur anytime without the intervention of an operator.

High Data Integrity

When the SNA/SDLC Link is initialized, the interface card performs a hardware self-test. This ensures the hardware is functional and will perform the job properly. When data is transmitted, parity checking is enabled. If data is transmitted incorrectly, retransmission occurs.

Product Requirements

If connecting to an IBM mainframe

- SNA/SDLC Link/iX requires an IBM System/370 or compatible mainframe (Model 370, 30xx, or 43xx) with an IBM 37xx or compatible communications controller. The following software must be running on the host and communications controller:
  - MVS/SP, MVS/XA, MVS/ESA, VSE, or VM
  - ACF/VTAM
  - ACF/NCP

If connecting to an IBM AS/400

- SNA/SDLC Link/iX requires an IBM AS/400 running OS/400 Version 1.2 or later operating system.

HP will support certain versions, releases, modifications, and PTF levels of the above software. Your HP Sales Representative or System Engineer can determine whether SNA/SDLC Link can be supported with your particular configuration. The Network Implementation Support Plan (NISP) will help the customer engineer determine support requirements in advance for the particular network.

- A terminal supported by V/3000 (in addition to the system console) is required for the HP 3000 Node Management software.

- A switched or nonswitched data communications line is required between the SNA/SDLC Link and the host communications controller.
- An external clock signal must be provided for operation at 64 Kbps.

SNA/SDLC Link/iX Product Requirements

- An HP 3000 Series 900 computer system
- MPE XL Release 2.2 or MPE/iX Release 4.0 or later operating system. For AS/400 connectivity, MPE/iX Release 4.0 or later is required.

Installation and Configuration Policy

The customer is responsible for loading the SNA/SDLC Link/iX software onto the system.

Hewlett-Packard will install the PSI card and perform minimum configuration of SNA/SDLC Link/iX in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility
Prior to having HP personnel onsite to install the PSI card and perform minimum configuration of SNA/SDLC Link/iX, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components.
- Installing a switched or nonswitched line between the HP 3000 system and the communications controller on the host system – with a matched pair of synchronous modems that are certified for use with HP 3000 systems at each end of the line.
- Conducting the appropriate tests to ensure that the line and modems are functioning properly.
- Verifying that the necessary host mainframe software is installed and configured to support SNA/SDLC Link/iX. The customer should contact their HP Sales Representative for typical host parameter values or consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (5958-8543) for details.
- Updating the HP 3000 system to the proper release level and installing the SNA/SDLC Link/iX software using AUTOINST. Refer to the HP 3000 MPE/iX Update Manual (36123-90001).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the PSI card installation and perform minimum configuration of SNA/SDLC Link/iX.

The customer is also responsible for completing the configuration in order to fully integrate SNA/SDLC Link/iX into the existing customer network after HP has completed the minimum configuration of SNA/SDLC Link/iX.

HP Responsibility
Following the installation of SNA/SDLC Link/iX, HP is responsible for the following:

- Installing and verifying the PSI card for SNA/SDLC Link/iX.
- Connecting the SNA/SDLC Link/iX hardware to the customer's communication line (only if available at installation time).
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the SNA/SDLC Link/iX product to a minimum configuration (1 PU and 1 LU) in order to verify software and hardware functionality.
- Verifying the SNA/SDLC Link/iX configuration by issuing the SNACONTROL START command and ensuring that the PU to SSCP session becomes active.

These steps complete HP's portion of the installation and minimum configuration of SNA/SDLC Link/iX.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

SNA/SDLC Link/iX is available on the HP 3000 Series 900 with MPE XL Release 2.2 or MPE/iX Release 4.0 or later (MPE/iX Release 4.0 or later for IBM AS/400 connectivity).

Note: SNA/SDLC Link does not support user access to its intrinsics. See your local HP office for information about an HP special product for this purpose.

Ordering Information

HP 30291A SNA/SDLC Link/iX requires service contract for hardware.

Select **one** PSI option AND **one** cable option AND **one** User License option. The User License Option must align with the MPE/iX License. Upgrade credits may be used where applicable.

PSI Options

001 Central Bus PSI (for HP 3000 CIO systems)
002 Precision Bus PSI (for HP 3000 NIO systems)
090 No PSI (software only)

Cable Options

010 RS-232 connection
020 V.35 connection
025 RS-232 auto-dial connection
099 No cable (software only)

User License Options

OAF 20-user license
UCY 40-user license
UA9 64-user license
UBD 100-user license
UCN 160-user license
UAT Unlimited user license

Upgrade Credit Options

UD8 Credit for 20-user license
UCZ Credit for 40-user license
UB9 Credit for 64-user license
UD9 Credit for 100-user license
UDV Credit for 160-user license
UBP Credit for Unlimited user license
OCD Credit for Processor Option 310
OGJ Credit for Processor Option 315
OCE Credit for Processor Option 320
OCF Credit for Processor Option 330
OGL Credit for Processor Option 335
OGM Credit for Processor Option 340
UEK Credit for Processor Option 350

In order to receive the upgrade credit, customers must select the upgrade credit option that pertains to their current processor/user license option in addition to the new user license option on the same order.

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Sales Representative, or refer to the HP data sheets for specific support services.

Documentation

For SNA/SDLC Link/iX:

30291-61000 SNA Link/iX Node Manager's Guide

HEWLETT® PACKARD

BSC Link

Technical Data

For HP 3000 MPE V Computer Systems Product Number HP 30251A

BSC Link provides the network connection to an IBM System/370-compatible host processor using bisynchronous (BSC) protocol. (BSC Link also supports SDLC-PU1 protocol with IMF.) BSC Link provides the lower level network connection, including the protocol management software, a hardware interface card, and a cable.

BSC Link only supports operation of HP 30248 RJE, 30249 MRJE, or 30250 IMF. A separate BSC Link product and data communications line is required for concurrent operation of IMF and RJE or MRJE.

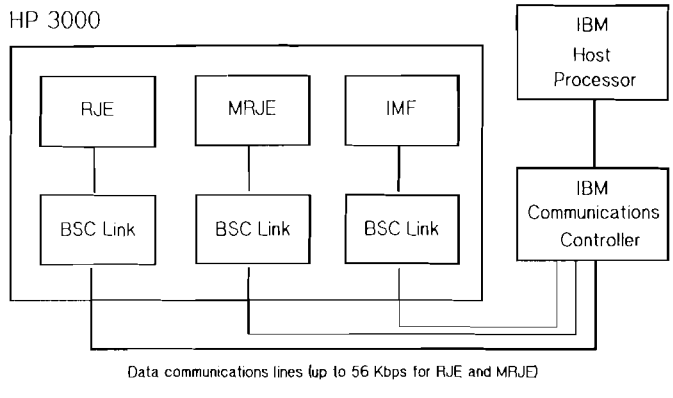
Features

- BSC Link consists of software, a hardware interface card, and a cable; and provides the network connection to an IBM System/370-compatible host processor.
- The hardware interface in BSC Link reduces CPU overhead.
- User applications run concurrently with BSC data communications.
- Each BSC Link connects to a separate data communications line, either dial-up or leased. (IMF requires a leased line.)
- Multiple BSC Links allow concurrent connection to multiple hosts, or multiple lines to a single host.
- A maximum data communications line speed of 56 Kbps is supported with an HP 3000 Series 37 through 70.

Functional Description

BSC Link provides the network connection to an IBM System/370-compatible mainframe using bisynchronous protocol. The BSC Link interface card and cable connect to an IBM 37xx communications controller on the host through a pair of synchronous modems. The maximum line speeds supported by RJE, MRJE, IMF, and BSC Link are shown above.

Each BSC Link connects to a single switched or non-switched data communications line. The HP 3000 supports multiple BSC Links for connection to multiple IBM mainframes, or multiple data communications lines to a single mainframe – 56 Kbps maximum.



Functional Specifications

BSC Link provides the network connection between an HP 3000 and an IBM System 370-compatible host processor. It manages the bisynchronous protocol for a switched or non-switched data communications line, through synchronous modems. A maximum line speed of 56 Kbps is supported, depending on the data communications package and the HP 3000 processor that it runs on.

The following modems have been tested with BSC Link/V:

- HP 37230A (up to 19.2 Kbps)
- Bell 210C (2400 bps)
- Bell 208A/B (4800 bps)
- Bell 209A (9600 bps)
- Bell 2024A (2400 bps)
- Bell 2048A (4800 bps)
- Bell 2096A (9600 bps)
- Bell 500B (up to 56 Kbps)

Link Contents

The BSC Link contains protocol handling software, an interface card, modem cable, and an Intelligent Network Processor (INP).

Intelligent Network Processor

The INP is a serial communications controller included with the BSC Link product. Its architecture accommodates various protocols, interfaces, and line speeds.

INP Features

- 16-bit microprocessor and LSI circuitry
- Data communications protocol handling
- Character handling and buffer storage capability
- Built-in diagnostics and self-test
- On-line diagnostics run under MPE
- Collects data volume and error statistics
- Modem and hardwired interfaces up to 56 Kbps
- Compatible with HP and common Telco/PTT modems in full- and half-duplex modes
- Bisync and HDLC/SDLC protocol compatible
- EIA RS-232-C, RS-422, CCITT V.24 and V.35 interfacing standards
- Auto Call capability, compatible with EIA RS-366, and CCITT V.25 standard.

Note: A single INP may be used by two Link products, but not concurrently.

The Direct Memory Access (DMA) controller on the INP provides three high-speed channels. The DMA channels link data buffers in onboard RAM with the HP 3000 interface and data communication devices. DMA moves data between external devices and onboard RAM concurrent with micro-processor operation. This ability to transfer data concurrently with instruction execution enables the INP to achieve high throughput rates. Also contributing to the high throughput rate is the INPs ability to transfer the last correctly received block of data to the HP 3000 CPU as it is also processing and buffering the next block of data coming from the communications channel.

Frees the HP 3000 for Other Tasks

Since the INP microprocessor performs all of the communication data link protocol management, the HP 3000 is relieved of that task. Specifically, serialization, BSC protocol management, frame/block management, and data buffering are all performed by the INP. The INP frees the HP 3000 to perform other tasks, making it a more efficient resource.

Note: The HP 3000 CPU must still process message formats and higher level procedures.

Additional flexibility is achieved with auto call capability. By connecting an INP to a modem and auto call unit and adding a phone number to the link configuration file, a remote connection in a dial-up environment can occur anytime without the intervention of a human operator.

High Data Integrity

When the BSC Link is initialized, the INP performs a hardware self-test. This ensures the hardware is functional and will perform the job properly. When data is transmitted, parity checking is enabled. If data is transmitted incorrectly, retransmission occurs. In addition, battery backup is provided for the user's data buffers. This assures the user that no data

will be lost in the event of a power failure or brown-out.

Note: There is a time limit on the battery backup capability. This depends upon the user's system configuration.

Product Requirements

- An HP 3000 running the current version of the MPE operating system
- A switched or non-switched data communications line is required between the BSC Link and the host communications controller
- An external clock signal must be provided for operation at 56 Kbps
- BSC Link requires an IBM System/370-compatible mainframe. (Model 370, 303x, 308x, 309x, 43xx) with an IBM 37xx-compatible communications controller
- One or more of the BSC Services products (RJE/V, MRJE/V, or IMF/V) are required to utilize BSC Link/V
- Because of the symmetrical nature of RJE communications, BSC Link with RJE can support communications (simple file transfer) with other systems running RJE emulators, eg, other minicomputers

Your HP System Engineer can help you determine whether RJE and BSC Link will support your application.

Installation and Configuration Policy

The software component of BSC Link/V is customer installable. Hewlett-Packard will install the INP card and perform minimum configuration of BSC Link/V in order to verify minimum product functionality. These tasks, performed by HP, are included in the product purchase price.

For product configuration tailored to the customer's specific needs, or for a complete HP implementation, HP offers a comprehensive range of integrated and flexible support services. Please refer to the Network Support data sheets in this guide for more information on these services.

Customer Responsibility
Prior to having HP personnel on-site to install the INP card and perform minimum configuration of BSC Link/V, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - System configurations
  - Logical network map identifying relevant traffic flow
  - Physical network map identifying relevant network hardware components
- Installing a switched or non-switched line between the HP 3000 system and the communications controller on the host system – with a matched pair of synchronous modems that are certified for use with HP 3000 systems at each end of the line.
- Conducting the appropriate tests to ensure that the line and modems are functioning properly.
- Verifying that the remote system software is installed and configured to support BSC Link/V.
- Updating the HP 3000 system to the proper release level and installing the BSC Link/V software using AUTOINST.

  Refer to the HP Software Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the CSLIST.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is on-site to complete the INP card installation and minimum configuration of BSC Link/V.

The customer is also responsible for completing the configuration in order to fully integrate BSC Link/V into the existing customer network after HP has completed the minimum configuration of the BSC Link/V.

HP Responsibility
Following the installation of Link/V, HP is responsible for the following:

- Installing and verifying the INP card for BSC Link/V.
- Connecting the BSC Link/V hardware to the customer's communication line (only if available at installation time).
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the BSC Link/V product to a minimum configuration (1 LDEV) in order to verify software and hardware functionality.

These steps complete HP's portion of the installation and minimum configuration of BSC Link/V.

HP effort spent on problems which are not caused by HP installation and configuration activities is considered HP Consulting Support and is billable to the customer at normal HP time-and-materials rates.

System Environment

RJE, MRJE, IMF, and BSC Link are available on the entire HP 3000 product line running MPE V.

Note: BSC Link/V requires HP 30248A/R RJE, 30249A/R MRJE or 30250A/R IMF. BSC Link/V does not support user access to its intrinsics.

Ordering Information

HP 30251A BSC Link/V
For use with HP 30248A/R RJE, 30249A/R MRJE, or 30250A/R IMF

Select **one** Processor/Cable Option.

110	For Series 37, MICROs, synchronous modem
120	For Series 37, MICROs, V.35
125	For Series 37, MICROs, auto call connect
190	For Series 37, MICROs, no hardware
310	For Series 39–58, synchronous modem
315	For Series 39–58, X.21
320	For Series 39–58, V.35
325	For Series 39–58, auto call connect
390	For Series 39–58, no hardware
410	For Series 64–70, synchronous modem
415	For Series 64–70, X.21
420	For Series 64–70, V.35
425	For Series 64–70, auto call connect
490	For Series 64–70, no hardware

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP Representative, or refer to the HP data sheets for specific support services.

HEWLETT® PACKARD

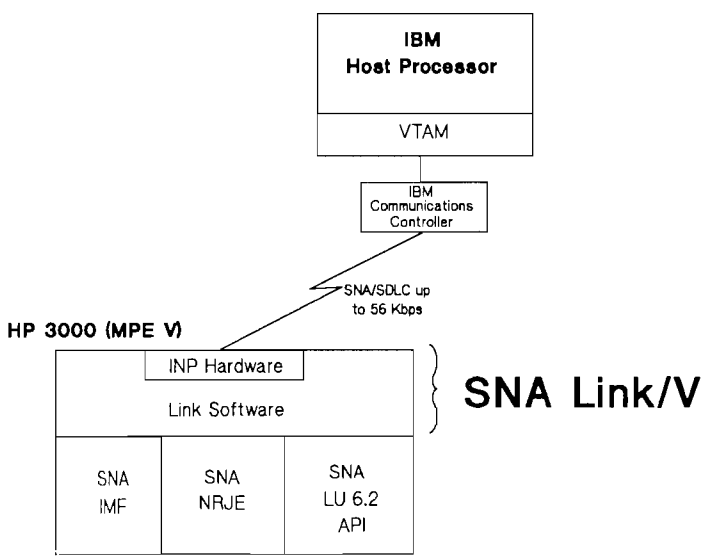
SNA Link

Technical Data

For HP 3000 MPE V Computer Systems Product Number HP 30246A

SNA Link provides the network connection for SNA services running on an HP 3000 Series 37 through 70, such as SNA IMF and SNA NRJE, to connect to an IBM System/370-compatible host processor in an IBM Systems Network Architecture environment. Systems Network Architecture (SNA) is IBM's comprehensive data communications specification for distributed data processing networks. SNA Link emulates the functions of the Transmission Control, Path Control, and Data Link Control SNA layers on an HP 3000.

SNA Link supports the simultaneous operation of two or more SNA services. With an SNA service, such as SNA IMF, SNA NRJE, or SNA LU6.2 API, SNA Link allows the HP 3000 to appear as a Node Type 2.0 device. Depending upon the SNA service running, SNA Link can support several logical unit types that include LU 1, LU 2, LU 3, and LU 6.2.



Features

- The SNA Link emulates the functions of the lower three SNA layers and can support several SNA services running concurrently on the same HP 3000.
- SNA Link consists of software, a hardware interface card, and a cable.
- The hardware interface card in SNA Link reduces CPU overhead.
- User applications run concurrently with SNA data communications.
- Each SNA Link connects to a separate data communications line, either dial-up or leased.
- Multiple SNA Links allow concurrent connection to multiple hosts, or multiple lines to a single host.
- A maximum data communications line speed of 56 Kbps is supported.

- Node management provides a friendly interface for configuration, event tracing, and logging.
- Supports RS-366 Auto Call.

Functional Description

SNA Link provides the connection to an IBM System/370-compatible mainframe in an SNA network, through an IBM 37xx communications controller. SNA Link allows the HP 3000 to emulate the functions of the Transmission Control, Path Control, and Data Link Control SNA layers.

Each SNA Link connects to a single switched or non-switched data communications line. The HP 3000 supports multiple SNA Links for connection to multiple IBM mainframes, or multiple data communications lines to a single mainframe.

The Node Management interface provides the Network Manager with an easy-to-use tool for configuration, event logging, and event tracing.

Functional Specifications

SNA Link provides the connection between an HP 3000 and an IBM System/370-compatible host processor in an SNA network. It manages the SNA/SDLC protocol for a switched or non-switched data communications line, through synchronous modems.

The following modems have been tested with SNA Link:

HP 37230A
AT&T 201C
AT&T 209A
AT&T 500B
AT&T 2024A
AT&T 2048A
AT&T 2096A
AT&T 2248A

CODEX 2640
CODEX 2660
CODEX 2680

GTE LENKURT 56K
DYNATECH LDM 22

Link Contents

SNA Link consists of protocol handling software, an interface card, and a modem cable.

The Interface Card

The interface card for SNA Link is the Intelligent Network Processor (INP). The INP is a 16-bit microprocessor with LSI circuitry supporting the HP 3000 Series 37 through 70.

INP Features

- Data communications protocol handling
- Character handling and buffer storage capability
- Built-in diagnostics and self-test
- Online diagnostics run under MPE
- Collects data volume and error statistics
- Modem and hardwired interfaces up to 56 Kbps for the INP
- Compatible with HP and common Telco/PTT modems in full- and half-duplex modes
- SDLC protocol compatible
- EIA RS-232-C, RS-422, CCITT V.24 and V.35 interfacing standards
- Auto Call capability, compatible with EIA RS-366 and CCITT V.25 standard
- Battery backup provides link recovery during a power failure

The Direct Memory Access (DMA) controller on the interface card provides three high-speed channels. The DMA channels link data buffers in on-board RAM with the HP 3000 interface and data communications devices. DMA moves data between external devices and on-board RAM concurrent with microprocessor operation. This ability to transfer data concurrently with instruction execution enables the interface card to achieve high throughput rates. Also contributing to the high throughput rate is the interface card's ability to transfer the last correctly received block of data to the HP 3000 CPU as it is also processing and buffering the next block of data coming from the communication channel.

Frees the HP 3000 for Other Tasks

Since the interface card microprocessor performs all of the communication data link protocol management, the HP 3000 is relieved of the task. Specifically, serialization, SDLC protocol management, frame/block management, and data buffering are all performed by the interface card. The interface card frees the HP 3000 to perform other tasks, making it a more efficient resource.

Note: The HP 3000 CPU must still process message formats and higher level procedures.

Additional flexibility is achieved with auto call capability. By connecting an interface card to a modem and auto call unit and adding a phone number to the link configuration file, a remote connection in a dial-up environment can occur anytime without the intervention of an operator.

High Data Integrity

When SNA Link is initialized, the interface card performs a hardware self-test. This ensures the hardware is functional and will perform the job properly. When data is transmitted, parity checking is enabled. If data is transmitted incorrectly, retransmission occurs. The INP provides battery backup for the user's data buffers. This assures link recovery in the event of a power failure or brown-out.

Note: There is a time limit on the battery backup capability. This depends upon the user's system configuration.

Product Requirements

- SNA Link requires an IBM System/370-compatible mainframe (Model 370, 30xx, or 43xx) with an IBM 37xx communications controller. The following software must be running on the IBM host and communications controller:
  - MVS/SP, MVS/XA, MVS/ESA, VSE or VM
  - ACF/VTAM
  - ACF/NCP

  HP will support certain versions, releases, modifications, and PTF levels of the above software. Your HP Sales Representative or System Engineer can determine whether SNA Link can be supported with your particular configuration. The Network Implementation Support Plan (NISP) will help the Customer Engineer determine support requirements in advance for the particular network.
- A terminal supported by V/PLUS (in addition to the system console) is required for the HP 3000 Node Management software.
- A switched or non-switched data communications line is required between the SNA Link and the host communications controller.
- An external clock signal must be provided for operation at 56 Kbps.
- One or more HP SNA Services (SNA NRJE, SNA IMF, or HP LU6.2) are required to utilize SNA Link.

SNA Link Product Requirements

- An HP 3000 Series 37 through 70 running the MPE V operating system.

Installation and Configuration Policy

The customer is responsible for loading the SNA Link software onto the system.

Hewlett-Packard will install the INP card and perform minimum configuration of SNA Link in order to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel onsite to install the INP card and perform minimum configuration of SNA Link, the customer is responsible for the following:

- Providing HP with the information necessary to complete the Network Implementation and Support Plan (NISP) including:
  - system configurations
  - logical network map identifying relevant traffic flow
  - physical network map identifying relevant network hardware components.
- Installing a switched or non-switched line between the HP 3000 system and the communications controller on the host system—with a matched pair of synchronous modems that are certified for use with HP 3000 systems at each end of the line.

- Conducting the appropriate tests to ensure that the line and modems are functioning properly.
- Verifying that the necessary host mainframe software is installed and configured to support SNA Link. The customer should contact their HP Representative for typical host parameter values or consult the "HP SNA Products: ACF/NCP and ACF/VTAM Guide" (5958-8543) for details.
- Updating the HP 3000 system to the proper release level and installing the SNA Link software using AUTOINST. Refer to the HP 3000 Update Manual (32033-90036).
- Verifying that all of the necessary software modules have been successfully installed by AUTOINST and are at the correct version levels using the NMMAINT.PUB.SYS utility.
- Performing full system backups as necessary and ensuring that the HP 3000 system and personnel with HP 3000 system management knowledge are available when HP is onsite to complete the INP card installation and perform minimum configuration of SNA Link.

The customer is also responsible for completing the configuration in order to fully integrate SNA Link into the existing customer network after HP has completed the minimum configuration of SNA Link.

HP Responsibility

Following the installation of SNA Link, HP is responsible for the following:

- Installing and verifying the INP card for SNA Link.
- Connecting the SNA Link hardware to the customer's communication line (only if available at installation time).
- Confirming that all of the necessary software modules have been installed and are at the correct version level.
- Configuring the SNA Link product to a minimum configuration (1 PU and 1 LU) in order to verify software and hardware functionality.
- Verifying the SNA Link configuration by issuing the SNACONTROL START command and ensuring that the PU to SSCP session becomes active.

These steps complete HP's portion of the installation and minimum configuration of SNA Link.

Additional Implementation Assistance

For implementation needs that go beyond installation, the customer can either provide self-support, or can purchase additional services from HP. These services include Network Startup and HP ConsultLine. In addition, the customer can also purchase service from HP on a time-and-materials basis.

Network Startup includes implementation scheduling and coordination assistance, network configuration and verification testing, and network documentation.

System Environment

SNA Link is available on HP 3000 Series 37 through 70 with MPE V.

Note: SNA Link does not support user access to its intrinsics. See your local HP office for information about an HP special product for this purpose.

Ordering Information

HP 30246A SNA Link
Requires service contract for hardware

Select **one** Processor/Cable Option.

110	For Series 37, MICROs, synchronous modem
120	For Series 37, MICROs, V.35
125	For Series 37, MICROs, auto call connect
190	For Series 37, MICROs, no hardware
310	For Series 39-58, synchronous modem
320	For Series 39-58, V.35
325	For Series 39-58, auto call connect
390	For Series 39-58, no hardware
410	For Series 64-70, synchronous modem
420	For Series 64-70, V.35
425	For Series 64-70, auto call connect
490	For Series 64-70, no hardware

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP representative, or refer to the HP data sheets for specific support services.

Documentation

30246-90002 Getting Started with SNA Node Management
30246-90003 SNA Link Services Reference Manual

HEWLETT® PACKARD

Color Video Output Interface

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12065A

The HP 12065A is a plug-in interface card providing full-color video output capability for the HP 1000 A-Series family of real-time computers.

Features

- Graphics/1000-II Version 2.0 compatible
- Red-Green-Blue (RGB) RS-343 compatible video output
- 512 x 512 pixel resolution for 1:1 aspect ratio displays
- 576 x 455 pixel resolution for 4:3 aspect ratio displays
- 16 colors selected from a palette of 4096
- Alphanumeric text overlay
- On-card, independent blink control of each color
- Polygon area fill
- Scrolling capability
- Two RS-232-C ports for keyboards, touch screens, and mice

Functional Description

The 12065A Video Output Interface provides full-color video output capability to color displays for the HP 1000 A-Series family of computer products. The 12065A has been designed to specifically address the needs of the computer-aided manufacturing marketplace. This video interface offers medium resolution, as well as some unique display features that will dramatically increase your productivity.

The card utilizes a Motorola 68008 16-bit microprocessor for system control and backplane communications. It also provides supervisory control over a specialized graphics processor, pixel memory and video circuits. Four pixel memory planes provide for two combinations of color and character capability. In one mode, three pixel memory planes are used to produce 8 colors from a palette of 4096 leaving the fourth plane for overlay of characters, cursors, and prompts. In the second color mode, all four planes are used to produce 16 colors from a palette of 4096. In both modes, independent blink control of each color is possible on-card.

A standard character set is provided in ROM with user-specified size and orientation for maximum flexibility. In addition, the card will support user-defined characters, for example, foreign languages which can be downloaded to local RAM from the A-Series CPU.

Benefits of the on-card intelligence and the DMA per I/O card A-Series architecture result in flexible drawing capabilities. In an Update mode, an existing screen is added to, either with characters or vectors, with immediate display of results. This is the mode you would use to change data or to perform limited animation, such as increasing or decreasing tank levels in a process control flow application.

Using the Frame Buffer Read/Write capability, entire screens can be downloaded via DMA to pixel display memory

(frame buffer) and then to the screen. The whole screen image is displayed within seconds. This feature is particularly useful in applications where several displays are used frequently as operators execute sequences of control or trackdown process problems tagged with alarms. Frame Buffer Reads/Writes automatically take advantage of flash-fill, where data is written to display memory while the screen is continuously blanked. The screen is then unblanked to display the image. Update mode can also be configured for flash-fill to take advantage of the higher performance realized.

In general, display images used frequently will be initially created in Update mode. Once in frame buffer memory, the image will be stored in A-Series memory, or on disk, via Frame Buffer Reads. Later, the A-Series can redisplay the image using Frame Buffer Writes; additional modifications can be made in Update mode.

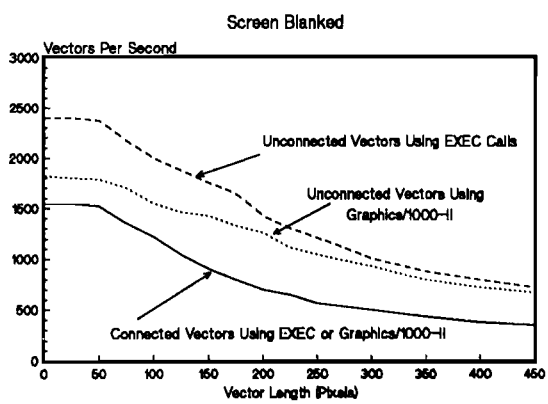
Finally, the 12065A also supports two RS-232-C serial ports to allow for the direct attachment of graphics input accessories. This allows devices like custom keyboards and keypads, touch screens, trackballs, joy sticks, or mice to be interfaced through one graphics sub-system. This saves money and I/O slots.

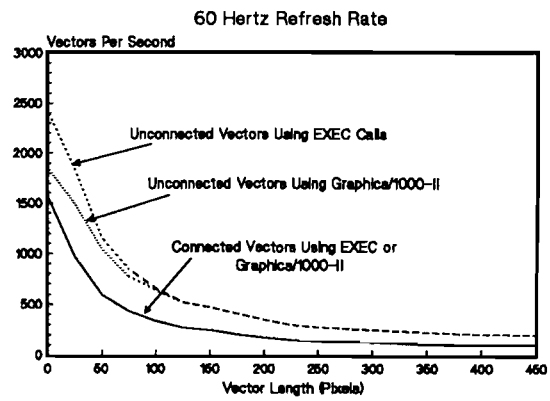
Functional Specifications

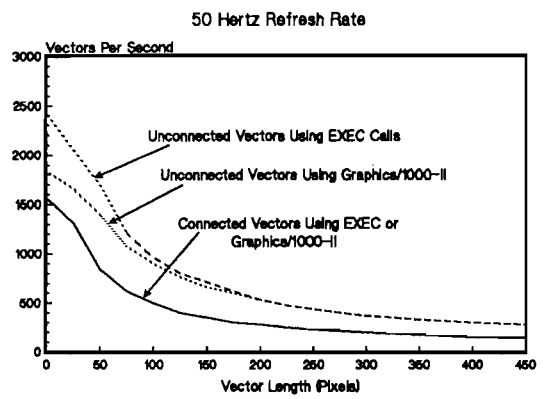
Video Output: Compatible with RGB RS-343. Three BNC connectors for RED, GREEN, and BLUE

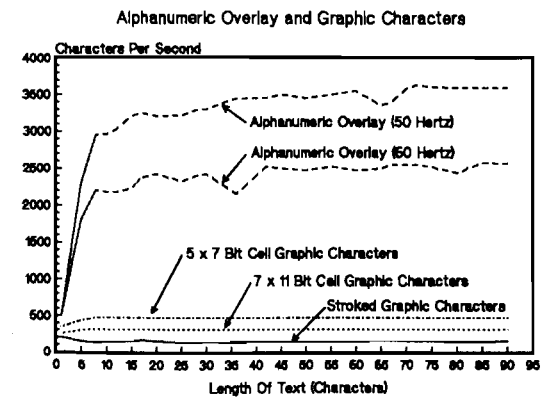
Resolution: 576 x 455 (4:3 aspect ratio) or 512 x 512 (1:1 aspect ratio)

Polygon Area Fill: 8 unique styles









Write Modes: Flash-fill: blanking the screen, then writing vectors, pixels, and characters, then displaying the screen. Update: single character or vector writes to existing display.

Scrolling Capability

Direct Pixel Memory Frame Buffer Reads and Writes: Yes

Memory Maps: 4 planes partitioned as:

- 3 planes producing 8 colors from a palette of 4096 and 1 overlay plane for alphanumeric text, or
- 4 planes producing 16 colors from a palette of 4096, plus
- Onboard blink control of all memory planes.

Accessory Datacom: Two RS-232-C ports, three wire. User programmable baud rate to 9600 baud, noncontinuous for interfacing Graphics Accessories.

Hardware Vector Generator: See graphs 1, 2, and 3.

Characters per second to overlay plane (one color): See graph 4.

Character Display:

- Variable size and orientation (90 degree increments),
- Onboard ROM storage of standard character set,
- Onboard RAM for user downloadable character sets,
- Onboard character field blinking.

Environmental Characteristics

Operating Temperature: 0°C to 55°C (32°F to 131°F)

Maximum Total Cable Distance from 3-meter HP 12065A Cable to Monitor:

- For RG 59/U (Belden #9259) Cable is 250 feet
- For RG 11/U (Belden #9212) Cable is 500 feet

Maximum Numbers of monitors per Card: 5

HP Supported Monitor: HP 13279B

Please note that the HP 13279B is currently the only 19-inch monitor tested for FCC RFI compliance. The responsibility of non-HP monitor FCC RFI compliance is with the user.

Ordering Information

The HP 12065A includes:

12065-60001 Video Output Interface Assembly
12065-63001 3-meter BNC Video Output Cables
12065-90001 Color Video Output Interface Reference Manual
12065-90003 Color Video Device Handlers Manual

HP 12065A Option:

001 Adds an additional 3-meter RS-232-C input cable with an edge connector to a female 25-pin connector, P/N 12065-63002.

A self-test loopback connector for optional use with the on-card self-test is available (P/N 12065-67001)

Electrical Specifications

dc Supply	Maximum Current	Maximum Power Used
+5 Volts	3.760 amps	19.9 watts
+12 Volts	0.062 amps	0.7 watt
-12 Volts	0.018 amps	0.2 watts

HEWLETT® PACKARD

16 Input/16 Output Isolated Digital Card

Technical Data

For HP 1000 A-Series Computer Systems
Product Numbers
HP 12063A and 12063AC

Features

- 16 optically isolated digital inputs
- 16 isolated Form-C relay outputs
- Resistor selectable input voltage levels: 5 to 42 V dc, 6 to 29 V ac
- Programmable event detection and debounce delay
- Provision for relay arc suppression
- On-card isolated power supply for relay coil power

Description

HP 12063A Card

The HP 12063A Isolated Digital Card is a plug-in I/O card for HP 1000 A-Series computers. It features flexible digital I/O capability for sensing and activating of devices in measurement and control applications.

Input Characteristics: The HP 12063A provides 16 fully isolated digital inputs via voltage threshold opto-couplers. Input voltage levels are selectable by the user for each channel by installing the appropriately valued resistors on plug-in headers (8 resistors per header = 8 channels). These headers allow the board to be adapted to the specific application without soldering components directly on the board, and are easily removed for repair purposes. Plug-in opto-couplers (supplied) allow user selection of ac or dc coupling for each channel by merely installing the opto-coupler in the ac position or dc position. For ac coupling, a plug-on jumper is provided for each channel to select 60 Hz ac filtering of the rectified input if desired.

Event Detection: In addition to status, any input may be user programmed to function as an interrupt input by use of the mask, sense, and sense override registers on the card. These registers allow the interrupt to be generated on the rising edge or falling edge of the input or both (whichever occurs first). This capability is easily activated by the user via loading the appropriate pattern into the three registers. The on-card microprocessor takes over to cause the interrupt to be generated when that event occurs. User programming is required to service the interrupt.

Debounce Delay: The same microprocessor also provides for user programmable debounce delay up to 246 milliseconds on inputs when monitoring contact closures, and may be used in both status mode and event sense mode. The selected delay will apply to all inputs.

Output Characteristics: Sixteen Form-C (SPDT) relay outputs are provided on the same card. Both the normally open (NO) and normally closed (NC) contacts are available to users. Two removable headers allow for arc suppression devices to be added by the user for each channel without soldering directly to the board. The use of arc suppression reduces coupled noise and extends relay life. Each header handles 8 output channels. Plug-on jumpers select the arc suppression across the NO or NC contacts. An on-card

isolated power supply derived from the 25 kHz ac supply in the A-Series processor provides coil power for the relays. This technique minimizes any coupling of relay contact noise into the computer itself. For ease of servicing, plug-in relays are used.

HP 12063AC Cable

The HP 12063AC 32-Channel Digital Input/Output Cable provides for easy connection of your application to the HP 12062A. The HP 12062AC provides a 3-meter cable prewired to the appropriate card-compatible edge-connector/hood assembly. Each channel is an individually shielded twisted pair for quite reliable performance. The "remote" end of the cable is unterminated allowing direct wiring to the application. Alternately, the cable may be wired to the easy-to-use insulation-displacement HP 12064A Termination Accessory which provides electrician-compatible heavy-duty screw terminals and built-in wiring tray (see HP 12064A data sheet).

User Programming

User programming of the HP 12063A card is easily accomplished using the parallel interface I/O driver (ID.50) in the RTE-A Operating System.

A simple RTE-EXEC call in the following format is used:

Call EXEC (R/W, LU#,Data Buffer, # Data Words, Control Word)

Control Words provide for:

- Open/Close Relays or read present state
- Set debounce delay
- Read status of inputs
- Write to Mask Register (enable/disable interrupt)
- Write to Sense Register (select rising or falling edge)
- Write to Sense Override Register (respond to which ever edge occurs first)
- Read from Mask, Sense, or Sense Override Registers
- Read from Interrupt Status Register

Note: See related products information concerning MAC/1000 high-level call subroutines for A-Series M&C interfaces.

Functional Specifications

HP 12063A Card Input Specifications

16 Optically Isolated Inputs

Input voltage levels:
5 to 42 V dc, 6 to 29 Vrms ac. User selectable on removable headers, level determined by resistor value

Example level selection:
See table 1.

Debounce timer (user programmable):
0 to 246 ohms, 960 ohms resolution

Isolation voltage between any two input channels:
250 V dc, 110 V ac

Input signal timing (without firmware debounce):
Minimum detectable pulse width during the ON state; 1 ms with or without filter capacitor; minimum detectable pulse width during the OFF state; 1 ms without filter capacitor, 53 ms with filter capacitor.

HP 12063A Card Output Specifications

Relay Isolated Outputs: 16

Contact form: 1 Form-C (SPDT)

Maximum contact rating (UL rating 42 V peak):
1.0 A at 28 V dc, 1.0 A at 120 V ac

Approximate contact switching:
Operate time: 2 ms
Release time: 3 ms

HP 12063A Card Example Level Selection ***Table 1***

Level	Resistor Value	Threshold Voltage Turn-off	Turn-on
5 V dc	None	2.0 V min	3.4 V min
		2.8 V max	4.0 V max
12 V dc	909 ohms	4.3 V min	6.5 V min
		5.6 V max	8.2 V max
16 Vrms ac	3.48 kilohms	8.1 V min	8.1 V min
		11.4 V max	11.3 V max

Contact resistance: less than 50 mW initial contact resistance (relay only)

Insulation resistance: 10 7 ohm at 250 V dc, Contact lifetime: 10 5 operations minimum at 1 amp, resistive load

Arc suppression voltage levels: User selectable on removable headers. Transient voltage suppressors are separately available from 5 V and up. Arc suppression should be used with inductive cards (including long cables).

HP 12063A Card

Physical Characteristics

PC board: 28.9 cm long by 17.2 cm wide by 1.9 cm high (11.4 in by 6.75 in by 0.75 in)

Net weight: 0.54 kg (1.21 lbs)

Power Requirements: 5 W at 5 V dc, 11.4 W at 25 kHz ac (normally provided by HP 12035A Power Module)

HP 12063AC Cable

Physical Characteristics

Cable length: 3 meters (9.8 ft) **Wire gauge**: 26 **Overall diameter**: < 1.31 cm (0.5 in)

Electrical Configuration: 32 shielded twisted pairs plus one drain common to all shields

Voltage rating: 300 V Peak

Environmental Characteristics (both products)

Temperature: **Operating**: 0°C to 55°C (32°F to 131°F) **Storage**: -40°C to 75°C (-40°F to 167°F)

Relative Humidity: 5% to 95% at 40°C (104°F) noncondensing

Altitude: **Operating**: to 4.6 km (15,000 ft) **Nonoperating**: to 15.3 km (50,000 ft)

System Compatibility: All HP 1000 A-Series computers with 25 kHz power options available. See HP 1000 Ordering Information (P/N 5953-8730).

Ordering Information

The HP 12063A includes:
12063-60010 A-Series Digital Multifunction Interface
12063-90001 Operating and Service Manual
12060-90003 User Information Manual

HP 12063A Option:

001 Adds Edge Connector Kit and extra edge connector

The HP 12063AC includes:
A 3-meter unterminated cable with 32 individually shielded twisted pairs.

Diagnostics

Diagnostics software is supplied with the HP 24612A. This product includes diagnostic manuals, diagnostic software, and test hoods for the A-Series Measurement and Control interfaces including the HP 12060B, HP 12061A, HP 12062A, and the HP 12063A. Must order one of the following media options: 020, 022, 041, 042, 044, or 051.

Related Products Information

MAC/1000 Software Library
This third-party software product provides a set of high-level call subroutines for the A-Series M&C family. These calls make upgrades to higher point count application straightforward. For more information contact:

Demand System, Inc.
6279 Variel Avenue, Suite D
Woodland Hills, CA 91367
Attn: Frank Zuhde
(213) 710-8851

Technical information in this document is subject to change without notice.

Printed in the U.S.A.

HEWLETT® PACKARD

Analog Output Card and Cable

Technical Data

For HP 1000 A-Series Products with 24 kHz Power
Product Numbers
HP 12062A and 12062AC

Features

- 4 channels of voltage output/card
- Output range of 10.24 volts
- 12 bit resolution including sign
- Short circuit and overvoltage protection
- One undedicated digital output per channel
- 90 kHz output from memory
- Programmable data rates

Description

HP 12062A Card

The HP 12062A is a plug-in card for the HP 1000 A-Series computers for low-cost, high-performance analog output capability in small distributed measurement and control applications.

The HP 12062A Analog Output Card provides 4 independent bipolar voltage outputs. Remote sensing per channel provides accurate output voltages compensating for long distances of field wiring. Undedicated digital outputs may be used in pen up/down control, CRT display, or X-Y plotters.

DMA-compatibility provides fast analog updates on a per channel basis or between channels. Programmable time delay between DMA updates provides signal reconstruction capability with a full power bandwidth of 20 kHz.

HP 12062AC Cable

The HP 12062AC 4-Channel Analog Output Cable provides for easy connection of your application to the HP 12062A. The HP 12062AC provides a 3-meter cable prewired to the appropriate card-compatible edge-connector/hood assembly. Each channel is an individually shielded twisted pair for optimal analog performance. The "remote" end of the cable is unterminated allowing direct wiring to the application. Alternately, the cable may be wired to the easy-to-use insulation displacement HP 12064A Termination Accessory providing electrician-compatible heavy-duty screw terminals and built-in wiring tray (see HP 12064A data sheet).

User Programming

User programming of the HP 12062A card is easily accomplished using the parallel interface I/O driver (ID.50) in the RTE-A Operating System. A simple RTE EXEC call in the following format is used:

Call EXEC (2, LU#, Data Buffer, #readings, control word) D

The control word specifies a time delay between successive DMA word transfers. Each increment (up to 255) in the control word adds a 1.085 microsecond time delay to the 10.85 microsecond base rate.

Calibration

The HP 12062A is calibrated at the factory and may require recalibration by the customer upon arrival by using a voltmeter and optional calibration software.

Functional Specifications

HP 12062A Card

Number of Channels: 4 bipolar

Resolution: 12 bits, LSB=5mV

Voltage Output Range: -10.24 to +10.235 V at 20 mA

Short Circuit and Overvoltage Protection: Protected against short to common or overvoltage up to −15 V dc

Accuracy

Linearity error (0°C to 70°C): 2.5 mV max
Monotonicity temperature range: 0°C to 70°C (32°F to 131°F)
Gain error: Adjustable to zero
Offset error: Adjustable to zero

Drift

Offset drift: 0.0015% of FSR per C, max

Gain drift: 0.0015% of FSR per C, max

Total error: (0°C to 70°C): 0.15% of FSR max

Output Characteristics

Slew rate: 10 V/ms, resistive load

Setting time for FSR change: 5 ms typical with resistive load

Full power bandwidth: 20 kHz with resistive load

Ripple and output noise: 2.5 mV p-p max (dc to 500 kHz, no load)

Fastest Update Time: 10.85 ohms

Programmable Times: 10.85 ohms to 288.61 ohms in increments of 1.085 ohms

Digital Outputs

TTL Level per channel:
1 Load per channel: 10 standard TTL loads

Physical Characteristics

Dimensions: 28.9 cm long by 17.2 cm wide by 1.9 cm high (11.4 in by 6.75 in by 0.75 in)
Net Weight: 0.36 kg (12.75 oz)

Power Requirements: 6.0 W at 5 V dc, 7.6 W at 25 kHz ac

HP 12062AC Cable

Physical Characteristics

Cable length: 3 m (9.84 ft)
Wire Gauge: 22
Overall Diameter: <1.31 cm (0.515 in)

Electrical Characteristics

Configuration:
9 shielded twisted pairs plus one drain per pair

Voltage rating: 300 V peak

Environmental Characteristics: (both products)

Operating Temperature:
0°C to 55°C (32°F to 131°F)

Storage Temperature:
-40°C to 75°C (-40°F to 167°F)

Relative Humidity:
5% to 95% at 40°C (104°F) noncondensing

Operating Altitude:
to 4.6 km (15,000 ft)

Non-operating Altitude:
to 15.3 km (50,000 ft)

System Compatibility: All HP 1000 A-Series computers with 25 kHz power option. See HP 1000 Ordering Information (P/N 5953-8730).

Ordering Information

The HP 12062A includes:

12062-60011 4-channel DAC Card
12060-90003 User Information Manual
12062-90001 Operating and Service Manual

HP 12062A Options

001	Adds Edge Connector Kit and extra edge connector
020	Adds Calibration Program on minicartridge (P/N 12062-13301)
041	Adds Calibration Program on 8-inch flexible disk (P/N 12062-13401)
044	Adds Calibration Program on 3½-inch microfloppy disk (P/N 12062-13402)

Note: Calibration requires A-Series card extender (P/N 12011-60001) and HP 3455A Multimeter (or equivalent).

The HP 12062AC includes:

A 3-meter unterminated cable with 9 individually shielded twisted pairs.

Diagnostics

Diagnostics software is supplied with the HP 24612A. This product includes diagnostic manuals, diagnostic software, and test hoods for the A-Series Measurement and Control interfaces including the HP 12060B, HP 12061A, HP 12062A, and the HP 12063A. Must order one of the following media options: 020, 022, 041, 042, 044, or 051.

Related Product Information

MAC/1000 Software Library

This product provides a set of high-level call subroutines for the A-Series M&C family. These calls make upgrades to higher point count applications, via Control 1000, straightforward. For more information contact:

Demand Systems, Inc.
6279 Variel Avenue, Suite D
Woodland Hills, CA 91367
Attn: Frank Zuhde
(213) 710-8851

HEWLETT® PACKARD

Analog Input Cards and Cables

Technical Data

For HP 1000 A-Series Products with 25 kHz Power Product Numbers HP 12060B, 12060BC, 12061A, and 12061AC

Features

- 8 differential inputs, expandable to 40 channels
- Up to 55 kHz throughput to memory
- Auto scanning or single-channel sampling
- 12-bit resolution including sign
- 4 programmable input ranges: ±1.28 V to ±10.24 V full-scale
- Input over-voltage protection
- External pacing/triggering
- Separate zero reference for error correction
- Easy connection via prewired cables and optional screw termination

Description

The HP 12060B and HP 12061A are plug-in cards for HP 1000 A-Series computers for low-cost, high-performance analog input capability in small distributed measurement and control applications. The A-Series product in which these cards are used must have a 25 kHz power supply. The HP 12060B High-Level Analog Input Card provides the capability of converting 8 differential analog voltage inputs to digital form. The HP 12061A Expansion Multiplexer Card provides an additional 32 channels of differential input for a total capability of 40 channels. All inputs are protected against accidental over voltage to 42 V peak.

HP 12060B Card

The HP 12060B is capable of acquiring up to 55,000 readings per second with 12-bit resolution. Auto scanning or single-channel sampling is possible to 55 kHz. Provisions for external pacing/triggering of sampling and scanning is provided. The HP 12060B includes four programmable full-scale ranges from ±1.28 V to ±10.24 V. Maximum resolution is 0.625 mV on the 1.28 V range to 5 mV on the 10.24 V range. A separate "zero reference" on the card allows the user to measure actual offset due to temperature drift, and correct reading on all 40 channels for higher accuracy.

HP 12061A Card

The HP 12061A provides 32 additional differential inputs for the HP 12060B card. It fastens directly onto the HP 12060B card, creating a two-board unit that occupies two I/O slots in an HP 1000 A-Series computer. Programming information is passed from the HP 12060B directly to the HP 12061A; analog signals on the additional 32 channels are in turn passed back to the HP 12060B for digitizing. The HP 12061A includes removable plug-in headers so the user can add current sense resistors for current loop measurements. These headers allow the board to be adapted to the specific application without soldering components directly on the board and are easily removable for repair.

HP 12060BC and 12061AC Cables

The HP 12060BC 8-channel Analog Input Cable and the HP 12061AC 32-channel Analog Input Cable provide for easy connection of your application to the HP 12060B and HP 12061A respectively. Both products provide a 3-meter cable prewired to the appropriate card-compatible edge-connector/hood assembly. Each channel is an individually shielded twisted pair for optional analog performance. The "remote" end of the cable is unterminated allowing direct wiring to the application. Alternately, the cable may be wired to the easy-to-use insulation displacement HP 12064A Termination Accessory providing electrician-compatible heavy-duty screw terminals and built-in wiring tray (see HP 12064A data sheet).

User Programming

User programming of both cards is easily accomplished using the parallel interface I/O driver (ID.50) in the RTE-A Operating System. A simple RTE EXEC call is all that is needed for full control of both cards. The format is as follows:

CALL EXEC (1, LU#, Data Buffer, # readings, control word)

The control word specifies:

- Gain (1, 2, 4, or 8)
- Start Channel: Scanning always begins at the specified "Start Channel" on the highest channel available (8 for the HP 12060B only and 40 with the HP 12061A). If more than one scan worth of readings has been requested, the next scan and all subsequent scans will also begin at the "Start Channel."
- Auto Scan: The user specifies the starting channel(1-40) and the number of readings to be taken. The card will automatically begin at the starting channel, increment to the next and so forth, returning to the starting channel when reaching channel 8 (HP 12060B only) or channel 40 (HP 12061A), continuing until the specified number of readings have been taken.
- Single Channel: The user specifies the number of readings on a specific channel. The card then takes the readings requested.
- Internal Pacing: The card begins taking readings on commands and takes all readings at the maximum rate (18 ohms per reading), either scanning or on channel.
- External Pacing: The card begins taking readings when the external pace input goes high and stops when it goes low. This allows for pacing on channel by supplying a pace pulse less than a conversion time wide (nominally 15 ohms) for a specified number of readings. In auto scan mode, it allows pacing the start of scan by holding the input high for "n" readings per scan times one conversion time. Alternatively, readings in auto scan mode may be taken at any rate by applying a pulse train with a pulse width < 15 ohms.

With a single call you can cause multiple scans and/or set up and wait for an external trigger.

Note: See related products information concerning MAC/1000 high-level call subroutines for A-Series M&C interfaces.

Calibration

The HP 12060B is calibrated at the factory and may require recalibration by the customer on arrival by using a voltage source and optional calibration software.

Gain Dependent *Table 1*

Specification	Gain 1	2	3	4
Full-scale Range ±1.28 V		±10.24 V	±5.12 V	±2.56 V
Resolution (12 bits)	5.0 mV	2.5 mV	1.25 mV	0.625 mV
Accuracy (25°C, RTI)	±5.0 mV	±2.5 mV	±1.25 mV	±0.625 mV
Temperature Coefficient	±0.38 mV/°C	±0.38 mV/°C	±0.095 mV/°C	±0.048 mV/°C
Inputs at: 12060B	±26.4 mV	±8.2 mV	±4.1 mV	±2.1 mV
12061A	±24.6 mV	±12.3 mV	±6.1 mV	±3.1 mV

Overall Accuracy* [0°C to 55°C, referred to input (RTI), Worst Case]

* May be improved to 25°C Accuracy Specification levels by correcting for the offset error due to temperature by measuring and subtracting the onboard zero reference voltage.

Functional Specifications

HP 12060B/12061A Analog Input System

Gain Dependent: See table 1.

Gain Independent:

Maximum input voltage: ±10.24 V to ground

Common mode rejection: >70 dB dc to 100 Hz with 1 k ohm source impedance and 1 kW source imbalance. Example: 20 Vp-p common mode voltage produces <6 mVp-p noise RTI.

Crosstalk: <80 dB dc to 100 Hz. Example: 20 V p-p adjacent channel input produces <2 mVp-p noise RTI.

Throughput to memory: 55,000 samples per second. Sample and hold aperture time: <20 nanoseconds

Input Overload Protection:

Steady state: Up to 25 V on any one input line to ground or to another input

Transient: 42 V for 500 ms without damage

Effective Input Impedance:

Power off: 1.2 k ohm (10%) to ground, 2.4 k ohm (10%) to any other channel

Power on: >5 M ohm

Source impedance and source imbalance: Up to 1 k ohm

Common mode return: Up to 10 k ohm

External Trigger: TTL-compatible handshake, not protected (operates at up to full 55 kHz rate, jumper selectable pull-up, pull-down, or TTL)

HP 12060B Physical Characteristics:

PC board: 28.9 cm (11.4 in) length, 17.2 cm (6.75 in) width, 1.9cm (0.75 in) height
Net weight: 0.4 kg (14 oz)

HP 12060B Power Requirements: 5.5 W at 5 V dc, 1.25 W at 25 kHz ac (normally provided by HP 12035A Power Module)

HP 12061A Physical Characteristics:

PC board: 28.9 cm (11.4 in) length, 17.2 cm (6.75 in) width, 2.8 cm (1.1 in) height
Net weight: 0.27 kg (9.3 oz)

HP 12061A Power Requirements: 0.05 W at 5 V dc, 2.0 W at 25 kHz ac

HP 12060BC And 12061AC Cables

Physical Characteristics

Cable length: 3 meters (9.84 feet) **Wire gauge**: 26 **Overall diameter**: <1.3 cm (0.5 in)

Electrical Characteristics

Configuration:
HP 12060BC – 8 shielded twisted pairs plus one drain common to all shields
HP 12061AC – 32 shielded twisted pairs plus one drain common to all shields

Voltage rating: 300 volts peak

Environmental characteristics: (both products)

Operating Temperature: 0°C to 55°C (32°F to 131°F)

Storage temperature: -40°C to 75°C (-40°F to 167°F)

Relative Humidity: 5% to 95% at 40°C (104°F) non-condensing

Altitude: Up to 4.6 km (15,000 ft) operating; up to 15.3 km (50,000 ft) non-operating

System Requirement:
HP 1000 A-Series computers with 25 kHz power options. See the HP 1000 Ordering Information Guide.

Ordering Information

HP 12060B High-Level Input Card

The HP 12060B includes:

12060-60101 A-Series Analog Input Interface
12060-90003 User Information Manual
12060-90004 Operating and Service Manual

HP 12060B Options:

001 Adds Edge Connector Kit and extra edge connector
020 Calibration software on phase encoded minicartridges (P/N 12060-13301)
041 Calibration software of 8-inch flexible disk (P/N 12060-13401)
044 Calibration software on 3½-inch microfloppy disk (P/N 12060-13402)

The HP 12060BC includes:

12060-63001 3-meter unterminated cable with 8 individually shielded twisted pairs

HP 12061A Expansion Multiplexer Card

The HP 12061A includes:

12061-60001 A-Series Analog Input Expansion Interface
12061-60002 Test Hood

HP 12061A Option:

001 Adds Edge Connector Kit and extra edge connector

The HP 12061AC includes:

12061-63002 3-meter unterminated cable with 32 individually shielded twisted pairs

Diagnostics

Diagnostics software is supplied with the HP 24612A. This product includes diagnostic manuals, diagnostic software, and test hoods for the A-Series Measurement and Control interfaces including the HP 12060B, 12061A, 12062A, and 12063A. *Must* order one of the following media options: 020, 022, 041, 042, 044, or 051.

Related Products Information

MAC/1000 Software Library

This third-party software product provides a set of high-level call subroutines for the A-Series M&C family. These calls make upgrades to higher point count applications via Control 1000, straightforward. For more information contact:

Demand System, Inc.
6279 Variel Avenue, Suite D
Woodland Hills, CA 91637
Attn: Frank Zuhde
(213) 710-8851

Technical information in this document is subject to change without notice.

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HEWLETT® PACKARD

Multiuse Programmable Serial Interface

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12043A

Features

- Z-80A CPU microprocessor control
- One Z-80A SIO/2 dual-channel serial I/O "USART" controller
  - Full- or half-duplex mode
  - Synchronous or asynchronous features
  - CRC-16 or CCITT block frame check for synchronous operation
  - Two modem control inputs and two modem control outputs per channel
  - Optional vectored interrupts per channel
  - Capability for two independent RS-232-C primary channels
- Two Z-80A DMA direct memory access controllers
- 16 Kbytes of Dynamic RAM for tables, buffers, and/or firmware
- One Z-80A Counter Timer Chip providing one system timer, an independent, programmable baud rate for each SIO channel, and a programmable DMA backplane transfer rate.
- Capability for EIA RS-449, EIA RS-232-C
- Multidrop capability
- Internal loopback of clocks and transmitted data under firmware control for self-test
- Four programmable indicator lights (LEDs)
- Eight switches, accessible as a single byte
- EPROM-based developmental debug monitor
- EPROM-based self-test
- Off-line RAM dump to host
- EPROM-based program for loading and executing downloaded code
- HP support

Functional Description

The HP 12043A is a microprogrammable interface for the HP 1000 A-Series Computer System. This card is intended to be purchased by customers who will use it with HP software downloading the characterizing protocol into 16 Kbytes of on-card RAM memory. The HP 12043A executes Multileaving Remote Job Entry protocol. Because the interface program is downloaded from software into RAM memory on the card, the interface never needs to be modified by the addition of EPROMs. This means the 12043A is used and supported as shipped from the factory. An 8 K EPROM on each interface contains programs for self-test, loading and executing code, and a development and debug monitor. The card is configurable through software.

Onboard Microprocessor Offloads Host Computer

A powerful microprocessor on the interface manages routine communications processing, relieving the host computer for applications-oriented tasks. Under control of downloaded firmware, the microprocessor converts command words into actions, such as establishing a communications link or loading/unloading data from the onboard buffers to the host CPU. The microprocessor can also perform protocol generation and interpretation, error checking, error recovery by retransmission, or general purpose I/O interfacing, all without the attention of the host computer.

16 Kbytes of RAM

Onboard memory allows messages and associated information to be buffered on the card either for transmission, reception, or temporary program storage. Thus, interrupts to the host processor can be kept at a minimum so the host CPU can be put to better use processing applications.

Direct Memory Access Transfers

Each interface card has its own DMA intelligence to control transfers of data between the card buffer and the host CPU backplane. DMA reduces the time and overhead required to move messages between interface and host CPU memory.

EPROM-based Self-Tests

A go/no-go self-test, performed at power-up or reset of card, helps to ensure reliable operation of the interfaces and minimize troubleshooting time. These tests check out the RAM memory, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface and signal self-tests results via LED indicators. The self-test can also be run with the supplied diagnostic hood. The diagnostic hood fits on the edge of the PSI card and tests more of the card than is possible with self-test alone.

EPROM-based Developmental Debug Monitor (DDM)

The DDM program serves as a monitor to aid in the development of user firmware. Once a firmware program is cross-assembled on a minicartridge tape, the DDM can load that program into the PSI card's RAM through an HP 2645 or 2648 terminal and a terminal-to-card-to-link cable supplied with the DDM. The DDM can then support these functions:

- Display and/or modification of memory locations
- Display and/or modification of registers
- Control of program flow by:
  a. transferring control to firmware entry points,
  b. setting and removing break points,
  c. single-step simulation with trace
- Reading and writing through all I/O ports
- Creating ("punching") modified code into 264x minicartridge tape
- Help facility providing information about the command set

Functional Specifications

Transmission Mode

Full or half duplex, bit-serial, synchronous or asynchronous

Z-80A SIO/2 Characteristics

Data Buffering: Received data quadruple buffered; transmitted data double buffered

Synchronous Features for Character Oriented Protocol:

- 1 or 2 Sync characters
- Automatic Sync character insertion
- Cyclic redundancy check generation and checking
- Received data overrun detection

Synchronous Features for Bit Oriented Protocol:

- Abort sequence generation and checking
- Automatic Zero insertion and detection
- Automatic Flag insertion between messages
- Address field recognition
- Supports 1 to 8 bits per channel
- Cyclic redundancy check generation and checking
- Valid receive message overrun detection

Asynchronous Features:

- 5, 6, 7, or 8 bits per character
- 1, 1-1/2, or 2 stop bits
- Even, odd, or no parity
- X1, X16, X32, or X64 clock modes
- Break generation and detection
- Parity, overrun, and framing error detection

Optional Generation of a Vectored Interrupt per Channel when:

- The state of an SIO modem control input changes
- The transmit buffer is empty
- A receive character is available
- A special receive condition occurs for: parity error, Rx overrun error, CRC/Framing error, End of Frame

Z-80A DMA Characteristics

Three Classes of Operation: Transfer only, Search only, Search and Transfer.

Three Modes of Operation: Byte-at-a-time, Burst (continuous as long as both sides are ready), Continuous (locks out CPU until done). Read and Write port addresses can independently increment, decrement, or stay fixed.

Interrupts: On Match Found, End of Block, or Port Ready. Each can be its own interrupt vector.

Address and Block Length Register Loading: Registers may be loaded for the next operation without disturbing current operation.

Operation Restart: Last operation can be restarted automatically or on command.

DMA Signaling: DMA can signal when a specified number of bytes have been transferred without disturbing the current system.

DMA Status: CPU can read the current channel status, Read or Write address registers or the length register.

Z-80A Counter Timer Chip Characteristics

Channels: Four independently programmed channels, used for dynamic RAM timing, Zilog-chip main-system clock and baud rate generator for each SIO channel.

Baud rate limits are: Asynchronous: max 57.6 K,min 50 **Synchronous**: max 460.8 K,min 50 **Synchronous External**: max 810 K

Note: The speed of transmission depends on and may be limited by the type of firmware protocol implemented. The best practical board rates that can be expected with sophisticated protocols are 230 Kbaud synchronous and 57.6 Kbaud asynchronous.

Modes: Operates in Counter or Timer mode.

Interrupt: On the zero count condition (each channel has its own interrupt vector).

Restart: Automatically restarts the last operation in either mode.

Output: Gives the Z-80A CPU the number of counts to go until a zero count condition.

Communications Interface Characteristics

Number of Input Lines: Six input lines with balanced receivers and eight input lines with unbalanced receivers

Output Lines: Four output lines that can be driven by unbalanced or balanced line drivers, eight output lines with unbalanced line drivers

Configuration Information

Computer I/O Channels Required: One per interface

Interface Current Required from Computer Power Supplies:

+ 5 V	+12 V	-12 V
Supply	Supply	Supply
2.60 A	0.35 A	0.18 A

Compatible Modems: The HP 12043A interface is compatible with the modems listed below and may be useful with other modems that are compatible with both the PSI card hardware and user-developed firmware. Note that compatibility with any modem is highly dependent on the firmware implemented on the PSI card.

Connections and Compatible Modems

Connection via Private Lines:

- Bell 201C
- Bell 208A
- Bell 208B
- Bell 209A

System Compatibility:

PSI Card System Compatibility

Compatible Computers	Compatible Computer Systems
2137A	2196C/D
2139A	2197C/D
2156B	2199C/D
2436A/E	2486A
2437A	2487A
2439A	2489A

Ordering Information

The HP 12043A includes:

12043-60001 Modem Programmable Serial Interface Assembly; includes 5180-1966 Self-Test/Download EPROM
5061-4914 5-meter (18 ft) RS-232-C Modem Interface Cable
5061-4916 Self-Test Hood
5955-7700 Installation and Reference Manual

HP 12043A Option

001 5061-4993 5-meter (18 ft) RS-449 Modem Interface Cable (delete 5061-4914)

HEWLETT® PACKARD

Programmable Serial Interface

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12042B

The HP 12042B is a microprogrammable interface for HP 1000 A-Series Computer Systems. This card is intended to be used by sophisticated OEMs or end users as a foundation for designing their own application-oriented communications products.

The HP 12042B consists of a Z-80A based intelligent interface with two available EPROM/ ROM sockets. User developed firmware modules are required for use. By designing firmware unique to a particular application, the user has almost unlimited scope in the number of customized products that are feasible.

The HP 24602A PSI Firmware Development Package provides reference material to guide users in the task of creating their own firmware. In conjunction with the 24602A, the 12042B creates a flexible solution to complex data communication problems.

Features

- Z-80A CPU microprocessor control
- One Z-80A SIO/2 dual-channel serial I/O "USART" controller
  - Full- or half-duplex mode
  - Synchronous or asynchronous features
  - CRC-16 or CCITT block frame check for synchronous operation
  - Two modem control inputs and two modem control outputs per channel
  - Optional vectored interrupts per channel
  - Capability for two independent RS-232-C primary channels
- Two Z-80A DMA direct memory access controllers
- 16 Kbytes of Dynamic RAM for tables, buffers, and/or firmware
- Capability for EIA RS-449, EIA RS-232-C (on one channel)
- Internal loopback of clocks and transmitted data under firmware control for self-test
- Two EPROM/ROM sockets capable of using any combination of 2716's, 2732's, 2764's, 2516's, 2532's, and similar devices up to a maximum of 8 Kbytes per socket
- Four programmable indicator lights (LEDs)
- One Z-80A CTC counter timer chip providing one system timer, an independent, programmable baud rate for each SIO channel, and a programmable DMA backplane transfer rate
- Multidrop capability
- Forced cold load capability
- Eight switches, accessible as a single byte

Functional Description

Onboard Microprocessor Offloads Host Computer

A powerful microprocessor on the interfaces manages routine communications processing, relieving the host computer for applications-oriented tasks. Under control of customer-supplied firmware, the microprocessor converts command words into actions, such as establishing a communications link or loading/unloading data from the onboard buffers to the host CPU. The microprocessor can also perform protocol generation and interpretation, error checking, error recovery by retransmission, or general-purpose I/O interfacing, all without the attention of the host computer.

16 Kbytes of RAM

Onboard memory allows messages and associated information to be buffered on the card either for transmission, reception, or temporary program storage. Thus, interrupts to the host processor can be kept at a minimum so the host CPU can be put to better use processing applications.

Direct Memory Access Transfers

Each interface card has its own DMA intelligence to control transfers of data between card buffer and the host CPU backplane. DMA reduces the time and overhead required to move messages between interface and host CPU memory.

EPROM-based Self-Tests

A go/no-go self-test (which can be optionally deleted), performed at power-up or reset of card, helps to ensure reliable operation of the interfaces and minimize troubleshooting time. These tests check out the RAM memory, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface and signal self-test results via LED indicators. The self-test can also be run with the supplied diagnostic hood. The diagnostic hood fits on the edge of the PSI card and tests more of the card than is possible with self-test alone.

Functional Specifications

Transmission Mode

Full- or half-duplex, bit-serial, synchronous or asynchronous

Z-80A SIO/2 Characteristics

Data Buffering: Received data quadruple buffered; transmitted data double buffered

Synchronous Features for Character Oriented Protocol:

- One or two Sync characters
- Automatic Sync character insertion
- Cyclic redundancy check generation and checking
- Received data overrun detection

Synchronous Features for Bit-Oriented Protocol:

- Abort sequence generation and checking
- Automatic Zero insertion and detection
- Automatic Flag insertion between messages
- Address field recognition
- Supports one to eight bits per character
- Cyclic redundancy check generation and checking
- Valid receive message overrun detection

Asynchronous Features:

- 5, 6, 7, or 8 bits per character
- 1, 1-1/2, or 2 stop bits
- Even, odd, or no parity
- X1, X16, X32, or X64 clock modes
- Break generation and detection
- Parity, overrun, and framing error detection

Optional Generation of a Vectored Interrupt per Channel when:

- The state of an SIO modem control input changes
- The transmit buffer is empty
- A receive character is available
- A special receive condition occurs for: parity error, Rx overrun error, CRC/Framing error, End of Frame

Z-80A DMA Characteristics
Three Classes of Operation: Transfer only, Search only, Search and Transfer

Three Modes of Operation: Byte-at-a-time, Burst (continuous as long as both sides are ready), Continuous (locks out CPU until done). Read and write port addresses can independently increment, decrement, or stay fixed.

Interrupts: On Match Found, End of Block, or Port Ready (each can be its own interrupt vector).

Address and Block Length Register Loading: Registers may be loaded for the next operation without disturbing current operation.

Operation Restart: Last operation can be restarted automatically or on command.

DMA Signaling: DMA can signal when a specified number of bytes have been transferred without disturbing the current system.

DMA Status: CPU can read the current channel status, Read or Write address registers or the length register.

Z-80A Counter Timer Chip Characteristics

Channels: Four independently programmed channels used for dynamic RAM timing, Zilog chip main system clock and baud rate generator for each SIO channel. Baud rate limits are:
Asynchronous: max 57.6 K, min 50
Synchronous: max 460.8 K,min 50
Synchronous External: max 810 K

Note: The speed of transmission depends on and may be limited by the type of firmware protocol implemented. The best practical board rates that can be expected with sophisticated protocols are 230 Kbaud synchronous and 57.6 Kbaud asynchronous.

Modes: Operates in Counter or Timer mode

Interrupt: On the zero count condition (each channel has its own interrupt vector)

Restart: Automatically restarts the last operation in either mode

Output: Gives the Z-80A CPU the number of counts to go until a zero count condition

Communications Interface Characteristics

Number of Input Lines: Six input lines with balanced receivers and eight input lines with unbalanced receivers

Output Lines: Four output lines that can be driven by unbalanced or balanced line drivers, eight output lines with unbalanced line drivers

Configuration Information

Computer I/O Channels Required: One per interface

Interface Current Required from Computer Power Supplies:

+5 V Supply	+12 V Supply	-12 V Supply
2.60 A	0.35 A	0.18 A

Compatible Modems: The HP 12042B interface is compatible with the modems listed below and may be useful with other modems that are compatible with both the PSI card hardware and user-developed firmware. Note that compatibility with any modem is highly dependent on the firmware implemented on the PSI card. Further information on the modems listed below is given in the HP 12042B PSI Card Installation and Reference Manual (5955-7698).

Connections and Compatible Modems:

Connection Lines	Model Type
Private Lines	Bell 201C
	Bell 208C
	Bell 208B
	Bell 209A

System Compatibility:

PSI Card System Compatibility

Compatible Computers	Compatible Computer Systems
2137A	2196C/D
2139A	2197C/D
2156B	2199C/D
2436A/E	2486A
2437A	2487A
2439A	2489A

Support Policy

Because the PSI card is a customizable system, the customer must assume responsibility for its support. Consequently, there is no Service Contract applicable to the PSI product. Hewlett-Packard Customer Engineers will accept contracts for HP 1000 systems containing PSI cards upon verification of the system by the responsible HP field office. However, the PSI card itself will not be diagnosed or repaired at the customer's site. If the PSI product develops problems, it will be the responsibility of the customer to diagnose and replace both its hardware and firmware.

The Self-Test EPROM is provided as a tool to be used at the discretion of the customer.

Customers must be prepared to develop their own support strategy for the PSI cards. It is suggested the customer maintain spare cards which can be swapped by the customer if a problem arises in the field. Board Repair and Exchange programs are available for the PSI to assist customers in their suppport. Contact the responsible HP Customer Engineer for further information.

Ordering Information

Note: It is strongly recommended that purchase of the HP 12042B for program development be done jointly with the purchase of the HP 24602A PSI Firmware Development Package.

The HP 12042B Interface includes:

12042-60001 Programmable Serial Interface with Self-Test EPROM (5180-1951)
5061-4914 5-meter (17 ft) RS-232-C Modem Interface Cable
5061-4916 Diagnostic Test Hood
5955-7698 PSI Installation and Reference Manual

HP 12042B Options:

001 Substitutes 5061-4993 5-meter (17 ft) RS-449 Modem Interface Cable for RS-232-C Cable (5061-4914)
002 Substitutes 5061-3440 Custom Cable Kit (edge connector only) for RS-232-C Cable (5061-4914)
003 Deletes Diagnostic Hood

HEWLETT® PACKARD

8-Channel Multiuse Asynchronous Multiplexer Interface

Technical Data

For HP 1000 A-Series Computer Systems
Product Number HP 12041B

Features

- EIA RS-423-A and RS-232-C/ CCITT V.24 compatibility
- Onboard microprocessor off-loads computer
- Onboard buffering with DMA capability
- Programmable character size, parity checking, and number of stop bits for flexible control of transmission format
- Parity, overrun, and framing error detection
- Programmable data rates using two baud rate generators to eliminate hardware speed strapping
- Full-duplex or echoplex transmission
- Includes an 8-port Distribution Panel for mounting RS-232 connections
- Onboard self-test

Functional Description

The HP 12041B is a microprogrammable interface for HP 1000 A-Series computers. These cards are intended to be purchased by customers who will use them with HP software downloading the characterizing protocol into 16 Kbytes of on-card RAM memory.

By designing firmware which is unique to a particular application, an HP division has almost unlimited scope in the variety of different specialized interfaces that are available to support application-oriented software products. Because the interface program is downloaded from software into RAM memory on the card, the interface never needs to be modified by the addition of EPROMs. This means the 12041B is used and supported as shipped from Roseville Networks Division. An 8-Kbyte EPROM on each interface contains programs for self-test, loading, and executing code.

Direct Memory Access Transfers

Each interface card has its own DMA intelligence to control transfers of data between card buffer and the host CPU backplane. DMA reduces the time and overhead required to move messages between interface and host CPU memory.

Onboard Microprocessor Offloads Host Computer

A powerful microprocessor on the interfaces manages routine communications processing, freeing the host computer for applications-oriented tasks. Under control of downloaded firmware, the microprocessor converts command words into actions, such as establishing a communications link, loading or unloading data from the onboard buffers to the host CPU. The microprocessor can also perform protocol generation and interpretation, error checking, error recovery by retransmission, or general purpose I/O interfacing, all

without the attention of the host computer.

16 Kbytes of RAM

Onboard memory allows messages and associated information to be buffered on the card either for transmission, reception, or temporary program storage. Thus, interrupts to the host processor can be kept at a minimum so the host CPU can be put to better use processing applications.

EPROM-based Self-Tests

A go/no-go self-test, performed at power-up or reset of card, helps to ensure reliable operation of the interfaces and minimize troubleshooting time. These tests check out the RAM memory, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface and signal self-tests results via the LED indicator. The self-test can also be run with the supplied diagnostic hood which allows for the test of the electrical drivers and receivers.

Communications

Interface Level: RS-423-A/RS-232-C or CCITT V.24

Communication Mode: Asynchronous, bit serial

Programmable Communications Parameters: Character length from 5 to 8 bits; 1, 1-1/2, or 2 stop bits; and odd, even, or no parity

Configuration Information

System Compatibility: The 12041B Interface is compatible with HP 1000 A-Series Computer Systems operating under RTE-A real-time executive systems.

Computer I/O Slots Required: 1

Software Support: RTE Driver: IDM00

Current Required from Computer Power Supply:

+5 V	2.5 A
+12 V	0.10 A
-12 V	0.05 A

Physical Characteristics

Dimensions: 26.9 cm long by 17.2 cm wide by 1.6 mm deep (11.4 in by 6.75 in by 0.06 in); top clearance, 10.2 mm (0.4 in); bottom clearance, 5.1 mm (0.2 in)

Weight: 481 grams (17 oz) with mating connector

RS-232 Panel Extension

The 1252-0508 MUX Cable Extender Kit includes 1 set of male and female connector components which are used with up to 300 feet of HP cable (P/N 8120-4510) to remotely position the 28658-60005 RS-232-C panel. The raw cable can be purchased from the Corporate Parts Center.

Ordering Information

The HP 12041B Interface includes:

12041-60012 8-Channel Multiplexer Interface; includes 5180-1968 Download Monitor EPROM
12041-90001 Interface Installation Manual
5001-5278 Mounting Bracket
28658-60005 8-Channel RS-232-C Panel
28658-63005 3-meter EIA RS-232 Cable
1252-0508 MUX Cable Extender Kit
5061-4901 MUX Diagnostic Hood

HP 12041B Option:

003: Customer Connector
Deletes: (28658-60005) RS-232-C Panel (28658-63005) Cable (1252-0508) Extender Kit(5001-5278) Mounting Bracket
Adds: (5061-3467) Edge Connector Kit

HEWLETT® PACKARD

8-Channel Asynchronous Multiplexer Interface

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12040D

The HP 12040D is an Asynchronous Multiplexer* Interface that can connect up to eight asynchronous terminal, printer, or "black box" devices to an HP 1000 A-Series Computer System using a single I/O slot.

* Modem control lines are passed through to the multiplexer panel to allow passive full-duplex modem support. Active modem control may be achieved by adding the HP 37214A System Modem.

Features

- EIA RS-423-A and RS-232-C/ CCITT V.24 compatibility
- Onboard microprocessor off-loads computer
- Onboard buffering with DMA capability
- Programmable data rates using two baud rate generators to eliminate hardware speed strapping
- Automatic baud rate generator configuration
- Programmable character size, parity checking, termination character, and number of stop bits for flexible control of transmission format
- Parity, overrun, and framing error detection
- Bi-directional Xon/Xoff control during multiplexer data transmission
- Supports HP 37214A Systems Modem, which can provide up to 7 ports having full modem control capabilities
- Two of ten baud rate groups may be simultaneously selected
- Supports a Virtual Control Panel (VCP) in RTE-A Systems
- Full-duplex or Echoplex transmission
- Capability to edit data prior to passing it to computer memory, featuring backspace erase
- Includes an 8-port Distribution Panel for mounting RS-232 connections

Functional Description

The HP 12040D Asynchronous Multiplexer Interface provides multiplexed terminal support for up to eight asynchronous RS-232-C compatible devices connected directly, or through full-duplex asynchronous modems*, to the multiplexer. The multiplexer interface can operate at programmable data rates up to 38.4 Kbits/second on a given channel. For a description of the overall throughput performance refer to the HP 12040D Performance Brief (P/N 5954-8548).

* Modem control lines are passed through to the multiplexer panel to allow passive full-duplex modem support. Active modem control may be achieved by adding the HP 37214A System Modem.

The HP 12040D includes an eight-port multiplexer panel to provide for convenient connection via EIA 25-pin connectors.

Functional Specifications

Capacity

Channels: Eight full-duplex (transmit and receive) communications channels

Buffering: Two 254-byte transmit buffers and two 254-byte receive buffers for each channel

Communications

Interface Level:
RS-423-A/RS-232-C or CCITT V.24

Program-selectable Data Rates: 50, 75, 110, 134.5, 150, 300, 1200, 1800, 2400, 4800, 9600, 19.2 K, and 38.4 Kbits/second

Communication Mode:
Asynchronous, bit serial

Programmable Communications Parameters: Character length from 5 to 8 bits; 1, 1½, or 2 stop bits; and odd, even, or no parity

Configuration Information

System Compatibility: The HP 12040D Interface is compatible with HP 1000 A-Series Computer Systems operating under the RTE-A real-time executive systems, version 4.1 or later.

The HP 12040D incorporates firmware designed specifically for RTE-A interface drivers ID800 and ID801 (for use with 37214A modem cardcage). The HP 12040D will be compatible with previous versions of RTE-A if interface driver IDM00 is replaced with either ID800 or ID801. Consult the RTE Driver Reference Manual (P/N 92077-90011) for more information about compatibility and upgrade.

Computer I/O Slots Required: 1

Software Support:
RTE Interface Drivers:
ID800, ID801 (37214A Modem)

Supports the following HP Terminals:

2392A	2645A
2621A	2645A Opt007
2622A	2647A
2623A	2647F
2624AB	2648A Opt 007
2625A	2648A
2626A	2649B Opt 007
2627A	2649B/C
2628A	2649C Opt 007
2631A/B	2649G
2635A/B	7310A
2640B	

Current Required from Computer Power Supply:

+5V	2.5 A
+12V	0.10 A
-12V	0.05 A

Physical Characteristics

Dimensions: 26.9 cm long by 17.2 cm wide, by 1.6 mm deep (11.4 in by 6.75 in by 0.06 in); top clearance, 10.2 mm (0.4 in); bottom clearance, 5.1 mm (0.2 in)

Weight: 481 grams (17 oz) with mating connector

RS-232-C Panel Extension

The 1252-0508 MUX Cable Extender Kit includes one set of male and female connector components which are used with up to 300 feet of HP cable (P/N 8120-4510) to remotely position the 28658-60005 RS-232-C panel. The raw cable can be purchased from the Corporate Parts Center.

Ordering Information

The HP 12040D includes:

12040-60214 8-Channel Multiplexer Interface Assembly
12040-90123 Interface Installation and Reference Manual
5001-5278 Mounting Bracket
28658-60005 8-Channel RS-232-C Panel
28658-63005 3-meter EIA RS-232 Cable
1252-0508 MUX Cable Extender Kit

HP 12040D Options:

001 Firmware upgrade from 12040C to 12040D
Deletes: Everything except manual (12040-90123)
Adds: (12040-96001) Instruction Sheet (5180-7300) Firmware ROM

002 Cable option for use with 37214A SystemModem
Deletes: (28658-60005) RS-232-C Panel (28658-63005) Cable (1252-0508) Extender Kit (5001-5278) Mounting Bracket
Adds: (12828-60002) Cable

003 Custom Connection
Deletes: (28658-60005) RS-232-C Panel (28658-63005) Cable (1252-0508) Extender Kit (5001-5278) Mounting Bracket
Adds: (5061-3467) Edge Connector Kit

HEWLETT® PACKARD

Extender Card and Priority Jumper Card

Technical Data

For HP 1000 A-Series Computer Systems
Product Numbers
HP 12011A and 12012A

The HP 12011A is the Extender Card for out-of-cardcage access to system- connected A-Series plug-in cards.

The HP 12012A is the Priority Jumper Card for continuation of the HP 1000 A-Series hardware priority chain through an otherwise unoccupied cardcage slot.

Functional Specifications

Computer and System Compatibility

The HP 12011A Extender Card and the HP 12012A Priority Jumper Card are compatible with all HP 1000 A-Series computers, systems, and cardcages.

Installation

The HP 12011A Extender Card: Remove the plug-in card to be accessed, plug the extender card into the cardcage in its place, and plug the card into the extender board.

The HP 12012A Priority Jumper Card: Plug the priority jumper card into the vacant cardcage slot through which the priority chain is to be continued.

Physical Characteristics

Weight:
Extender Card: 426 grams (15 oz)
Priority Jumper Card: 170 grams (6 oz)

Ordering Information

The HP 12011A includes:

12011-60001 Extender Card

The HP 12012A includes:

12012-60001 Priority Jumper Card

Technical information in this document is subject to change without notice.

Printed in the U.S.A.

HEWLETT® PACKARD

Breadboard Interface

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12010A

The HP 12010A Breadboard Interface provides the standard A-Series I/O master circuit along with space for sixty 16-pin wire wrap sockets for user-designed custom interfaces. The printed circuit layout is based on a 2.5 mm (0.1 in) by 7.6 mm (0.3 in) matrix, which accommodates any mix of dual or single in-line integrated circuits. All signals needed by the user are brought along with dc power supply voltages to convenient, labeled connection pads along the edge of the I/O master circuit area.

Features

- Standard A-Series I/O master interface to computer or system backplane
- Built-in DMA capability for optimum I/O efficiency
- 60-socket space for user's circuits
- TTL-compatible signals

Functional Specifications

I/O Master

Purpose: To ensure compatibility of user-designed interfaces with the high performance I/O design of A-Series Computers and Systems, the Breadboard Interface includes the same I/O master circuit as other A-Series interfaces. This includes the CMOS LSI I/O Processor chip, which executes I/O instructions, and other circuits that make high-speed transfers possible.

Determination of I/O Address: I/O address select code is set by select code switches and is independent of interface card position along the A-Series backplane bus.

I/O Addressing: The Breadboard Interface may be preaddressed by presetting the select code into its Global Register (GR), which leaves the six select code bits of I/O instructions available for addressing registers or other functions on the interface. Alternatively, the GR can be turned off and the select code bits in each instruction can be used to address the user-designed custom interface.

I/O Device Interrupt Priority: Depends upon I/O interface position in the cardcage with respect to the processor board.

Interrupt Masking: Under program control an interrupt mask register provides selective inhibition of interrupts from specific under program control. This capability can be programmed interfaces to temporarily cut off undesirable interrupts from any combination of interfaces when they could interfere with crucial transfers.

Direct Memory Access (DMA): The I/O master supports DMA capability for user's circuits on the breadboard interface. This feature reduces the number of interrupts from one per data item (byte or word) to one per complete DMA block transfer, greatly reducing overhead and increasing throughput.

Self-Configured, Chained DMA: A self-configuring mode of DMA operation is available for when groups of DMA transfers must be performed. In this mode, instead of interrupting after a block transfer, the I/O master fetches a new set of DMA control words for the next transfer, reconfigures itself, and initiates another block transfer. This chained process continues as long as additional control word sets are available.

Data Packing under DMA: When byte mode is specified in control word instructions, the I/O master automatically manages byte packing or unpacking.

Maximum Achievable DMA Rate: 700,000 words/second (1.4 Mbytes/second)

Virtual Control Panel Support: The I/O master supports the provision of virtual control panel interface capability on user-designed custom interfaces based on the breadboard interface.

I/O Master Signals and Timing: Refer to the HP 1000 A-Series I/O Interfacing Guide (02103-90005)

User's Circuit Space

Area: 13.3 cm by 14.6 cm (5.25 in by 5.75 in)

Organization: The user's circuit area is organized into ten column pairs of 53 circuit pads each for mounting up to sixty 16-pin wire-wrap integrated circuit sockets or any other combination of dual in-line integrated circuit sockets with different numbers of pins.

Maximum Component Height above board surface: 10mm (0.4 in) for an interface capable of being installed in any circuit card position in the 12030A or 2103L 10-slot cardcage, 12032A 5-slot cardcage, or 2145B 16-slot cardcage. Height can be up to 1.8cm (0.7 in) for an interface to be used only in 10-slot cardcage slot XA6 or 16-slot cardcage slot XA9

Maximum Permissible Depth below board for leads or attaching hardware: 5 mm (0.2 in)

Power Dissipation

Maximum per A-Series Interface Card: 17 W, determined by air flow provided through the cardcages

I/O Master Dissipation: 5.29 W

Power Dissipation Capacity available for user's circuits: 11.7 W

Configuration Information

Computer and System Compatibility: The I/O master on the HP 12010A Breadboard Interface is compatible with all HP 1000 A-Series Computers and Systems.

Software Support: User's custom-designed interfaces based on the HP 12010A Breadboard Interface will require user-written RTE-A/L driver software, which can be modeled on the general-purpose RTE-A/L driver ID.50.

Diagnostic Support: Diagnostic support for user's custom-designed interfaces must be user written. A kernel diagnostic, supplemented by a BASIC-like interactive diagnostic test and design language is provided in the HP 24612A Diagnostic Package to assist the user's diagnostic development efforts.

Installation: Build user's custom interface on the breadboard interface; establish control settings as required for the user's custom applications; set select code switches to the appropriate I/O address; turn off power to the computer and the interfaced device; plug the custom interface into the computer backplane; connect an appropriate cable, and integrate the interface and its

user-written driver into the RTE- A/L operating system.

Note: The I/O address setting of the interface select code switches is independent of the interface card's position in the computer backplane.

Electrical Specifications

Direct Current Requirements: The I/O master requires 0.912A (+5 V), and 0.061A (+12 V).

Physical Characteristics

Dimensions: 28.9 cm long by 17.2 cm wide by 0.21 cm board thickness (11.38 in by 6.75 in by 0.063 in), with 1.0 cm (0.4 in) top-of-board parts clearance and 0.5 cm (0.2 in) beneath-board clearance.

Weight: 313 grams (11 oz) with mating connector

Power Sources Available:

dc/ac Voltages	P2 Pin(s)
+5.0 V dc	35-37
+12.0 V dc	41, 42
-12.0 V dc	43, 44
19.5 V ms, 25kHz*	47, 48
common	2, 15, 17, 21, 27, 34
19.5 V ms, 25 kHz*	49, 50

* The 19.5 V ms, 25 kHz power is available for metting unique power supply requirements. For more information, see HP Application Note 404-3, which is available from your HP Representative.

Ordering Information

The HP 12010A includes:

12010-60003 Breadboard Interface Card
5061-3426 8-pin Connector Kit
02103-90005 A-Series I/O Interfacing Guide

HEWLETT® PACKARD

HP-IB Interface for HP 1000 A-Series Computer Systems

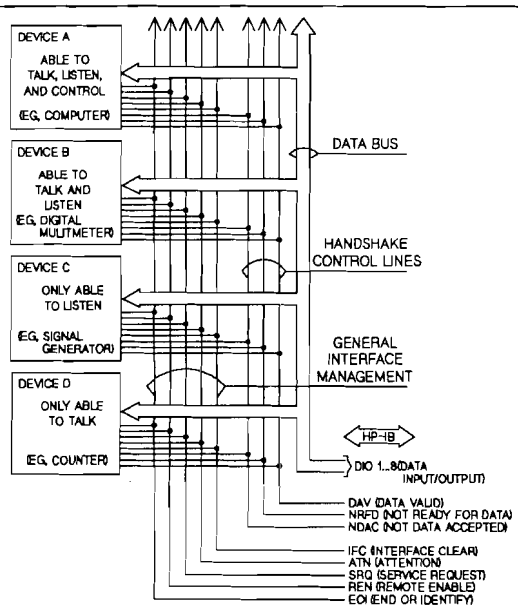
Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12009A

The HP 12009A HP-IB Interface provides for connection of up to 14 Hewlett-Packard Interface Bus compatible devices to HP 1000 A-Series computers or systems. HP-IB compatible devices include flexible and hard disk drives, printers, magnetic tape drives, plotters, graphics digitizers, and an extensive list of measurement instruments.

* The Hewlett-Packard Interface Bus (HP-IB) is HP's implementation of IEEE Standard 488-1978: "Digital Interface for programmable instrumentation" and identical ANSI Standard MC 1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

Figure 1



Features

- Interface to low-cost peripherals
- Capacity of up to 14 instruments
- Simple software control of HP-IB based instrumentation systems
- Built-in DMA capability for optimum I/O efficiency
- Burst transfer rates to 940 Kbytes/second
- Concurrent operation of multiple HP-IB buses under control of the RTE-L/A operating system
- I/O driver support with RTE-XL, RTE-A, RTE-L operating system

HP-IB Capabilities

The HP 12009A HP-IB interface connects to the signal lines shown in Figure 1, acting as DEVICE A. Eight bidirectional data bus lines carry coded messages in bit-parallel-byte-serial to/from other devices on the bus, with each byte transferred from one "talker" to one or more "listeners." Data is exchanged asynchronously using interface messages to set up, maintain,

and terminate an orderly flow of device-dependent messages. Three data byte transfer control lines control the transfer of each byte of coded data on the eight data lines. The five general interface management lines ensure on orderly flow of information within the HP-IB.

The HP-IB functions of the HP 12009A interface are largely embodied in a CMOS/SOS LSI integrated circuit chip that works with the I/O master processor LSI chip and circuits to manage HP-IB control and communications.

Functional Specifications

Capacity

HP 7906H/7910HR Disks per HP 12009A Interface: Up to two, maximum, in addition to single or dual flexible disk

Other HP-IB Devices/ Interface: Up to 14

Switch-Selectable Operating Modes

High-speed Mode: Selects operation at data rates to 940 Kbytes/second, maximum. Only 7 high-speed devices plus the HP 12009A allowed on bus.

Normal Mode: Selects operation at data rates to 500 Kbytes/second, maximum; 14 normal speed devices may be on the bus.

Matching Requirements: All devices connected to the same bus must be compatible with the selected mode. For that reason, separate HP 12009A interfaces will be required to interface both high-speed mode and normal mode devices to the same A-Series computer or system.

System Controller Mode: A two-position switch enables HP 12009A operation as system controller (supported by RTE-L/XL/A) or disables such operation (not supported by RTE-L).

Bus Characteristics

Bus Signal Lines:

DIO	1-8 Data I/O Lines 1 through 8
DAV	Data Valid
NRFD	Not Ready for Data Accepted
IFC	Interface Clear
ATN	Attention
SRQ	Service Request
REN	Remote Enable
EOI	End or Identify

Logic Levels, Line Drivers, Line Terminations, and Line Receivers: All characteristics conform to IEEE Standard 488-1978.

Maximum Cable Length for Normal-Mode Operation: 2 meters (6.5 ft) per device connected, with a 20-meter (65 ft) total length. The maximum number of devices is accommodated by interconnection using shorter than maximum cable length.

Maximum Cable Length for High-speed Operation: 2 meters (6.5 ft) per device connected, with 15-meter (48.75 ft) total length. Additional load resistors, provided with the interface, are required.

Direct Memory Access (DMA) Operation

The HP 12009A can directly access computer memory under control of its I/O master processor regardless of how many other interfaces in the system are also accessing memory via DMA.

Transfer Rates

High-speed Mode: Up to 940 Kbytes per second via Direct Memory Access when HP-IB interface is plugged into the highest priority I/O slot (next to the central processor board) in the cardcage.

Normal Mode: Up to 500 Kbytes per second via Direct Memory Access.

Configuration Information

Computer and System Compatibility: The HP 12009A HP-IB Interface is compatible with all HP 1000 A-Series Computers and Systems.

Software Support: The HP 12009A interface is supported by RTE-L/XL/A interface driver ID.37. Use of Hewlett-Packard disk memories and printers with the HP 12009A interface is supported by RTE-L device drivers DD.30 and DD.12 respectively, which work with interface driver ID.37.

Diagnostic Support: A diagnostic for the HP 12009A interface is provided in the HP 24612A Diagnostic Package.

Installation: Set interface card switches to select (or unselect) operation as bus controller, normal or fast settling time, appropriate HP-IB address and control functions and appropriate I/O address select code; turn off power to the computer; plug the interface into the computer backplane*; connect the bus cable from the interface to HP-IB devices; integrate the interface driver into the operating system if that was not done previously.

Note: To achieve maximum data rate in high-speed mode, the HP-IB interface must be plugged into the cardcage slot next to the central processor; I/O address setting of the interface select code switches is independent of the interface card's position in the computer backplane.

Electrical Specifications

Direct Current Requirements: 2.1 A (+5 V), 0.084 A (+12 V)

Physical Characteristics

Dimensions: 28.9 cm long by 17.2 cm wide by 0.16 cm board thickness (11.48 in by 6.75 in by 0.063 in) , with 1.0 cm (0.4 in) top-of-board parts clearance and 0.5 cm (0.2 in) beneath-board clearance.

Weight: 710 grams (25 oz) with HP-IB cable

Ordering Information

The HP 12009A Interface includes:

12009-60020 HP-IB Interface Card
12009-60014 HP-IB 2-meter RFI Filter Cable
12009-90001 Reference Manual

HP 12009A Option

001 Replaces 12009-60014 2-meter cable with 12009-60015 4-meter RFI Filter Cable.

HEWLETT® PACKARD

PROM Storage Module

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12008A

The HP 12008A PROM Storage Module provides mounting for up to 64 Kbytes of off-line PROM storage for HP 1000 A-Series computers and systems. For applications in which operating system and user software can be stored in PROMs, the use of the 12008A PROM Storage Module offers the following advantages:

- Nonvolatile storage, unaffected by loss of the power regardless of duration.
- Rugged storage medium that is usable in environments too harsh for flexible or hard disk or other mechanical storage devices.
- For minimal storage requirements, the PROM module is more compact and less costly than disk storage.

I/O Master Processor and PROM interface logic on the PROM module can load software into main memory at up to 1.7 Mbytes/second in blocks that can range in size from 2 bytes up to 64 Kbytes. This can include automatic bootup of PROM-resident programs at power on.

The size and destination of the transfer into main memory is dynamically determined under software control. Multiple PROM modules can be used to keep several different software systems resident inside the A-Series Computer. Any of these systems can be loaded extremely quickly under program control or under Direct Memory Access.

Note: Programs may not be executed directly from PROM, but must be loaded into main memory for execution.

Features

- Capacity for 64 Kbytes of PROM storage
- Automatic program load on power-up capability
- Multi-system storage with multiple PROM modules
- Dynamic control of transfer size and destination
- 1.7 Mbyte/second transfer rate into main memory
- Direct memory access capability

Functional Specifications

Organization

Capacity: 32 sockets for 16 Kbytes PROMs; 64 Kbytes, maximum

Minimum Block Size: 2

PROM Selection and Programming

Recommended PROMs: Intel 2716 or equivalent UV-erasable 16 Kbyte PROMs.

PROM Burners: PROMs may be programmed using any commercial PROM burner

Transfer Characteristics

Minimum Transfer: 2 bytes under program control, 10 bytes under DMA control

Maximum Transfer: 64 Kbytes under DMA or program control

Maximum Transfer Rate: 1.7 Mbytes/second under DMA control

Configuration Information

Computer and System Compatibility: The HP 12008A PROM Storage Module is compatible with all HP 1000 A-Series Computers and Systems.

Software Support: Formatting of the data to burn onto PROMs is supported by a PFORM DATA included in the RTE-L and RTE-XL operating systems.

Please note there is no software support included in the RTE-A operating system.

Cardcage Slots Required: One per HP 12008A PROM Module

Installation: Set the select code switches on the PROM module to the appropriate select code I/O address and plug the PROM module into an I/O slot in the A-Series computer or system cardcage.

Electrical Specifications

Direct Current Requirements: 2.18A (+5 V) and 0.06A (+12 V)

Physical Characteristics

Dimensions: 28.9 cm long by 17.2 cm wide (11.4 in by 6.75 in)

Weight: 340 grams (12 oz)

Ordering Information

The HP 12008A PROM Storage Module includes:

12008-60002 PROM Storage Module
12008-90001 PROM Storage Module Reference Manual

HEWLETT® PACKARD

HDLC Network Interfaces for DS/1000-IV

Technical Data

For HP 1000 A-Series Computer Systems Product Numbers HP 12007B and 12044A

The HP 12007B and 12044A are interfaces for communication between DS/1000-IV network nodes based on the HP 1000 A-Series Computers. The HP 12007B is the modem interface; the HP 12044A is the direct-connect interface.

These processor-based interfaces use the widely accepted, full-duplex High Level Data Link Control (HDLC) protocol to maximize communications' efficiency and reliability. The interface handles all HDLC protocol generation, including CRC-CCITT error checking, onboard buffer management, and all modem control tasks (the HP 12007B interface only). In conjunction with the HP 91750A DS/1000-IV software, the HDLC interfaces support high-level user access between HP 1000 computers.

Features

- Availability of both modem and direct-connect interfaces to maximize network planning flexibility
- 16 Kbytes of RAM memory for extensive onboard message buffering
- Onboard microprocessor off-loads the computer, making possible larger networks and leaving more CPU capacity for processing user's applications
- Firmware-controlled automatic power-up self-test to help ensure interface integrity
- Remote Forced Cold Load (FCL) over DS/1000-IV links
- Remote Virtual Control Panel access to A-Series DS/1000-IV network nodes
- Long-term communication line statistics and message logs available through user request via DS/1000-IV software to facilitate checks of line quality and to aid link troubleshooting
- HDLC interface for DS/1000-IV to DS/1000-IV communication links with microprocessor management of HDLC protocol, CRC-CCITT error checking, buffer management, DMA transfers, and modem control tasks
- Data rates to 257 Kbits/s
- HP 12007B supports synchronous full-duplex modems
- HP 12044A supports hardwired links up to 2.2 km (1.36 miles)
- HP 12044A optically isolated input breaks ground loops, maximizing noise immunity for direct-connect links

Functional Description

Onboard Microprocessor Offloads Host Computer

A powerful microprocessor on the HDLC network interface manages routine communications processing, freeing the host computer for applications-oriented tasks. Under control of onboard firmware, the microprocessor converts command words into actions, such as establishing the communications link and

loading/unloading data between the onboard buffers and the host CPU. The microprocessor also performs protocol generation and interpretation, error checking, and error recovery by retransmission, all without the attention of the host computer.

Numerous user-programmable parameters are available to tailor the interface to specific applications and configurations, which are also managed by the microprocessor. For example, the number of retransmissions of frames in error can be set by the user, or a default of 10 may be used. Frame size is accessible, as are controllable communication line timeouts to promote maximum use and efficiency of the communication links.

Interface buffer tasks, also microprocessor managed, include packing bytes into words for Direct Memory Access transfers to the host CPU and unpacking words into bytes for transmission.

Finally, on the HP 12007B interface, the microprocessor handles the synchronous modem control signals and is capable of setting additional modem control lines, such as Rate Select.

Firmware-Controlled Self-Tests

Onboard, firmware-controlled self-tests, performed at power-up, help to ensure reliable operation of the HDLC network interface and minimize troubleshooting time. These tests check out the RAM and ROM memories, the Direct Memory Access operations, baud rate generators, and the I/O parts of the communication interface.

Communication Line Statistics

Eleven long-term statistics are accumulated automatically and buffered on the interface. These statistics can be easily read by the user to help determine the quality of the communication line and to aid link troubleshooting. All statistics are cleared when read, facilitating use, since they are 16-bit unsigned integers (0-65535) that will roll over if not cleared or reset. The eleven long-term statistics are:

- Information frames correctly received
- Receiver Ready frames received
- Receiver Not Ready frames received
- Reject frames received
- Receive process overruns
- CRC errors
- Abort sequences received
- Receive buffer overflows
- SIO chip receiver overruns
- Frames with incorrect address field
- CMDR frames received

Remote Forced Cold Load Capability

The HDLC network interfaces support Remote Forced Cold Load (FCL) in which a remote HP 1000 A-Series Computer is forced to accept and run a new program load regardless of its current state. In this way, the HDLC interfaces and the HP 91750A software provide a capability that supports completely unattended remote DS/1000 nodes.

Remote A-Series Virtual Control Panel Capability

The HP 12007B and 12044A interfaces can be set to support Virtual Control Panel (VCP) access to an HP 1000 A-Series system from the system console at any remote, but adjacent, HP 1000 system in the same network. With VCP capability, an operator at the remote console can examine and change the contents of registers and memory locations, control execution of diagnostics and other programs, and select a bootstrap loader and initiate the boot-up of the A-Series system. By making possible a considerable degree of remote fault diagnosis and maintenance, this VCP capability greatly augments the support for completely unattended DS/1000 A-Series nodes.

HP 12007B Interface Signals *Table 1*

CCITT V.24	EIA RS-232-C	EIA RS-449	Source	Default	Function
104	BB	RD	DCE	None	Receive Data
103	BA	SD	DTE	None	Send Data
106	CB	CS	DCE	DCE dep	Clear to Send
105	CA	RS	DTE	F/W	Request to Send
108.2	CD	TR	DTE	F/W	Data Terminal Ready
109	CF	RR	DCE	DCE dep	Receiver Ready (Data Carrier Detect)
114	DB	ST	DCE	None	Send Timing (Transmit Clock)
115	DD	RT	DCE	None	Receive Timing (Receive Clock)
113	DA	TT	DTE	None	Terminal Timing
125	CE	IC	DCE	DCE dep	Incoming Call (Ring Indicator)
107	CC	DM	DCE	DCE dep	Data Set Ready
142	-	TM	DTE	DCE dep	Test Mode
141	-	LL	DTE	F/W	Local Loopback
140	-	RL	DTE	F/W	Remote Loopback
110	CG	SQ	DCE	DCE dep	Signal Quality
111	CH	SF/SR	DTE	F/W	Select Frequency/Select Rate
-	-	IS	DTE	F/W	In Service
-	-	NS	DTE	F/W	New Signal
119	SBB	SRD	DCE	None	Secondary Receive Data
118	SBA	SSD	DTE	None	Secondary Send Data
120	SCA	SRS	DTE	F/W	Secondary Request to Send
121	SCB	SCS	DCE	DCE dep	Secondary Clear to Send
122	SCF	SRR	DCE	DCE dep	Secondary Receiver Ready

Where: DCE dep = Depends on external DCE device and connection
F/W = Set by interface firmware

Functional Specifications

Communications

Interface Level:
EIA RS-232-C and EIA RS-449, CCITT V.28, V.10, V.11

Internally Clocked Data Rates: 300, 1200, 2400, 4800, 9600, 19200, 57600, and 230000 bits/second

Externally Clocked Data Rates: To 257,000 bits/second

Transmission Mode:
Full-duplex, bit-serial synchronous

Message Buffering: Seven frames in either direction (14 frames total, with up to 1024 bytes per frame) may be buffered using the 16 Kbyte onboard RAM memory.

Error Detection and Correction: Errors are detected using CRC-CCITT cyclic redundancy checking on all frames sent or received. The interface retransmits, or requests retransmission of all frames with errors to attain error-free data transfer. The maximum number of retransmissions may be user specified. If not user specified, the maximum number of retransmissions initiated by the interface defaults to 10.

Usable HP 12044A Data Rates and Direct Connect Cable Length: Usable direct connect data rate depends on the length of the cable used for data transfer, as shown below:

Data Rate to Cable Length:
257,000 (bits/second): 1.0 km (0.6 mi/3279 ft)
57,600 (bits/second): 2.2 km (1.4 mi/7218 ft)

Line Protocol: The HDLC network interfaces implement a superset of the High Level Data Link Control (HDLC) communications protocol, which is not suitable for general-purpose HDLC communications and should not be used for other than HP 1000-to-HP 1000 communications links in the DS/1000-IV environment.

European Licensing of HDLC Modem Interfaces

Hewlett-Packard has applied for FTZ licensing of the HP 12007B interface in Germany and GPO licensing in the United Kingdom. Consult your Hewlett-Packard sales representative on the status of FTZ or GPO licensing of these interfaces if such licensing is important to you.

Configuration Information

System Compatibility: The HP 12007B and 12044A interface cards, running under RTE-A operating system, are supported as follows:

Compatible Computers: HP 2137A, 2139A, 2156B, 2436A/E, 2437A, and 2439A.

Compatible Computer Systems: HP 2196C/D, 2197C/D, 2199C/D, 2486A, 2487A, and 2489A

Computer I/O Channels Required: One per HDLC network interface

European Modems: Contact local European HP sales office for information. European modems and interfaces should have approval of PTT in each country

Compatible U.S. Modems and Communication Lines: The HP 12007B interface is compatible with modems listed below. Strapping requirements and recommendations for U.S. modems used with the HP 12007B are given in the HDLC Firmware Installation Manual (P/N 5955-7694).

Connection via	Model	Maximum Synchronous Data Rate (bits/second)
Private Lines	Bell 201C	to 2400
	Bell 208A	to 4800
	Bell 209A	to 9600
	HP 37220T	to 9600
	HP 37230A	to 19200
Dial Up	Bell 212A	to 1200
	GDC	to 1200

Interface Current Required from Computer Power Supplies:

Interface	5 V	12 V	-12 V
12007B	2.6 A	0.35 A	0.18 A
12044A	2.4 A	0.31 A	0.04 A

Software Support: Operation of HDLC network interfaces is supported by HP 91750A DS/1000-IV software as described in the 91750A data sheet.

HP 12007B Installation: Set the interface configuration switch for baud rate, 128 or 1024 byte maximum buffer size, and forced cold load enable/disable. On the HP 12007B interface, set I/O address on the select code switches and VCP enable/disable. With power off, plug the interface into the computer I/O backplane, connect the supplied cable to the compatible customer-furnished modem, and integrate the interface card and HP 91750A software into the RTE-L/XL/A/RTE-IVB/ RTE-IVE/RTE-6 operating system.

HP 12044A Installation: Set the interface configuration switch for baud rate, 128 or 1024 maximum buffer size, and forced cold load enable/disable. On the HP 12044A interface, set I/O address on the select code switches and VCP enable/ disable. With power off, plug the interface into the computer I/O backplane, fabricate any necessary direct-connect extension cables, connect cables between the local and remote HP 12044A interfaces, and integrate the interface card and 91750A software into the RTE-L/XL/A/RTE-IVB/RTE-IV E/RTE-6 operating system.

Ordering Information

Note: The HP 12007B and 12044A interfaces are for use only in the HP 91750A DS/1000-IV environment for HP 1000-to-HP 1000 communication links. They are not general-purpose HDLC interfaces.

HP 12007B HDLC Network Modem Interface

The HP 12007B Interface includes:

12007-60002 HDLC Modem Interface; includes 5180-7233 Network Firmware ROM
5061-4914 5-meter (17 ft) RS-232-C Modem Interface Cable
5061-3425 RS-232-C Loopback Verifier Hood
5955-7694 HDLC Interface Installation and Reference Manual

HP 12007B Options

001 Adds updated firmware ROM
002 Substitutes 5061-4993 5-meter (17 ft) RS-449 Modem Interface Cable and 5061-4915 RS-449 Loopback Verifier Hood for HP 12007B Cables (P/N 5061-4914 and 5061-3425) listed above.

HP 12044A HDLC Direct Connect Interface

The HP 12044A Interface includes:

12044-60002 HDLC Direct Connect Interface; includes 5180-7233 Network Firmware ROM
5061-3422 5-meter (17 ft) Direct Connect Interface cables with a male connector
5061-4908 A 5-meter (17 ft) Direct Connect Interface cable with a female connector

Note: Together, the 5061-3422 and the 5061-4908 provide a complete link between local and remote HDLC direct-connect-interfaces, although extension cables (91712A/ 13A/14A) may be required.

5061-3421 Direct Connect Loopback Verifier Hood
5955-7694 HDLC Interface Installation and Reference Manual

HP 12044A Options:

001 Adds an updated firmware ROM
002 Deletes cables (5061-3422 and 5061-4908) and Loopback Verifier Hood (P/N 5061-3421) from the HP 12044A (for second HDLC direct-connect interface in a DS/1000-IV link)

Accessories:

HP 91712A Assembled 75-meter (255ft) Extension Cable with 24-pin connectors for DS/1000 direct connections
HP 91713A Pair of 24-pin Female Cable Connectors for user fabricated card-to-card direct-connect extension cable (cable P/N 8120-3096 not supplied)
HP 91713A Option 001 Pair of Edge Connectors for user-fabricated direct-connect cable (cable P/N 8120-3096 not supplied)
HP 91714A 300 meters of 8120-3096 Direct-connect Cable with 24-pin cable connectors and a connector kit for user-fabricated direct-connect extension cable

Note: HP cable is equivalent to Belden YR19169. No other cable is supported or has been tested.

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Parallel Interface

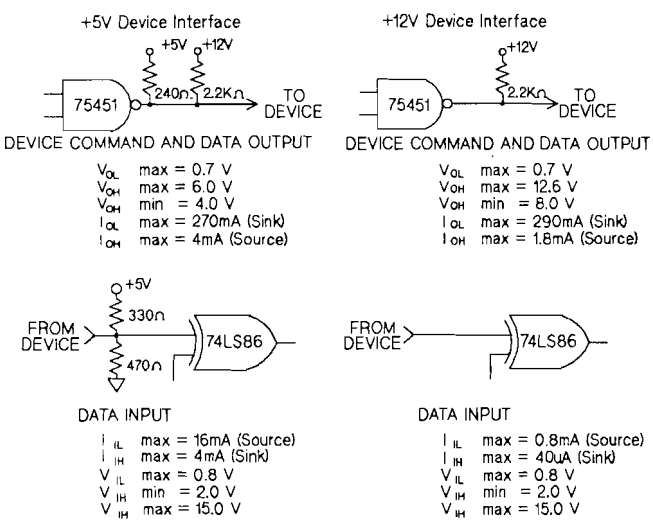
Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12006A

The HP 12006A is a multipurpose interface for 8- or 16-bit bidirectional data transfers between external devices and HP 1000 A-Series Computers and Systems.

Features

- TTL (+5 V) and +12 V interface compatibility
- Wide choice of programmable operating modes for easy use with instrumentation
- Separate 16-bit input and output storage registers
- Built-in DMA capability offering maximum data rates to 850 K words per second on inputs and 730 K words per second on outputs
- 8- or 16-bit operation with hardware packing of bytes into or from words
- Pin compatibility with HP 12566B/C interface used in other HP 1000 computers and systems



Functional Specifications

Data Transfer

Protocol: Transfers either 8 or 16 parallel bits at a time

High Logic Level Choices: TTL (+5 volt) is standard; removal of six resistor packages converts the interface to +12 volt level.

Byte Packing: For use with 8-bit devices, such as tape readers, tape punches, and some line printers, the interface may be programmed to automatically pack/unpack bytes into/from 16-bit computer words.

Device Command Sense Selection: The interface can be set to respond to either high-true to low-true device commands from the interfaced device for card/device synchronization.

Maximum Rate: The following transfer rates can be attained in a quiescent RTE-A environment with the HP 12006A interface in the highest priority position.

Input	Output
A600+ 850 K words/s	730 K words/s
A700 790 K words/s	650 K words/s
A900 740 K words/s,	500 K words/s

Typical CPU-to-CPU transfer rates will be less than 50% of the output rate.

Logic Levels and Circuits

Clocked Mode: The parallel interface supports a clocked mode in which data transfers to/from external devices are synchronized by a flag-to-device handshake that is clocked by the external device.

Transparent (asynchronous) Mode: The parallel interface can also be used to send data to or receive data from one or several devices, such as indicators or switches, that do not provide or use any type of clocking signal. Information is output to the destination devices exclusively under program control and input information may be read at any time.

Control and Status Bit Communication

Control Output: Four control bits may be sent to the interfaced device via an output control word for use as control, command, or address bits. For instance, they can be decoded to address any of 16 device registers or actions, or to address any of 16 devices connected to the same parallel interface.

Status Input: Four status bits may be received from the interfaced device via an input control word.

Direct Memory Access (DMA) Operation

DMA Accessibility: The HP 12006A can access memory under control of its I/O master processor, regardless of how many other interfaces in the system are also accessing memory via DMA.

Self-Configured, Chained DMA Mode: The I/O master processor on the HP 12006A interface supports a self-configuring mode of operation. In this mode, instead of interrupting the central process or after a block transfer, the I/O processor fetches a new set of control words for the next transfer. This process continues as long as additional sets of control words are available. Chained DMA transfer is particularly useful for storing several sequential scans of measurement channels from an instrumentation subsystem into memory, which can be accomplished without interrupting computations or other processing by the central processor.

Configuration Information

Computer and System Compatibility: The HP 12006A Parallel Interface is compatible with all HP 1000 A-Series computers and systems.

Connector Compatibility: The HP 12006A interface printed circuit cable connector is pin-compatible with the HP 12566B/C Microcircuit Interface, permitting direct substitution of an HP 1000 A-Series computer or system with the HP 12006A interface for an HP 1000 M/E/F-Series with HP 12566B/C interface.

Software Support: The HP 12006A interface is supported by RTE-A interface driver ID.5O.

Diagnostic Support: A diagnostic and a test hood for the HP 12006A interface are provided in the HP 24612A Diagnostic Package.

Installation: Set device command sense switch to appropriate level; set the interface's I/O address on the select code switches; turn off power to the computer and interfaced device; plug the interface into the computer backplane; connect an appropriate cable from the interface to the device; and integrate the interface driver into the operating system if that has not been accomplished previously.

Note: The I/O address setting of the interface select code switches is independent of the interface card's position in the computer backplane.

Electrical Specifications

Direct Current Requirements: Configured as a +5 V device interface: +5 V at 1.94 A; +12 V at 179 mA. Configured as a +12 V device interface: +5 V at 1.61 A; +12 V at 175 mA

Physical Characteristics

Dimensions: 28.9 cm long by 17.2 cm wide by 0.2 cm board thickness (11.4 in by 6.75 in by 0.06 in) with 1.0 cm (0.4 in) top-of-board parts clearance and 0.5cm (0.2 in) beneath-board clearance

Weight: 370 grams (13 oz) with mating connector

Ordering Information

The HP 12006A includes:

12006-60003 Parallel Interface Card
5061-3426 48-pin Connector Kit
12006-90001 Reference Manual

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Asynchronous Serial Interface

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12005B

The HP 12005B Asynchronous Serial Interface provides an asynchronous serial communications link between the HP 1000 A-Series Computer and RS-449, RS-422, or RS-232 compatible devices. The connection can be made through a fiber-optic or hardwire cable. Modem control signals through the hardwired cables are also available.

Features

- Fiber-Optic interface and 15-meter cable to minimize electrical interference
- EIA RS-232-C, RS-422, RS-423, and a subset of RS-449 compatibility
- Complies with European standard CCITT V.28
- Sixteen data transfer rates from 50 to 19.2 K baud
- 56 K baud data rate with external clock
- Choice of half-duplex, full-duplex, or echoplex operation
- Built-in DMA capability for optimum I/O efficiency
- Selectable special character recognition capability for termination of indeterminate length DMA transfers by an End of Transmission character
- Virtual control panel support
- Built-in framing error, overrun error, and parity error checking
- Hardware break detection
- Voltage level and current loop outputs
- I/O driver support with RTE-L/XL and RTE-A operating systems

Functional Specifications

Formats, Parity, and Format Control

Data Codes: 7-bit ASCII or 8-bit binary

Serial Data Transfer Format: Each 7-bit or 8-bit data code is preceded by a start bit, accompanied by an odd or even parity bit, and followed by one or two stop bits.

Parity Selection: Odd, even, or no parity

Stop Bit Selection: One or two stop bits

Interface Level

Complies with EIA Standard RS-232-C, RS-422, RS-423, and a subset of RS-449

Complies with CCITT Recommendation V.28

Transfer Rates

Interface Clocked Rates: 50, 75, 110, 134.5, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, 9600, and 19200 baud

Externally Clocked Rate: Up to 56,000 baud, with external clock signal (requires fabrication of an interface cable)

Character Buffering

Two characters

Teleprinter Interface

A 20 mA current loop interface is provided for interfacing to teleprinters; connection to this interface requires that a cable be fabricated for the device used.

Virtual Control Panel Support

The HP 12005B interface can be set to support a terminal which will function as the Virtual Control Panel of HP 1000 A-Series computers.

Direct Memory Access (DMA) Operation

DMA Accessibility: The HP 12005B can transfer data directly to or from computer memory. DMA control is performed on the card, reducing the overhead of handling DMA operations.

Termination of Indeterminate Length Transfers: Special hardware on the HP 12005B has the capability of monitoring the incoming serial data stream for the occurrence of a specific 7- or 8-bit pattern. This pattern can be used to terminate a DMA block data transfer of indefinite length.

Break Detection
Hardware on the HP 12005B monitors the incoming serial data stream for BREAK characters, which are defined as SPACES occurring over 12 successive bit times. When the line returns to a MARK condition, the computer is informed of receipt of the BREAK.

Configuration Information

Computer and System Compatibility: The HP 12005B Asynchronous Serial Interface is compatible with all HP 1000 A-Series computers and systems.

Software Support: The HP 12005B interface uses RTE-A interface drivers ID.00 and ID.01. RTE-A device drivers DD.00 (keyboard-display I/O) and DD.20 (minicartridge I/O) which will operate with ID.00 to support Hewlett-Packard terminals.

Modem Capability: The HP 12005B interface with RTE-A driver ID.00 and ID.01 is designed to be compatible with Bell Type 103 and 212 Data Sets and equivalent modems.

Diagnostic Support: A diagnostic test and test connector for the HP 12005B interface can be obtained by purchasing the HP 24612A A/L Systems Diagnostic Package.

Electrical Specifications

Direct Current Requirements: 1.6 A (+5 V); 0.145 A (+12 V); 0.11 A (-12 V)

Switch-Selectable Options:

- Operation as a virtual control panel
- Baud rate selection select code setting
- Stop bit selection (1 or 2) Parity sense (even or odd)

Physical Characteristics

Dimensions: 28.9 cm (11.4 in) long by 17.2 cm (6.8 in) wide by 0.16 cm (0.06 in) board thickness, with 1.0 cm (0.4 in) top-of-board parts clearance and 0.5 cm (0.2 in) beneath-board clearance.

Weight: 795 grams (28 oz)

Ordering Information

The HP 12005B includes:

12005-60012 Asynchronous Serial Interface
12005-90002 Installation and Reference Manual
5061-5798 15-meter Fiber-Optic Cable

HP 12005B Options:

001 Substitutes a 5-meter 5061-6604 filtered cable for 5061-5798 for interfacing to HP terminals using a 50-pin connector.

002 Substitutes a 5-meter 5061-6634 filtered cable for 5061-5798 for interfacing to terminals which require a 25-pin DB25P male RS-232-C DTE connector.

003 Substitutes a 5-meter 12005-60004 RS-232-C cable for 5061-5798 for interfacing to modems which require a 25-pin male connector.

004 Substitutes a 5-meter 12005-60005 cable for 5061-5798 for interfacing to HP terminals requiring a hooded connector.

005 Adds a fiber-optic interface, 5061-5800, for interfacing via fiber-optic cable to HP terminals having 50-pin connectors.

006 Substitutes a 48-pin edge connector kit (5061-3426) for 5061-5798.

Note: If the intended terminal does not include a built-in fiber-optic interface, **one** of options 1 through 6 ***must*** be ordered.

HP 12005B Signals *Table 1*

(PCA) J1	Signal Name	Signal Definition	RS-232-C	RS-449	Signal Source
A	GND				
1	GND				
B	IC(A)*	Incoming Call (A)	CE	IC	Device
2	RS(B)	Request to Send (B)	CA	RS	Interface
C	RIC	Used by Diagnostics Only			
3	RS(A)*	Request to Send (A)	CA	RS	Interface
D	TTYI	Teleprinter Input			
4	TTYI	Teleprinter Input			
E	RS(U)**	Request to Send (U)	CA	**	Interface
5	DRST	Reset Line Used by Diagnostics Only			
F	IC(B)*	Incoming Call (B)	CE	IC	Device
6	RDM	Used in Diagnostics Only			
H	RCS	Used in Diagnostics Only			
7	XTCLK	Clock from External Device (if any)(16X)			
J	+5 V	+5 to Terminal			
8	ECHOM	Used by Diagnostics Only			
K	SPC2	Used by Diagnostics Only			
9	SD(B)	Send Data (B)	BA	SD	Interface
L	RRR	Used by Diagnostics Only			
10	SD(A)*	Send Data (A)	BA	SD	Interface
M	TR	Terminal Ready	CD	TR	Interface
11	SBS	Stop Bit Select			
N	TTY+12	+12 to Teleprinter			
12	TTY+12	+12 to Teleprinter			
P	RDRCNTL	Reader Control (GND)			
13	RDRCNTL	Reader Control (GND)			
R	TTY-12	-12 to Teleprinter			
14	TTY-12	-12 to Teleprinter			
S	RD(B)*	Receive Data (B)	BB	RD	Device
15	SRD(A)*	Secondary Receive Data (B)	SBB	SRD	Device
T	TTYO	Output to Teleprinter			
16	TTYO	Output to Teleprinter			
U	RD(A)*	Receive Data (A)	BB	RD	Device
17	SRD(B)*	Secondary Receive Data (B)	SBB	SRD	Device
V	RR(A)*	Receiver Ready (A)	CF	RR	Device
18	RR(B)	Receiver Ready (A)	CF	RR	Device
W	SD(U)**	Send Data (U)	BA	#	Interface
19	MSB-	Most Significant Bit of Baud Rate Select			
X	CS(A)*	Clear to Send (A)	CB	CS	Device
20	NMSB-	Next to Most Significant Bit of Baud Rate Select			
Y	CS(B)*	Clear to Send (B)	CB	CS	Device
21	NLSB+	Next to Least Significant Bit of Baud Rate Select			
Z	DM(A)*	Data Mode (A)	CC	DM	Device
22	LSB+	Least Significant Bit of Baud Rate Select			
AA	DM(B)*	Data Mode (B)	CC	DM	Device
23	SSD	Secondary Send Data	SBA	SSD	Interface
BB	O/E	Optical/Electrical Select			
24	GND				

Notes:
* Indicates Differential Driver or Receiver used on this signal.
** Indicates Single-ended Driver used on this signal.
\# RS-449 recommends the use of Differential Drivers.

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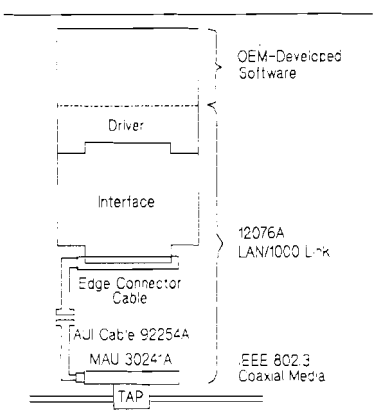
LAN/1000 Link and DDA

Technical Data

Local Area Network Interface Controller Product Numbers HP 12076A and 12079A

The HP 12076A LAN/1000 Link and HP 12079A Direct Driver Access (DDA) products provide the hardware, software, and documentation for customers to connect an HP 1000 A-Series computer to a local area network (LAN).

The LAN/1000 Link product provides the interface between an A-Series computer and an IEEE 802.3 local area network. The HP 12076A enables an A-Series computer to communicate with other A-Series computers at a 10 Mbits/second transfer rate along the network. The product consists of a printed circuit assembly, a card connector cable, an Attachment Unit Interface (AUI) cable, and an installation guide. Interface driver and node management software are structured to the RTE-A operating system (HP 92077A) version 4.1 or later. The figure below shows the 12076A as it connects to an IEEE 802.3 type 10Base5 backbone ("thick") coaxial cable. The product can also be connected to an IEEE 802.3 type 10Base2 ThinLAN ("thin") coaxial cable via an HP 28641A ThinMAU.



The 12076A can connect to Ethernet Rev. 1 baseband local area networks using an optional card connector cable. The LAN/1000 Link transmits and receives both IEEE 802.3 and Ethernet Rev. 1 type packets.

The LAN/1000 Link product provides the signaling layer and the media access control sublayer protocols as defined in the IEEE 802.3 and Ethernet Rev. 1 standards. This capability allows the interface to prepare packets for transmission by adding preamble and cyclic redundancy check (CRC), transmit packets according to link access protocol, receive incoming packets addressed to the node, and check them for correctness before transmitting them to the host CPU. The LAN/1000 Link also provides diagnostic and link management functions such as self-test, loopback, promiscuous mode addressing, and statistics gathering. Higher level protocols are handled by the host system.

The Direct Driver Access (DDA) product provides the necessary information to interface the user's customized networking software to the driver contained in the LAN/1000 Link product.

Features

- Direct Driver Access
- 10 Mb/s Burst Transfer Rate
- Single-card interface
- Frame size of 1500 bytes
- Operational compatibility with IEEE 802.3 and Ethernet Rev. 1
- Power (0.5 A at 12 V) for MAU
- Physical signaling layer and media access control sublayer
- 32 Kb of onboard RAM allowing buffering for both transmit and receive packets
- Interface adds preamble, Source Address, and CRC to transmit packets; strips preamble and CRC from receive packets
- Capable of receiving multiple back-to-back packets
- Provides for multicast, broadcast, and individual addressing
- Collection of Link Statistics (collided packets, bad packets, etc)
- Onboard loopback of transmit packets addressed to self
- Card configuration stored in nonvolatile memory
- Response packets for TEST and XID packets for specific DSAP
- Power-on self-test
- Environment: Class B
- EMC: will pass FCC, VDE level A

Communication Line Statistics

As packets are transmitted and received from the link, the interface firmware tabulates occurrences of particular events and returns these counts as statistics when requested. When reading the statistics, a user has the capability of resetting them all. Good received packets, good transmitted packets, good bytes transmitted, and good bytes received, are all 32-bit unsigned integers. All other statistics are 16-bit unsigned integers.

The following statistics are collected:

- Interface firmware revision code (not resettable)
- Total number of good bytes transmitted
- Total number of good bytes received
- Total number of good packets transmitted
- Total number of good packets received
- Total number of errors on transmit
- Total number of bad frames received
- Total number of times no heartbeat was indicated after a transmission
- Total number of times a packet was missed due to a lack of resources
- Total number of memory errors
- Total number of receive framing errors
- Number of packets discarded by driver (on card)
- The number of packets received with a CRC error
- 802.3 length field errors
- Total number of times the transmission of a packet was completed after 2 to 15 retries
- Number of times exactly one retry was needed to transmit
- Number of times any packet was deferred while trying to transmit
- Total number of underflow errors on transmit
- Number of times the interface detected a late collision on transmit
- Number of times the carrier was lost when transmitting a frame
- Number of times the transmission of a frame failed after 16 retries
- TDR information from last valid TDR

User-Configurable Address

Each interface is shipped with a unique link level (node) address. In order to allow the user the most flexibility, the nodal address may be changed from the factory set address. This is an important feature for OEMs who may want their devices to have specific addresses or may not have software which can be easily updated as nodes are moved around in the network.

Remote Forced Cold-Load Capability

The A-Series LAN interface supports Virtual Control Panel/Remote Forced Cold-Load modes of operation. Hence, the host may be downloaded and booted from a remote mode over the LAN.

Functional Specifications

General Characteristics

Topology: Bus

Network Medium: IEEE 802.3 type 10Base5 backbone ("thick") coax

Maximum Distance Between Nodes per Segment: 500 meters (excluding AUI cables)

Minimum Distance Between Nodes: 2.5 meters

Maximum Number of Nodes: 100

Maximum AUI Length: 42 meters

Transmission Characteristics

Transmission Mode: Baseband Digital

Access Methods: Carrier Sense Multiple Access with Collision Detection (CSMA/CD)

Impedance: 50 ohms

Environmental Characteristics

Temperature:
Non-operating: -40°C to +75°C (-40°F to 167°F)
Operating: 0°C to +70°C (32°F to 158°F)
Relative Humidity: 5% to 95% humidity

Electrical Specifications

Maximum Power Consumption: (+5 V) 3 A, 15 watts; (+12 V) 0.5 A, 6 watts (with MAU attached)

Ordering Information

HP 12076A LAN/1000 Link

The HP 12076A Standard Product includes:

12076-60001 PCA
A-Series LAN Unit
12076-63001 802.3 Card Connector Cable
12076-90001 Installation Manual
12076-90002 Node Manager User's Guide
30241-60102 Medium Attachment Unit
0362-0819 Coaxial Cable Tap Kit
92254A 6-meter FEP AUI cable

HP 12076A Options

001 Substitutes an Ethernet Rev. 1 Card Connector Cable for the standard IEEE 802.3 compatible cable. The option also deletes the AUI and MAU. Since there are grounding differences between the two types of hardware, it is important to distinguish the type of media hardware being used at a node. If the media access hardware conforms to Ethernet Rev. 1 then Option 001 should be ordered. Option 001 substitutes an Ethernet Edge Connector cable for the standard 802.3 compatible cable.

002 Update option which will delete everything except the latest firmware stored on EPROMs. Customers on support subscriptions will receive updates automatically.

241 Deletes the 6-meter FEP AUI cable and the Medium Attachment Unit.

Note: Software for Node Management interface and driver are incorporated into the RTE-A operating system (HP 92077A) version 4.1 or later.

The HP 12079A includes:

12079-90001 Driver Reference Manual

Ordering Related Products

HP 30241A Medium Attachment Unit can be ordered separately through HP Direct Marketing Division. This product is for attachment to 802.3 backbone "thick" coax cable only.
HP 28641B ThinMAU with integral 1-meter AUI cable is available through HP. This product enables the LAN interface to attach to an IEEE 802.3 type 10Base2 ThinLAN coaxial cable.

Attachment Unit Interface (AUI) Cables are available through HP Direct Marketing Division only. They come in various sizes up to a maximum length of 48 meters. There are PVC and Teflon cables available. PVC should be used when the cable will be installed in a conduit. Teflon (FEP) cable should be used when installing into ceilings and walls. Due to local and municipal codes, it is the customer's responsibility to determine proper cable selection. These AUI cables cannot be used with the HP 28641A ThinMAU.

IEEE 802.3 Coaxial Cable and Installation Kits are available through HP for both "thin" and "thick" coaxial cable environments. The lengths of the coaxial cable were determined to be the best to minimize impedance problems when connecting multiple cables.

Printed in the U.S.A.
5862-3675 M1093

HEWLETT® PACKARD

LAP-B Modem Interface Package

Technical Data

For HP 1000 A-Series Computer Systems Product Number HP 12075A

The HP 12075A is an interface for modem communication which implements the CCITT X.25 recommendation for physical interface (X.21 bis) and frame interface (LAP-B) levels. This interface provides access to packet-switching wide-area networks which use the X.25 interface standards.

The HP 12075A is used with HP 1000 A-Series minicomputers. It provides support for the internationally adopted full-duplex Link Access Protocol-Balanced (LAP-B) and handles all LAP-B protocol generation (including CCITT-compatible CRC error checking), onboard buffer management, and all modem control tasks. This interface operates in conjunction with HP 91751A DSN/X.25 and HP 91750A DS/1000 IV Software to allow higher-level user communication through a packet-switching network.

Features

- Meets international recommendations for physical and frame level CCITT X.25 packet switching networks
- Compatible with DSN/X.25 (HP 91751A)
- Onboard microprocessor off-loads the computer, making possible larger networks and leaving more CPU capacity for processing user's applications
- Onboard message buffering
- Firmware-controlled automatic power-up self-test
- Supports synchronous full-duplex modems
- LAP-B interface for communication link with microprocessor management of LAP-B protocol, CCITT-compatible CRC error checking, buffer management, DMA transfers, and modem control tasks

Functional Description

Onboard Microprocessor Offloads Host Computer

A powerful microprocessor on the LAP-B network interface manages routine communications processing, freeing the host computer for applications-oriented tasks. Under control of onboard firmware, the microprocessor converts command words into actions, such as establishing the communications link and loading/unloading data from the onboard buffers to the host CPU. The microprocessor also performs the protocol generation and interpretation, error checking and error recovery, all without the attention of the host computer.

Numerous user-programmable parameters are available to tailor the interface to specific network applications and configurations, which are also managed by the microprocessor. For example, the number of retransmissions of a frame before error recovery can be set by the user through HP 91750A network software. Maximum frame size and communication line timeouts, are accessible for optimizing efficiency of each communications link.

Interface buffer tasks, also microprocessor managed, include packing bytes into words for Direct Memory Access transfers to the host CPU and unpacking words into bytes for transmission. The microprocessor handles the synchronous modem control signals and is capable of setting or sensing additional modem control lines by software request.

Firmware-Controlled Self-Test

At power-up, an onboard, firmware-controlled self-test is performed to ensure reliable operation of the LAP-B network interface and minimize troubleshooting time. RAM and ROM memories, Direct Memory Access operations, baud rate generators, and the I/O drivers and receivers are tested.

Communications Line Statistics

Long-term statistics are accumulated automatically and buffered on the interface to assist in verifying the quality of the communication line and to aid troubleshooting. Statistics are:

- Information frames received
- Receiver Ready frames received
- Receiver Not Ready frames received
- Reject frames received
- Receive process overflows
- CRC errors
- Abort sequences received
- SIO chip receive overruns
- Receive buffer overruns
- Frames with incorrect address field
- FRMR frames received

Functional Specifications

HP 12075A Interface Signals
See table 1.

Communications

Interface Level: EIA RS-232, EIA RS-449, CCITT X.21 bis compatibility

Transmission Mode: Full-duplex, bit-serial synchronous

Internally Clocked, Programmable Data Rates: 300, 1200, 2400, 4800, 9600, 19200, 38400, 48000, and 57600 bits/second

Externally Clocked Rates: To 57.6 Kbits/second

HP 12075A Interface Signals *Table 1*

Signal	Source	Default	Function
RD	DCE	None	Receive Data
SD	DTE	None	Send Data
CS	DCE	DCE dep	Clear to Send
RS	DTE	F/W	Request to Send
TR	DTE	F/W	Data Terminal Ready
RR	DCE	DCE dep	Receiver Ready (Data Carrier Detect)
ST	DCE	None	Send Timing (Transmit Clock)
RT	DCE	None	Receive Timing (Receive Clock)
TT	DTE	None	Terminal Timing
IC	DCE	DCE dep	Incoming Call (Ring Indicator)
DM	DCE	DCE dep	Data Set Ready
TM	DCE	DCE dep	Test Mode
LL	DTE	F/W	Local Loopback
RL	DTE	F/W	Remote Loopback
SQ	DCE	DCE dep	Signal Quality
SF/SR	DTE	F/W	Select Frequency/Select Rate
IS	DTE	F/W	In Service
NS	DTE	F/W	New Signal
SRD	DCE	None	Secondary Receive Data
SSD	DTE	None	Secondary Send Data
SRS	DTE	F/W	Secondary Request to Send
SCS	DCE	DCE dep	Secondary Clear to Send
SRR	DCE	DCE dep	Secondary Receiver Ready

Where: DCE dep = Depends on external DCE device and connection
F/W = Set by interface firmware

Message Buffering:
14 Kbytes available for data buffering

Error Detection and Correction: Errors are detected using CCITT-compatible cyclic redundancy checking on all frames sent or received. The interface transmits, or requests retransmission of all frames with errors to attain error-free data transfer. The maximum number of retransmissions specified by the user.

European Licensing of LAP-B Modem Interfaces

Hewlett-Packard has applied for FTZ licensing of the HP 12075A interfaces in Germany and GPO licensing in the United Kingdom. Current status of licensing is available from local HP representatives.

Configuration Information

System Compatibility: for the HP 12075B LAP-B Network Interface.

Compatible Computers:
2137A, 2139A, 2156B, 2436A/E, 2437A, 2439A

Compatible Systems:
2196C/D, 2197C/D, 2199C/D 2486A, 2487A, 2489A

Computer I/O Channels Required: 1

Interface Current Required from Computer Power Supplies:

+5 V supply	2.6 A
+12 V supply	0.35 A
-12 V supply	0.18 A

Compatible U.S. Modems and Communications Lines:
The HP 12075A interface is compatible with the modems listed below. The LAP-B card supports standard RS-232-C compatible modems supplied by Transpac and Telenet at speeds up to 19200 bits/second. Strapping requirements and recommendations for U.S. modems used with the HP 12075A/12250A are given in the LAP-B Firmware Manual.

Connections, Modems, and Data Rates:

Connection via	Modem	Maximum Synchronous Data Rate
Switched Telephone Lines	Bell 212A	to 1200 bits/s
	Bell 201C	to 2400 bits/s
Private Lines	Bell 208A	to 4800 bits/s
	Bell 209A	to 9600 bits/s
	HP 37220T	to 9600 bits/s

Software Support: Operation of the LAP-B network interfaces is supported by 91751A DSN/X.25 and can be used with the 91751A and 91750A DS/1000-IV software.

European Modems: Contact local European HP sales office for information. European modems and interfaces should have approval of PTT in each country.

HP 12075A Installation: Set the interface configuration switch for baud rate. On the HP 12075A interface, set I/O address on the select code switches. With power off, plug the interface into the computer I/O backplane, connect the supplied cable to the compatible customer-furnished modem, and integrate the interface card and operating system.

Ordering Information

The HP 12075A includes:

12075-60001 A-Series Modem Programmable Serial Interface Assembly; includes 5180-7260 LAP-B Network Firmware ROM
5061-4914 5-meter (17 ft) RS-232-C Modem Interface Cable
5061-3425 RS-232-C Loopback Verifier Hood
5955-7696 LAP-B Interface Installation and Reference Manual

HP 12075A Options:

001 Deletes all updated firmware ROMs
002 Substitutes 5061-4993 5-meter (17 ft) RS-449 Modem Interface Cable and 5061-4915 RS-449 Loopback Verifier Hood for 5061-4914 and 5061-3425

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HEWLETT® PACKARD

ARPA Services/1000

Technical Data

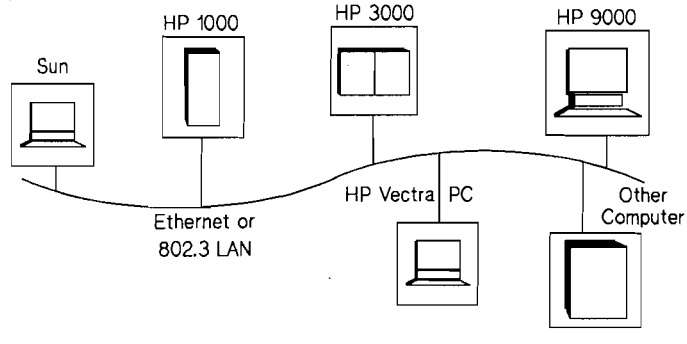
Product Number
HP 98170A/R

ARPA Services/1000 (ARPA/1000) provides industry-standard, multivendor networking on the HP 1000 over a high-speed Local Area Network (LAN). It provides an easy method of transferring files or logging on remotely between the HP 1000 A-Series and HP 9000, HP 3000, and other computers. Because ARPA/1000 uses protocols supported by most vendors, it can be used to connect to many HP and non-HP machines. It provides file transfer using the FTP protocol and virtual terminal service using TELNET. The transport and routing protocols are TCP/IP, and both Ethernet and IEEE 802.3 are supported for the LAN link.

Installation and operation of ARPA/1000 are oriented to customers who do not have extensive networking expertise. Its ease of use makes it suited for users who need to communicate frequently, while its economical price makes it cost-effective even for customers who only use it occasionally.

ARPA/1000 is intended primarily for customers who only need basic networking services (file transfer and virtual terminal). Customers requiring more sophisticated networking, like process-to-process communication or compatibility with DS/1000-IV, should consider the NS-ARPA/1000 product (P/N 91790A/R).

Figure 1



Multivendor Networking

Features

ARPA Services
ARPA/1000 runs on HP 1000 A-Series computers, and provides the following services, based on protocols developed for the U.S. Department of Defense Advanced Research Projects Agency.

- File Transfer:
  The File Transfer Protocol (FTP) is a general file utility for performing operations on remote files and directories such as transferring, deleting, renaming, and listing files. It implements RFC 959.
- Virtual Terminal/Remote Logon:
  The TELNET protocol enables users connected to a local computer to access a remote computer (via the LAN) as though their terminals were directly connected to it. TELNET is based on MIL-STD 1782.

Transport and Links
ARPA/1000 includes an underlying transport mechanism based on the following industry-standard and de facto protocols:

- Transmission Control Protocol (TCP) (MIL-STD 1778)
- Internet Protocol (IP) (MIL-STD 1777)
- Address Resolution Protocol (ARP) (RFC-826)
- IEEE 802.3 CSMA/CD Media Access Control
- Ethernet

Ethernet and IEEE 802.3 both operate over 50-ohm coaxial cable LANs. When communicating with another computer, ARPA/1000 automatically determines which protocol the other machine uses, and adapts accordingly. ARPA/1000 can communicate with Ethernet and IEEE 802.3 machines at the same time over the same or different LANs. Both thick and thin coax (IEEE 802.3 10Base5 and 10Base2) are supported. If the HP 1000 is connected to two or more LANs, ARPA/1000 will provide IP routing between them.

Diagnostics
Several diagnostic tools are included with ARPA/1000 and the LAN/1000 Link. These tools can be used to monitor the network, gather statistics, test remote nodes, and diagnose problems in both multivendor and HP environments. These tools include:

- Connection verification to other systems running TCP/IP (Ping).
- Link-level connectivity verification across the LAN (NM).
- A menu-driven utility to display network status and resource utilization (NETINF).
- Tracing and logging (for troubleshooting and network planning).

Detailed Description

File Transfer Protocol (FTP)
FTP offers a family of commands for performing file and directory operations over the network. A user can transfer ASCII or binary files to or from a remote machine; append, rename, and delete files; list, change, make, and remove directories; check status; and toggle switches to change the FTP environment. An online help facility explains the function and syntax of each command.

FTP is normally run from the operating system prompt (CI>) by typing commands at the terminal. However, it can also be driven from a command file and (through EXEC calls) can be invoked by another program, permitting automatic file transfers.

The FTP interface and command syntax are the same as in ARPA Services on the HP 9000 and most other UNIX® machines, making it easier for users to move between systems. For users more accustomed to RTE-A, the programmatic interface mentioned in the preceding paragraph can be used to simulate RTE commands, that is, RTE's "dl" instead of FTP's "dir".

TELNET Virtual Terminal
TELNET is an interactive network virtual terminal service based on MIL-STD 1782. It allows the user, via his or her terminal, to access another computer anywhere on

the network, as though the user's terminal were directly attached to it. The remote computer can be running an operating system other than RTE. For example, to log on to a remote host named "rnode," just type "telnet rnode" at the CI> prompt. The remote node will prompt you for your logon user name and password.

Once logged on, the user can issue commands and run most programs as if his or her terminal were directly connected to the remote machine. TELNET does not emulate a particular terminal type, and does not convert control characters. The remote computer and the application you are running must support the terminal you are using.

With Rev 5.24 and later, a Telnet user on the local system can run a block mode application on a remote HP 1000 system, as long as the local terminal or terminal emulator can handle block mode I/O.

In addition to passing data between your terminal and the remote machine, TELNET provides basic commands to make and terminate connections, determine status, and set and send escape and interrupt (break) characters. Online help provides the syntax and function of all commands. TELNET in ARPA/1000 is identical to TELNET in NS-ARPA/1000, and similar to TELNET on other machines. There is no programmatic interface.

Connectivity to Other Computers

ARPA Services have been implemented on more different machines than any other modern protocol suite. Most hardware vendors and many independent software vendors have ARPA implementations. ARPA/1000 is expected to communicate with most of these.

Configuration and Prerequisites

Computer

- HP 1000, A-Series

Required Hardware

- LAN/1000 Link (P/N 12076). Up to three simultaneous LAN cards are supported.
- At least 1.5 Mbytes of memory. This includes the memory required for RTE, ARPA/1000, and about five active user processes. Customers with large numbers of users, or large applications like IMAGE/1000, should contact their HP Systems Engineer for more specific requirements.

Required Software

- RTE-A, current version
- VC+ (CDS and MultiUser) must be installed.

Related Considerations

ARPA/1000 requires that Code and Data Separation (CDS) and MultiUser options, which are part of VC+, be installed. Users purchasing an "R" copy of ARPA/1000 for network nodes on which no software development is done can purchase the "E" copy of VC+, which is more economical than the "A" or "R" versions.

When ARPA/1000 is installed, RTE-A may only be configured ("genned") with a maximum of six pages of System Common. Therefore, user programs may not require more than six pages of labeled and unlabeled common, regardless of whether or not they utilize ARPA/1000.

Direct Driver Access (DDA) to the LAN/1000 Link card is supported with restrictions when ARPA/1000 is active.

Installation

Customer Responsibility

Customers purchasing ARPA/1000 must assume the following responsibilities. HP can provide expert assistance in all of them, but this is not part of the HP 98170A/R product.

- Install appropriate LAN facilities (cables, repeaters, connectors, etc) and establish link-level communications between the HP 1000 System and other machines on the network.
- One person in the customer's organization must be designated Network Manager. This person will assume responsibility for configuration and generation of the customer's systems, and will serve as focal point for Hewlett-Packard's support of the network.
- ARPA/1000 is a customer-installed product unless it is ordered with an HP 1000 system.

- Hewlett-Packard strongly recommends that the customer purchase support from Hewlett-Packard.

Ordering Information

ARPA/1000

The first copy of ARPA/1000 ordered by a customer must be HP 98170A. One processor option and one media option must be specified. Additional licenses for use of ARPA/1000 on other processors should be ordered as HP 98170R. Only a processor feature code should be specified, as the "R" copy does not include media or documentation. The "A" copy must always be ordered for (or upgraded to) the most powerful HP 1000 System using ARPA/1000. The ARPA/1000 options are listed below.

Prior to ordering ARPA/1000, the proposed network configuration must be reviewed and approved by a qualified HP technical representative.

HP 98170A ARPA/1000 Right-to-Use
HP 98170R ARPA/1000 Right-to-Copy

022 CS/80 Cartridge Tape Media
051 1600 bpi, 9-track Magnetic Tape Media
AAH DAT Tape Media
400 Use in A400 computer
600 Use in A600 computer
890 Use in A900 computer
894 Upgrade from A400 to A900
896 Upgrade from A600 to A900
990 Use in A990 computer
994 Upgrade from A400 to A990
996 Upgrade from A600 to A990
998 Upgrade from A900 to A990

Upgrade credits are only applicable when purchasing a license for ARPA/1000 on a larger HP 1000 System.

Documentation

One set of documentation (including binders) is included with HP 98170A (not HP 98170R). To obtain additional copies, order either or both of the following manuals from HP (binders must be ordered separately):

98170-90001 ARPA/1000 Node Manager's Manual
98170-90002 ARPA/1000 User's Manual

Related Hardware

ARPA/1000 requires the LAN/1000 Link product (HP 12076A) for connection to the LAN. This product includes the AUI cable and Medium Access Unit (MAU) IEEE 803.3 Type 10BASE5 for "thick" backbone coaxial cable. A MAU for IEEE 802.3 Type 10BASE2 ThinLAN coax is available from HP, as are LAN cables. For more information, see the LAN/1000 Link data sheet.

Related Products

This section lists Hewlett-Packard products that may be of interest to customers considering ARPA/1000. Listing of a product here does not imply that it can communicate with ARPA/1000.

Product Number	Product Name	Computer System
91790A/R	NS-ARPA/1000	HP 1000
91750A/R	DS/1000-IV	HP 1000
12079A	LAN/1000 Direct Driver Access	HP 1000
91751A/R	X.25/1000	HP 1000
92078A/R/E	VC+ System Enhancements Package	HP 1000

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NS-ARPA/1000

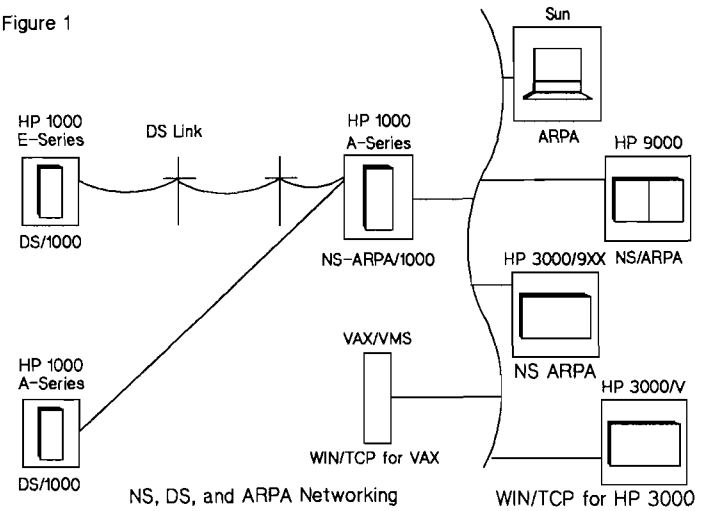
Technical Data

Product Number
HP 91790A/R

Network Services and ARPA Services for the HP 1000 (NS-ARPA/1000) provide multivendor networking to HP 1000 customers. NS-ARPA/1000 combines the high-level networking protocols of NS, backward compatibility with DS/1000-IV, and the industry-standard, multivendor networking services of ARPA.

NS-ARPA/1000 provides unparalleled connectivity between the HP 1000 A-Series processors, HP 3000, HP 9000, and other computers. The product is intended for a variety of networking applications, such as process-to-process communication, file transfer, virtual terminal, and DS-compatible services. For those applications requiring only basic multivendor applications (file transfer and virtual terminal), customers should consider ARPA/1000 (P/N 98170A/R).

Figure 1



Features and Benefits

NS-ARPA/1000 runs on HP 1000 A-Series computers, and provides the user with several key benefits:

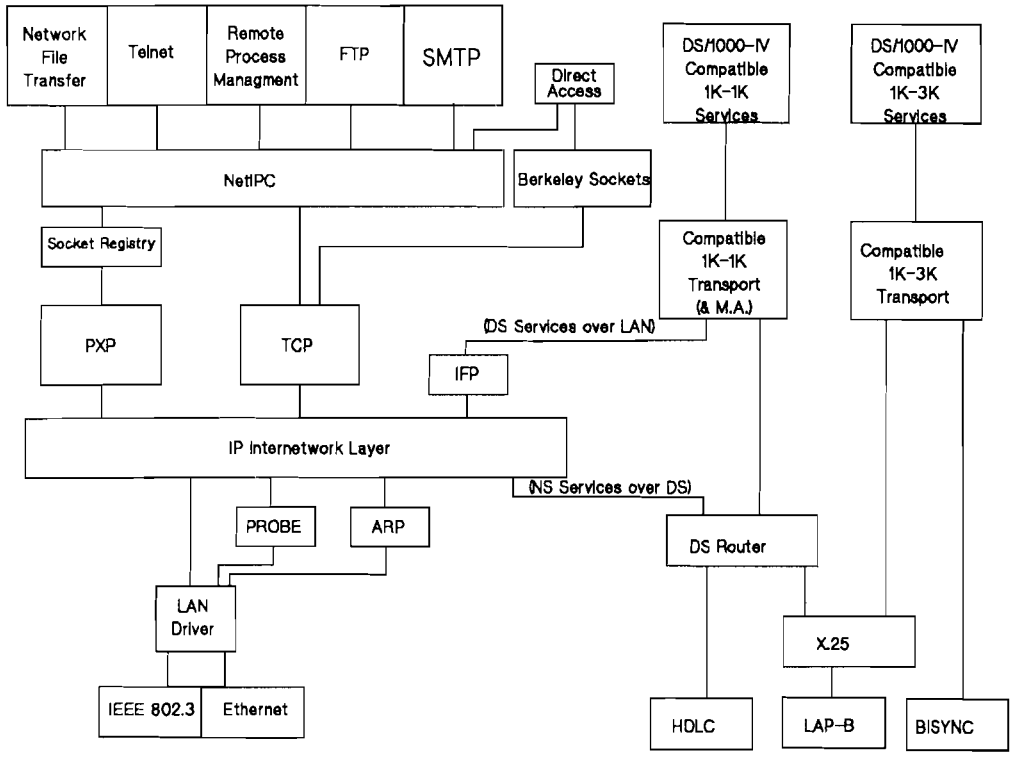
- High-speed, high-reliability communication from an HP 1000 A-Series computer to an HP 1000 F-Series, or to machines from several vendors including HP, DEC, Sun, and IBM. The result is easier and more cost-effective integration and implementation of distributed systems.
- An underlying transport mechanism based on industry-standard and de facto protocols. Such a basis increases connectivity and system integration possibilities. The NS-ARPA/1000 transport mechanism is based on the following:
  - Transmission Control Protocol (TCP) (MIL-STD 1778)
  - Internet Protocol (IP) (MIL-STD 1777)
  - Address Resolution Protocol (ARP) (RFC-826)
  - IEEE 802.3 CSMA/CD Media Access Control
  - Ethernet

- When communicating with another computer, NS-ARPA/1000 automatically determines which protocol (Ethernet or IEEE 802.3) the other machine uses and adapts accordingly. NS-ARPA/1000 can therefore communicate with Ethernet and 802.3 machines simultaneously over the same or different LANs. If the HP 1000 is connected to two or more LANs, NS-ARPA/1000 will provide IP routing between them.
- Several diagnostic tools which can be used to monitor the network, gather statistics, test remote nodes, and diagnose problems in both HP and multivendor environments. These tools include:
  - Connection verification to other systems running TCP/IP: PING
  - Link-level connectivity verification across the LAN:NM
  - A menu-driven utility to display network status and resource utilization: NSINF
  - Tracing and Logging (for troubleshooting and network planning)

Functional Description

NS-ARPA/1000 functionality is the result of combining the facilities of NS Services, DS/1000-IV Backward Compatible Service (and its transport), and ARPA Services, with industry-standard and de facto transport protocols. Figure 2 shows the internal structure of the NS-ARPA/1000 product.

NS-ARPA/1000



NS-ARPA/1000 Services

The services provided by NS-ARPA/1000 allows users to share information among computers supporting either DS, NS, or ARPA Services. Those services available on the HP 1000 System are Network InterProcess Communication, Remote Process Management, Network File Transfer, TELNET Virtual Terminal, File Transfer Protocol, and a variety of DS/1000-IV Backward Compatible Services. Table 1 shows which services are available over which links. Not all services operate on all links or on all systems.

Berkeley InterProcess Communication (BSD IPC) Application Program Interface.
NS-ARPA/1000 includes 4.3 BSD IPC developed by University of California at Berkeley (UCB). BSD offers a programmable interface to TCP/IP for multivendor connectivity to the systems with BSD IPC.

Network InterProcess Communication (NetIPC)
NetIPC provides direct programmatic access to the TCP/IP transport layers. This allows processes on different nodes to share data and send or receive messages. It consists of programmatic calls that can be used to identify and communicate with remote processes. Because the relationship between NetIPC processes is peer-to-peer rather than master-slave, its processes are more independent and flexible than DS/1000-IV Compatible Services' Program-to-Program (PTOP) communication. NetIPC also provides synchronous and asynchronous communication where PTOP only provides synchronous communication. The benefit of asynchronous communication is that a response is not needed before the next message is sent.

Network File Transfer (NFT)
NFT lets users copy files between any two NS nodes on a network. Files can be copied interactively or programmatically. Refer to the technical documentation for details of what features are available between different computer systems. NFT includes features for copying remote files, groups of files, or a variety of file types, translating file attributes, and accessing remote accounts.

Remote Process Management (RPM)
RPM consists of a set of programmatic calls for initiating and terminating remote processes. These calls will generally be used in conjunction with the NetIPC calls, allowing an entire distributed application to be controlled from a single system. Created processes may be independent (continue executing when the creation process terminates) or dependent (terminates when the creating process terminates).

File Transfer Protocol (FTP)
FTP, based on RFC 959, offers a family of commands for performing file and directory operations over the network. A user can transfer ASCII or binary files to or from a remote machine, append, rename, and delete files, list, change, make, and remove directories, check status, and toggle switches to change the environment. An on-line help facility explains the function and syntax of each command. Further information on FTP is available in the ARPA/1000 data sheet.

TELNET Virtual Terminal
TELNET is an interactive network virtual terminal service based on MIL-STD 1782. It allows the user, via his or her terminal and local computer, to access another computer anywhere on the network, as though the user's terminal were directly attached to it. The remote computer can be running an operating system other than RTE. With Rev 5.24 and later, a TELNET user on the local system can run a block mode application on a remote HP 1000 system as long as the local terminal or terminal emulator can handle block mode I/O. Further information on TELNET is available in the ARPA/1000 data sheet.

DS/1000-IV Backward Compatible Services on the HP 1000

DS/1000-IV Backward Compatible Services have been included in NS-ARPA/1000 to provide complete backward compatibility with DS/1000-IV. DS Services available include:

- Remote File Access (RFA)
- Distributed Executive (DEXEC)
- Remote 3000 Access (RMOTE)
- Remote Attach (REMAT)
- Program-to-Program Communication (PTOP)
- Remote Database Access (RDBA), part of IMAGE/1000 Service
- DS Transparency
- Remote System Download
- Remote Virtual Control Panel (VCP)

The DS/1000-IV Backward Compatible Services of NS-ARPA/1000 are the same as those offered by the DS/1000-IV product. Further information on DS/1000-IV and associated services is available in the DS/1000-IV data sheet.

NS-ARPA/1000 Transport Protocols

The NS-ARPA/1000 transport is based on the Defense Advanced Research Project Agency (DARPA) Transmission Control Protocol (TCP) and Internet Protocol (IP) standards.

TCP provides end-to-end reliable, connection-oriented services with flow control and multiplexing of connections. TCP also provides mechanisms for detecting duplicate, lost, or out-of-sequence packets.

IP allows network designers to implement large networks by interconnecting a series of smaller networks. IP then routes messages between the networks and performs any message segmentation and reassembly required. Segmentation and reassembly may be needed if a message must be routed through a network with different packet size restrictions than the source and/or destination network.

Link Interfaces

Use of NS-ARPA/1000 on the HP 1000 A-Series computer family requires one of the following link interfaces (see ordering section for product numbers):

HDLC Direct Connect Interface

The HDLC direct connect interface allows HP 1000 A-Series computers to communicate via the widely accepted, full-duplex High Level Data Link Control protocol. HDLC interfaces provide efficient communication particularly suited for applications requiring communication to one or two other processors with low computer overhead.

HDLC Modem Connect Interface

The HDLC modem connect interface allows HP 1000 A-Series computers to communicate via the HDLC protocol over synchronous, full-duplex modems. The HDLC modem connect interface supports dynamic rerouting around down nodes.

LAN/1000 Link Interface

The LAN/1000 link interface allows HP 1000 A-Series computers to communicate over an IEEE 802.3 or Ethernet LAN. The LAN/1000 Link allows an A-Series computer to communicate with other A-Series computers, as well as HP 3000, HP 9000, and other computers.

LAP-B Modem Interface

The LAP-B modem interface allows HP 1000 A-Series computers to communicate using the physical interface (X.25 bis, level 1) and the frame interface (LAP-B, level 2) of the CCITT X.25 recommendation.

Connectivity to Other Computers

ARPA Services and transports have been implemented on a wider variety of machines than any other modern protocol suite. Most hardware vendors and many independent software vendors have ARPA implementations.

Table 1: **Functionality from NS-ARPA/1000 to:**

Product	User Services	Link Type
NS-ARPA/1000	FTP, TELNET, NFT, RPM, NetIPC DS/1000-IV Services[1], BSD IPC	802.3/Ethernet, HDLC,LAP-B[2]
DS/1000-IV	DS/1000-IV Services	HDLC, LAP-B[2]
ARPA/1000	FTP, TELNET	802.3/Ethernet
NS3000/V	NFT, NetIPC DS/1000-3000 Services	802.3 LAP-B[3]
NS3000/iX	NFT, NetIPC, BSD IPC	802.3
DS/3000	DS/1000-3000 Services	LAP-B[3]
NS/9000	NFT, NetIPC,	802.3/Ethernet
LAN/9000	BSD IPC	802.3/Ethernet
ARPA/3000 FTP	FTP	802.3/Ethernet
ARPA/3000 Telnet	Telnet	802.3/Ethernet
ARPA/9000 & LAN/9000	NFT,NetIPC, BSD IPC	802.3/Ethernet
ARPA/9000 & LAN/9000	FTP,TELNET,NetIPC BSD IPC	802.3/Ethernet

Notes:
1. Remote Control Panel and Forced Cold Load are only available over HDLC to DS/1000-IV and NS-ARPA/1000 nodes.
2. X.25 can only be used as a Router/1000 link, not X.25 gateway.
3. DS/3000 X.25 Link only.

Product Requirements

Required Hardware

- An HP 1000 A-Series computer
- A minimum of 1.5 Mbytes of main memory
- One of the following data communication link products:
  - LAN/1000 Link (P/N 12076A)
  - HDLC Direct Connect Interface (P/N 12044A)
  - HDLC Modem Connect Interface (P/N 12007A/B)
  - BSC Modem Connect Interface (P/N 12073A)
  - LAP-B Modem Interface (P/N 12075A)

Software Requirements

- RTE-A, current version
- VC+ (CDS and MultiUser) installed
- A maximum of six pages of system common memory may be used with NS-ARPA/1000

Backward Compatibility with DS/1000-IV

NS-ARPA/1000 is backward compatible with DS/1000-IV running on other HP 1000 computers. All communication between A-Series computers running NS-ARPA/1000 and nodes running DS/1000-IV must utilize the DS/1000-IV Backward Compatible Services and HDLC or LAP-B Link interfaces.

Related Considerations

NS-ARPA/1000 requires that Code and Data Separation (CDS) and MultiUser options, which are part of VC+, be installed. Users purchasing an "R" copy of NS-ARPA/1000 for network nodes on which no software development is done can purchase the "E" copy of VC+, which is more economical than the "A" or "R" versions.

Application programs utilizing NFT, NetIPC, or RPM intrinsics must be compiled with the Code and Data Separation (CDS) option turned on.

When NS-ARPA/1000 is installed, RTE-A may only be configured ("genned") with a maximum of six pages of System Common. Therefore, user programs may not require more than six pages of labeled and unlabeled common, regardless of whether or not they utilize NS-ARPA/1000 services and features.

Direct Driver Access (DDA) to the LAN/1000 Link card is supported with restrictions when NS-ARPA/1000 is active.

Installation

Customer Responsibility
Customers purchasing NS-ARPA/1000 must assume the following responsibilities. HP can provide expert assistance in all areas, but this is not part of the 91790A/R product.

- Install approriate LAN facilities (cables, repeaters, connectors, etc.) and establish link-level communications between the HP 1000 and other machines on the network.
- One person in the customer's organization must be designated the Network Manager. This person will assume responsibility for configuration and generation of the customer's systems, and will serve as a focal point for Hewlett-Packard's support of the network.
- NS-ARPA/1000 is a customer-installed product unless it is ordered with an HP 1000 system.
- Hewlett-Packard strongly recommends that the customer purchase support from Hewlett-Packard.

Ordering Information

The first copy of NS-ARPA/1000 must be HP 91790A. One processor option and one media option must be specified. Additional licenses for use of NS-ARPA/1000 should be ordered as 91790R. Only a processor feature code should be specified, as the "R" copy does not include media or documentation. The "A" copy must always be ordered for (or upgraded to) the most powerful HP 1000 System using NS-ARPA/1000.

Prior to ordering NS-ARPA/1000, the proposed network configuration must be approved by a qualified HP technical representative. An ACN number is required to complete the NS-ARPA/1000 order. The NS-ARPA/1000 options are outlined below.

91790A NS-ARPA/1000 Right-to-Use
91790R NS-ARPA/1000 Right-to-Copy
022 CS/80 Cartridge Tape Media
051 1600 bpi, 9-track Magnetic Tape Media
AAH DAT Tape Media
400 Use in A400 computer
600 Use in A600 computer
890 Use in A900 computer
894 Upgrade from A400 to A900
896 Upgrade from A600 to A900
990 Use in A990 computer
994 Upgrade from A400 to A990
996 Upgrade from A600 to A990
998 Upgrade from A900 to A990

Upgrade credits are only applicable when purchasing a license for NS-ARPA/1000 on a larger HP 1000 system.

Documentation

Included with the HP 91790A are the following manuals:

91790-90020 NS-ARPA/1000 User/Programmer Reference Manual
91790-90030 NS-ARPA/1000 Generation & Initialization Reference Manual
91790-90031 NS-ARPA/1000 Maintenance and Principles of Operation Reference Manual
91790-90040 NS-ARPA/1000 Quick Reference Guide
91790-90045 NS-ARPA/1000 Error Message & Recovery Manual
91790-90050 NS-ARPA/1000 DS/1000-IV Services Reference Manual
5958-8523 NS Message Formats Reference Manual
5958-8563 NS Cross System NFT Reference Manual
91790-90060 NS ARPA/1000 BSD IPC Reference Manual

Printed in the U.S.A.
5862-3678 M1093

HEWLETT® PACKARD

DS/1000-IV

Technical Data

For HP 1000 Computers
Product Number
HP 91750A

Distributed Systems/1000-IV (DS/1000-IV) provides an integrated set of high-level network facilities and procedures for HP 1000 A-Series Computer Systems. These facilities and procedures support network resource sharing, remote database access, distributed data file management, communication between application programs, and the coordinated distribution of processor workloads to other HP 1000 Computer Systems in the network and/or to HP 3000 Systems with DS/3000.

The Network Transports

- Generalized Architecture with network-wide nodal addressing and store-and-forward capabilities
- Dynamic Rerouting between HP 1000 systems to bypass a "down" node or network link
- Transparent Message Accounting, which guarantees delivery of each message once and only once

The Network Links

- Communication with other HP 1000 nodes over HDLC links (hardwired or modem) or over X.25/1000
- Communication with HP 3000 nodes with DS/3000 or over X.25/1000
- DS/1000-IV modem interface cards with V.28 standard support for Europe

The Network Services and Features

- Remote command processing (REMAT) between DS/1000-IV network nodes
- Program-to-Program (PTOP) data exchange and control between DS/1000-IV nodes and between a DS/1000-IV node and a DS/3000 node in the network
- Remote RTE EXEC calls through DEXEC calls
- Remote I/O Mapping to direct device I/O to or from a device on any DS/1000-IV node
- Remote File Access (RFA) and transfer between a DS/1000-IV node and a neighboring DS/3000 node
- Remote access to IMAGE/1000 databases via REMAT or programmatically
- Remote command processing between a DS/1000-IV node and a neighboring DS/3000 node

Other Features

- Network transaction logging to analyze network problems
- Support for memory-based RTE-A nodes
- Support for forced cold load and remote VCP access (HDLC only)

DS/1000-IV Network Features

Generalized Architecture

Within a network of HP 1000 systems, each system is assigned a unique node identification number by the user. Remote operator commands and user program requests reference the node number of the node.

Nodal addressing with the store-and-forward capability establishes a single communication path between two nodes whether there is a direct connection or not. However, store-and-forward to or through an HP 3000 system is not supported.

Dynamic Message Rerouting (DS/1000-IV-to-DS/1000-IV)
In a network with alternate communication paths, DS/1000-IV supports dynamic rerouting of messages that are blocked by failure of a node or communications link. When a node or link failure is detected, the dynamic message rerouting software attempts to locate and set up an alternate communication path. If no alternate path exists, an error message is sent to the user. When the "down" communications path is brought back up, the original message routing is automatically restored. Dynamic message rerouting can be omitted from network nodes that cannot take advantage of it to minimize memory requirements.

Transparent Message Accounting (DS/1000-IV-to-DS/1000-IV)
In various applications such as process control, order processing, and stock reordering, it is critically important that each message is received once and only once by the user-level task to which it is directed. DS/1000-IV provides this assurance by setting up an end-to-end protocol that both prevents duplication of messages and retransmits messages lost due to severe line failure. In addition, the message accounting function makes channel status information available to the user. Because the message accounting function is optional, it can be used selectively for only those channels that require maximum reliability. This also could minimize memory requirements and CPU overhead for nodes in the network.

DS/1000-IV Communication Over X.25 Packet Switched Networks
DS/1000-IV can be utilized over public or private X.25 Packet Switched Networks. This connection to X.25 networks provides:

- Potential communications costs savings with X.25 connections (costs are proportional to the volume of data transmitted)
- Increased communications reliability inherent in X.25 Public Packet Switched Networks
- Increased network flexibility with fewer connections required for geographically dispersed networks
- Communication with HP 3000 systems connected via DS/3000 and X.25/3000 to X.25 networks

All DS/1000-IV features (except A-Series remote front panel, system download, and forced cold load) are supported over X.25 Packet Switched Network connections. The same DS/1000-IV user interface is maintained for all DS/1000-IV connections including point-to-point and X.25 Packet Switched Networks. This stable and common user interface allows programs to be written independent of network topology and particular transport layer utilized.

For operation of DS/1000-IV over X.25 Packet Switched Networks, the X.25/1000 Communicaton Software product (91751A) must also be purchased. X.25 is *not* bundled with 91750A DS/1000-IV. For more information on X.25/1000, refer to the 91751A data sheet.

Remote Command Processing, REMAT (DS/1000-IV-to-DS/1000-IV)
DS/1000-IV remote command processing feature makes it possible for a user at a local terminal to interactively access any HP 1000 system in the DS/1000-IV network via the nodal addressing and store-and-forward capabilities of DS/1000-IV. The local operator can use the entire RTE command set of the remote node as well as special network-oriented commands provided by REMAT, the DS/1000-IV remote command processor.

Remote Command Processing via the RMOTE Virtual Terminal Capability (DS/1000-IV-to-DS/3000)
The operator at an HP 1000 system can log on remotely to an HP 3000 system using RMOTE. The operator can then execute local HP 3000 MPE commands. The HP 1000 system thereby becomes a virtual HP 3000 terminal, gaining access to facilities, such as COBOL and QUERY/3000.

Remote Command Processing (DS/3000-to-DS/1000-IV)
An operator at an HP 3000 system using DS/3000 DSLINE or REMOTE commands can execute any RTE system command. This feature supports control of an unattended HP 1000 satellite system.

Program-to-Program Data Exchange, PTOP (DS/1000-IV-to-DS/1000-IV and DS/1000-IV-to-DS/3000)
Using high-level distributed system calls, a program at a DS/1000-IV node can initiate a data exchange with another program at a remote DS/1000-IV node or remote DS/3000 node. A program at the DS/3000 node can also initiate the PTOP exchange. Multiple PTOP exchanges can be active on the same network connection concurrently. In DS/1000-IV nodes, one program can communicate with more than one remote node concurrently.
In addition, PTOP intrinsics can be used to access and transfer records from remote IMAGE/3000 databases.

Remote RTE EXEC Calls, DEXEC
DS/1000-IV and DS/3000 programs can make EXEC calls to the RTE system at a remote DS/1000-IV node using DEXEC calls.

Remote I/O Mapping (DS/1000-IV-to-DS/1000-IV)
Remote I/O mapping is used in DS/1000-IV networks to transparently map any local unit record device to another unit record device anywhere in the network. In this way, messages that would normally be exchanged with a local terminal, printer, or magnetic tape unit can instead be exchanged with a similar device on another node. This can reduce overall network hardware and programming costs. Along with the forced cold load capability of HP 1000 computers, this enables unattended operation.

Remote File Access, RFA (DS/1000-IV-to-DS/1000-IV and DS/1000-IV-to-DS/3000)
High-level DS/1000-IV calls, analogous to standard RTE FMP or FS/3000 calls, can be used in HP 1000 or HP 3000 programs to define, access, control, and query the status of named files in a remote DS/1000-IV or DS/3000 node. In addition, standard FMP calls are able to access remote files as though they were local (File Transparency). This means that any application using the standard FMP file access calls can access files on a remote HP 1000 system.

Remote Database Access (DS/1000-IV-to-DS/1000-IV)
Remote QUERY access makes it possible for an operator to interactively access data in a 92069A IMAGE/1000 or 92081A IMAGE/1000-II database in a remote HP 1000 System. Command mnemonics and parameters are the same in remote or local access. The one exception is the RU, QUERY request issued from REMAT in the local system to the remote system. Remote access from programs is accomplished with similar ease and programs can access both 92069A and 92081A databases.

Network Transaction Logging (DS/1000-IV-to-DS/1000-IV and DS/1000-IV-to-DS/3000)
Transaction logging provides a powerful tool for analyzing and optimizing network traffic and isolating communications link faults. With this facility enabled, all message request and reply buffers are logged on disk or magnetic tape. This includes transactions between the local DS/1000-IV node and remote DS/1000-IV nodes and/or remote DS/3000 nodes.

Remote VCP Access (HDLC Only)

DS/1000-IV includes two programs that work through the 12007A/B or 12044A A-Series HDLC interface in a neighboring A-Series network node to give remote access to the Virtual Control Panel (VCP) program and also to monitor and display messages from the VCP program. With this capability, the remote operator can examine and change the contents of registers and memory locations, control execution of diagnostics and other programs, and select a bootstrap loader and initiate the boot of the neighboring A-Series System. Remote VCP access cannot take advantage of the store-and-forward capability of DS/1000-IV. For this reason, remote VCP access can only be from neighboring DS/1000-IV network nodes.

Remote DS/1000-IV Node System Generation

RTE-A or RTE-6/VM operating systems can be generated at a single DS/1000-IV node and distributed using REMAT and loaded locally. The same generation file can be sent to several RTE-A or RTE-6/VM nodes to be switched and if necessary, a slow boot can be performed. With disk-based RTE-A nodes, the generation file can be sent to the system disk using REMAT and later loaded from the local file. For memory-based RTE-A nodes, the generation file can be sent to a neighboring disk-based node and stored for later loading into the memory-based node. The generation file can also be downloaded from a nonadjacent node by using the store-and-forward capability of DS/1000-IV.

Remote DS/1000-IV Node Program Development

Program development for an entire DS/1000-IV network of HP 1000 systems can be accomplished at a single DS/1000-IV node. Programs can be developed on-line, relocated off-line, and loaded on-line to other RTE-A or RTE-6/VM nodes by operator command or program call.

Network Utilities (DS/1000-IV-to-DS/1000-IV)

Network utilities provide single-call programming for such network tasks as sending messages to remote DS/1000-IV nodes, retrieving local node numbers, copying files, and retrieving DS execution errors.

Remote Sessions Under RTE-6/VM

Remote access to a DS/1000-IV node with RTE-6/VM and Session Monitor is possible with the same control as a local session. Session Monitor access control requires all users, including remote users, to log on under a predefined user name with specific capabilities given by the system manager. All RFA, DEXEC, PTOP, and operator command access to a remote RTE-6/VM Session Monitor node thus requires a prior logon. REMAT commands are supported and can be used to remotely perform various program development and program testing tasks, or to remotely run applications. Because remote session commands are not supported, and because there is no REMAT-type support in DS/3000, HP 3000 virtual terminal access to a remote HP 1000 session is not supported.

Hardware Interfaces

Point-to-Point Communication

The 12825A and 12044A (direct connect) and 12007A/B and 12794A/B (modem) interfaces using HDLC protocol provide HP 1000 to HP 1000 connections. The HP 12793A/B and 12073A (modem) or 12834A and 12082A (direct connect) interfaces using binary synchronous protocol (BISYNC) to provide HP 1000 to HP 3000 connections.

The 12771A or 12773A interfaces provide direct connect or modem connections for backward compatibility to older 91740A (DS/1000) nodes.

X.25 Communication

The 12250A and 12075A interfaces provide LAP-B modem connection to X.25 Packet Switched Networks.

V.28 Standard Support for Modem Interfaces

All DS/1000-IV modem interfaces support the V.28 electrical signal interface standard for leased-line communications as specified by European PTTs. The V.28 compatible interfaces are as follows:

A-Series

- 12075A X.25/1000 interface
- 12007B DS/1000-DS/1000 interface

Software Requirements

All software must be at the most current version.

- RTE-6/VM (92084A) for an E/F-Series Computer
- RTE-A (92077A) for an A-Series Computer
- IMAGE/1000 (92069A or 92081A) if the remote database access feature is used

Memory Requirements for RTE-A Memory-Based Node

- RTE-A memory-based operating system
- A minimum of 256 Kbytes of memory
- An *additional* 256 Kbytes of memory for complete DS/1000-IV functionality
- A recommended amount of 512 Kbytes total for an RTE-A system with complete DS/1000-IV functionality

Memory Requirements for RTE-A Disk-Based Node

- RTE-A disk-based operating system
- A minimum of 90 Kbytes of memory
- An *additional* 100 Kbytes of memory for complete DS/1000-IV functionality
- A recommended amount of 256 Kbytes total for an RTE-A system with complete DS/1000-IV functionality

Memory Requirements for RTE-6/VM Node

- RTE-6/VM operating system
- A minimum of 110 Kbytes of memory
- A minimum of 120 Kbytes of memory with rerouting and message accounting
- A recommended amount of 256, 384, or 512 Kbytes total for an RTE-6/VM system with complete DS/1000-IV functionality; the amount depends upon how many DS/1000-IV programs reside in their partitions at the same time and how much swap and network response time needs to be minimized

Installation

Customer Responsibility

Customers purchasing DS/1000-IV must assume the following responsibilities. HP can provide expert assistance in all areas, but this is not part of the 91750A/R product.

- Install communication facilities (cables, modems, etc.) and their connection to the HP 1000 computer and establish successful communications between the HP 1000 and other computers on the network.
- One person in the customer's organization must be designated as the Network Manager. This person will assume responsibility for configuration and generation of the customer's systems, and will serve as a focal point for Hewlett-Packard's support of the network.

- DS/1000-IV is a customer-installed product unless it is ordered with an HP 1000 system.
- Hewlett-Packard strongly recommends that the customer purchase support from HP.

Ordering Information

The first copy of DS/1000-IV must be HP 91750A. One processor option and one media option must be specified. Additional licenses for use of DS/1000-IV should be ordered as HP 91750R. Only a processor feature code should be specified, as the "R" copy does not include media. The "A" copy must always be ordered for (or upgraded to) the most powerful HP 1000 that DS/1000-IV will be used on.

HP 91750A DS/1000-IV Right-to-Use
HP 91750R DS/1000-IV Right-to-Copy

022	CS/80 Cartridge Tape Media
050	800 bpi, 9-track Magnetic Tape Media
051	1600 bpi, 9-track Magnetic Tape Media
AAH	DAT Tape Media
400	Use in A400 Computer
600	Use in A600 Computer
890	Use in A900 Computer
894	Upgrade from A400 to A900
896	Upgrade from A600 to A900
897	Upgrade from A700 to A900
990	Use in A990 Computer
994	Upgrade from A400 to A990
996	Upgrade from A600 to A990
997	Upgrade from A700 to A990
998	Upgrade from A900 to A990

Upgrade credits are only applicable when purchasing a license for DS/1000-IV on a larger HP 1000.

Both the HP 91750A and HP 91750R include the 91750-80007 Communications Bootstrap Loader (CBL) ROM and manuals. The manuals are listed under "Documentation" below.

Documentation

The following manuals are included in HP 91750A/R:

91750-90006 DS/1000-IV Communications Bootstrap Loader Installation Manual
91750-90012 DS/1000-IV User's Manual for RTE-A and RTE-6/VM
91750-90013 DS/1000-IV Generation and Initialization Manual for RTE-A and RTE-6/VM
91750-90014 DS/1000-IV Theory of Operation and Troubleshooting Manual for RTE-A and RTE-6/VM
91750-90015 DS/1000-IV Quick Reference Guide for RTE-A and RTE-6/VM

DS/1000-IV on Older HP 1000 E/F-Series Computers

The current revision Base Set Instruction ROMS are required on HP 1000 E/F-Series computers shipped *prior* to November 1, 1980 with a serial prefix of 2043 or less. These ROMS are necessary for proper operation of the remote Forced Cold Load feature after a system halt over a DS/1000-IV line. These ROMS are available as the following products:

E-Series Base Set Instructions 12728H

F-Series Base Set Instructions 12728K

Printed in the U.S.A.
5862-3679 M1093

HEWLETT® PACKARD

Remote Job Entry-II (RJE/1000-II)

Technical Data

For HP 1000 Computer Systems Product Number HP 91781A

RJE/1000-II provides batch communications capability between HP 1000 computers and other computers emulating the widely implemented IBM 2780/3780 protocol.

- Up or downloading of jobs from a host computer
- Submission of jobs for remote processing
- File transfer to other computers emulating the 2780/3780 workstation
- Remote spooling of files

Features

- 2780/3780 emulation
- Up to 19.2 Kbps
- Greater than 90% line efficiency
- Less than 10% CPU overhead (even at 19.2 Kbps)
- Interactive use
- Programmatic use
- Automatic post-processor scheduling of user programs
- Background use
- Multiple users
- Disk file transfer
- File queuing
- Automatic data conversion (EBCDIC/ASCII)
- Bisync protocol (contention)
- Intelligent microprocessor-based I/O card
- Diagnostic utilities
- Communicates with JES2, JES3, and HASP II
- Communicates with accurate emulations of 2780/3780 workstations
- Switched (dial-up) or leased (dedicated) communication lines

Functional Description

2780/3780 Emulation
RJE/1000-II is a software package that lets HP 1000 E/F- and A-Series computers emulate the IBM 2780/3780 workstation. This product allows HP 1000 users to send and receive files (jobs) from remote job entry subsystems on IBM and IBM plug-compatible hosts. The job entry subsystems that are supported currently are JES3, JES4, and HASP II. Contact your support engineer for the latest list of supported job entry subsystems.

RJE/1000-II also enables HP 1000 users to transfer files with other computers that have accurately implemented the 2780/3780 protocol. This capability is supported on the HP 1000, HP 3000, and HP 9000 computers (RJE/1000-II only on the HP 1000 computers).

Interactive Use

RJE/1000-II allows users to interactively send and receive files using a set of powerful but simple commands. In addition, RJE/1000-II gives powerful diagnostic tools to trace and check status. Additional tools are provided to abort and route HP 1000 destinations for files which are already in transmission.

Custom Interface

RJE/1000-II may be invoked from a user's program. It will return status parameters to the calling program. This gives the user the flexibility to design custom interfaces to suit his own needs. Optionally, the user may write special programs that send and receive files via RJE/1000-II, allowing unattended operation. On completion of transmission RJE/1000-II can schedule a program to handle the file received. The program scheduled will run independently of RJE/1000-II and perform post processing upon received file; eg, route files to the appropriate device or program as required.

Flexible Usage

RJE/1000-II allows multiple users to send and receive files through one copy of executing code. The users may send multiple requests, which are queued up for transmission. Data files may be binary or ASCII. RJE/1000-II performs automatic data conversion of ASCII to EBCDIC for transmission; it also converts received data from EBCDIC to ASCII. Automatic queuing and data conversion provide a user-friendly interface.

Distributed Processing

RJE/1000-II uses a microprocessor-based intelligent I/O card to handle the bisync protocol to the host computer. This Programmable Serial Interface (PSI) card offloads much of the I/O handling and task scheduling, thus lowering CPU usage and increasing effective throughput.

Functional Specifications

Workstations

The following IBM workstations are emulated:

- 2780
- 3780

Remote Systems

The host computer must run with one of the following job entry subsystems using bisync contention protocol:

- JES2
- JES3
- HASP II

or

- HP 3000 with RJE
- HP 9000 with RJE, Series 300 only
- HP 1000 with RJE/1000-II

Please contact your SE for the latest list of supported systems.

Communications Link

The Communications Link must have the following features:

- Switched or nonswitched
- Up to 19,2000 bps
- 2780/3780 Protocol—(EBCDIC and Transparent line codes are supported, ASCII line code is not supported)
- Binary synchronous contention protocol
- Point-to-point lines

Modems Supported

Connection to the communications line is made through a modem obtained and installed independently of RJE/1000-II. One modem links the Programmable Serial Interface card in the HP 1000 and the communications line. Another modem connects the communications line to the host computer. The modems must be compatible with each other and must be strapped properly.

The following modems are supported:

- Bell 201C (2400 bps)
- Bell 208A (4800 bps)
- Bell 208B (4800 bps)
- Bell Dataphone II 2024 (2400 bps)
- Bell Dataphone II 2096 (9600 bps)

Modems operating at 19.2 Kbps may be used if they meet the following criteria:

1. Provide, transmit, and receive clocks for the PSI card
2. Ensure ground isolation between the communicating systems
3. Support the DTR, DSR, RTS, CTS, CD, and RI handshake signals

RJE/1000-II Commands

The following commands are supported by RJE/1000-II:

Command	Description
Send	Send a file to remote site
Route	Route file to another HP 1000 output (file classification)
Trace	Modify trace control and remote logfile
Status	Check status of monitor, PSI card, or data link
Abort	Stop data transmission or reception
Close	Drop data communications link and terminate

Product Requirements

- An HP 1000 E/F-Series or A-Series disk-based system
- RTE-6/VM for E/F-Series; RTE-A for A-Series (rev 2340 or later)
- PSI card (see hardware requirements for details)
- Switched or nonswitched bisync line to the host computer
- Matched compatible modems
- A supported job entry subsystem configured to emulate a 2780/3780 workstation
- Enough memory on the HP 1000 for work area, program area, memory area, and the operating system: 128 Kbytes minimum (66 Kbytes for RJE/1000-II plus 16 Kbytes per user)

Installation and Customer Responsibilities

Installation is not included with RJE/1000-II. It is the responsibility of the customer to install the product. HP will provide installation service at the prevailing service rates.

Installation of all communication facilities (cables and modems) and their connection to the HP 1000 computer systems for RJE/1000-II is the customer's responsibility.

The establishment of successful communication between the HP 1000 computer system running RJE/1000-II and the host computer is the customer's responsibility.

Prior to the customer's installation of RJE/1000-II on the HP 1000, the customer is responsible for installation of a switched or nonswitched bisync communications line between the HP 1000 and the host computer. This line must be matched with a pair of modems that are compatible with RJE/1000-II at each end of the line. The customer should verify the functioning of the line and modems.

Prior to installation of RJE/1000-II the customer should install the necessary host computer system software and hardware to support RJE/1000-II. The customer should ensure that the host software is compatible with RJE/1000-II and consistent with the specifications of RJE/1000-II. Modifications may prevent operation of RJE/1000-II. Hewlett-Packard does not warrant the successful operation of RJE/1000-II if modifications have been made.

Ordering Information

To order RJE/1000-II, the customer must order the PSI card and RJE/1000-II software.

RJE/1000-II Hardware Requirements

One of the following PSI cards must be used with RJE/1000-II, depending on the processor owned:

HP 12043A—A-Series

HP 12260A—E/F Series

RJE/1000-II Software Requirements

The RJE/1000-II software must be ordered with one of the processor options listed below:
91781A Right to use RJE/1000-II on HP 1000.

Must order **one** processor option and one media option

400 Use on A400
600 Use on A600

Customers using RJE (91780) may use this option to upgrade to **HP 91781A**

890 Use on A900
990 Use on A990

Media Options

022 7908/11/12/14 Cartridge
050 800 bpi Mag tape (E/F-Series only)
051 1600 bpi Mag Tape
AAH DAT Tape media

HP 91781R Right-to-Copy RJE/1000-II to one system.

Must order **one** processor option

400 Use on A400
600 Use on A600
890 Use on A900
990 Use on A990

Options to upgrade to higher end processors are also available. Please see your HP Sales Representative for more information.

Documentation

91781-90001 RJE/1000-II Reference Manual

Support Products

HP offers a spectrum of support service products to help plan, implement, operate, and manage your multivendor network throughout the network lifecycle.

For more information, contact your HP sales representative, or refer to the HP data sheets for specific support services.

Printed in the U.S.A.
5862-3680 M1093

HEWLETT® PACKARD

HP EtherTwist LAN Adapter Cards

Technical Data

Product Numbers
HP 27245A, J2405A, 27247B, 27252A, 27246A, 27248A

HP EtherTwist LAN adapter cards offer high performance for both client and server applications across a variety of backplanes (8-bit ISA, 16-bit ISA, 16-bit Micro Channel, and 32-bit EISA), at low prices that make networking attractive for all your systems.

High performance—
The EtherTwist LAN adapters are designed for high throughput and low CPU utilization. The cards have plenty of on-board memory for packet buffering—most have 32 or 64 Kbytes. The performance of the 16-bit cards rivals that of most 32-bit EISA cards.

Simplicity—
The 16-bit ISA cards have no hardware jumpers or switches to set; all settings are made in software. A two-step quick configuration screen ensures that all cards are installed, verified, and running in minutes.

Reliability—
The HP EtherTwist adapters give you trouble-free operation over the long term. These cards use the latest in application-specific integrated circuit (ASIC) chips and surface-mount technology (SMT) packaging. This results in fewer components than competing cards, and yields mean-time-between-failure (MTBF) ratings of 250 years and more. All cards are backed with a lifetime limited warranty.

Extensive Driver Support—
In addition to fast LAN adapters, HP provides the drivers that let you use these adapters with all major network operating systems: NetWare, LAN Manager, SCO UNIX®, LANtastic, and many others.

HP 27245A PC LAN Adapter/8 TP
Low-cost 8-bit ISA twisted-pair card for client computers

HP J2405A PC LAN Adapter NC/16 TP
Low-cost, high-performance 16-bit ISA twisted-pair card, optimized for clients

HP 27247B PC LAN Adapter/16 TP Plus
High-performance 16-bit ISA twisted-pair card for clients and, especially, servers

HP 27252A PC LAN Adapter/16 TL Plus
High-performance 16-bit ISA thin coaxial card for clients and servers

HP 27246A MC LAN Adapter/16 TP
High-performance 16-bit Micro Channel twisted-pair card for clients and servers

HP 27248A EISA LAN Adapter/32 TP
High-performance 32-bit EISA twisted-pair card for servers and power-user clients

Comparative Features	27245A PC LAN Adapter/ 8TP	J2405A PC LAN Adapter/ NC/16 TP	27247B PC LAN Adapter/ 16 TP Plus	27252A PC LAN Adapter/ 16 TL Plus	27246A MC LAN Adapter/ 16 TP	27248A EISA LAN Adapter/ 32 TP
Bus/width (in bits)	ISA/8	ISA/16	ISA/16	ISA/16	MC/16	EISA/32
Ports						
twisted-pair	•	•	•		•	•
BNC (thin coaxial)				•		
AUI			•	•		
Boot ROM socket						
LEDs	Link beat	Link beat Activity	Link beat AUI active Transmit Receive	BNC active	—	Transmit Receive
Warranty	lifetime	lifetime	lifetime	lifetime	lifetime	lifetime

Driver Support

The HP EtherTwist LAN Adapter Cards provide driver support for all major network operating systems. This support includes:

- **Novell NetWare 286**: client and server IPX (except J2405A card); 27247B and 27252A cards additionally provide server with AppleTalk Phase 1 and Phase 2 VAP
- **Novell NetWare 386**: client, requester, and server ODI; client IPX
- **Novell NetWare 4.0**: client and server
- **Novell LAN Workplace**: client ODI
- **Novell NetWare Lite** v1.0, v1.1: client ODI
- **Microsoft LAN Manager** v2.0, v2.1 for DOS 3.1 or later: NDIS 2.0
- **Microsoft LAN Manager** v2.0, v2.1 for OS/2 v1.x and v2.x: NDIS 2.0
- **HP LAN Manager**: NDIS 2.0
- **HP LM/X**: NDIS client
- **HP OfficeShare**: OfficeShare driver for 27245A and 27246A cards
- **Artisoft LANtastic**: AM21 driver for NC/16 card (J2405A)
- **3COM 3+Open** v1.1 XNS: NDIS 2.0
- **IBM LAN Server** v2.0, v2.1 (for OS/2 v1.x and v 2.x): NDIS 2.0
- **DEC Pathworks** v4.0: NDIS 2.0
- **SCO UNIX, Open Desktop, and Multiprocessor Extension**: hpi driver for ISA cards (27245A, 27247B, and 27252A), a2x driver for NC/16 card (J2405A), hpm driver for Micro Channel card (27246A), and hpe driver for EISA card (27248A)
- **Banyan Vines**: NDIS 2.0 client; native Vines driver for 27247B, 27246A, 27248A, and 27252A cards
- **FTP Inc. PC/TCP**: NDIS 2.0
- **FTP Inc. PC/TCP Plus**: Packet Driver (except 27248A card)
- **NCSA TCP/IP Services**, v2.3: Packet Driver (except 27248A card)
- **Hughes ProLINC**: NDIS 2.0
- **WRQ Reflections®**: NDIS 2.0

HP 27245A PC LAN Adapter/8 TP

HP 27267A PC LAN Adapter/8 TP 6-Pack

Features

- 8-bit ISA (AT) backplane connection.
- 32 Kbytes of onboard static RAM for buffering back-to-back packets.
- 8-pin modular (RJ-45) jack for 10BaseT connection.
- 6-pin modular (RJ-11) jack for integration with phone cabling.
- LED indicator for 10Base-T link beat signal.
- Extensive driver support.
- Lifetime limited hardware warranty.

HP J2405A PC LAN Adapter NC/16 TP

HP J2406A PC LAN Adapter NC/16 TP 6-Pack

Features

- 16-bit ISA backplane connection.
- Pipelined bus-master DMA architecture for market-leading performance.
- Integrated Transmit and Receive FIFO for packet buffers.
- Highly integrated hardware design for low cost and high reliability.
- Built-in NE2100 compatibility.
- RJ-45 jack for 10BaseT connection.
- Wide selection of interrupts (IRQs 3, 4, 5, 9, 10, 11, 12, 15).
- Full software configuration—no hardware jumpers or switches.
- HPNCSet utility for auto-configuration and diagnostics.
- LEDs for link beat and activity.
- Driver support for all major network operating systems.
- Lifetime limited hardware warranty.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 1314°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

HP 27245A:
Dimensions:
10.5 cm by 8.6 cm (4.1 in. by 3.4 in.)
Weight:
71 g (2.5 oz)

HP J2405A:
Dimensions:
15.9 cm by 8.9 cm (6.3 in. by 3.5 in.)
Weight:
85 g (3.0 oz)

Electrical Characteristics

HP 27245A:
0.65A @ 5 V typical;0.70A @ 5 V maximum
HP J2405A:
0.50A @ 5 V typical;0.70A @ 5 V maximum

Standards

Communications.
IEEE 802.3 Type 10BaseT
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity.
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

All HP EtherTwist LAN Adapters have a lifetime limited warranty.

Ordering Information

For PC LAN Adapter/8 TP
Order HP 27245A for single card; order HP 27267A for 6-pack

For PC LAN Adapter NC/16 TP
Order HP J2405A for single card; order HP J2406A for 6-pack

HP 27247B PC LAN Adapter/16 TP Plus

HP 27269B PC LAN Adapter/16 TP Plus 6-Pack

Features

- 16-bit ISA (AT) backplane connection.
- Large packet buffer (32 Kbytes) for back-to-back packets.
- Remote boot support for Novell NetWare 286 and 386, and for Microsoft LAN Manager.
- Dual-mode operation: shared memory or Rep I/0.
- Full software configuration—no hardware jumpers, or switches.
- RJ-45 jack for 10BaseT connection.
- Standard 15-pin AUI port.
- LED indicators for Transmit, Receive, Link Beat Status, Port Selected.
- Wide selection of interrupts (IRQ 3, 4, 5, 6, 7, 9, 10, 11, 12, 15).
- Easy-to-use configuration and diagnostic program (HPLANSet).
- Extensive driver support.
- Lifetime limited hardware warranty.

HP 27252A PC LAN Adapter/16 TL Plus

Features

- 16-bit ISA (AT) backplane connection.
- Large packet buffer memory (32 Kbytes).
- Remote boot support for Novell NetWare 286 and 386, and for Microsoft LAN Manager.
- Dual-mode operation: shared memory or Rep I/O.
- Full software configuration—no hardware jumpers or switches.
- BNC port for standard Ethernet thin coaxial connection.
- Standard 15-pin AUI port.
- LED indicator for Port Selected.
- Wide selection of interrupts (IRQ 3, 4, 5, 6, 7, 9, 10, 11, 12, 15).
- Easy-to-use configuration and diagnostic program (HPLANSet).
- Extensive driver support.
- Lifetime limited hardware warranty.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 1314°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

Dimensions:
15.9 cm by 8.9 cm (6.3 in. by 3.5 in.)
Weight:
85 g (3.0 oz)

Electrical Characteristics

0.75A @ 5 V typical;0.90A @ 5 V maximum

Standards

Communications:
HP 27247B: IEEE 802.3 Type 10BaseT
HP 27252A: IEEE 802.3 Type 10Base2
Emissions.
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity.
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

All HP EtherTwist LAN Adapters have a lifetime limited warranty.

Ordering Information

For PC LAN Adapter/I6 TP Plus
Order HP 27247B for single card; order HP 27269B for 6-pack

For PC LAN Adapter/I6 TL Plus
Order HP 27252A (single card)

For Boot ROM
(remote boot support): order HP 27260A for NetWare ROM; Order HP 27261A for LAN Manager R0M

HP 27246A MC LAN Adapter/16 TP

Features

- 16-bit Micro Channel backplane connection.
- 64 Kbytes of onboard static RAM for packet buffering.
- 8-pin modular (RJ-45) jack for 10BaseT connection.
- 6-pin modular (RJ-11) jack for integration with phone cabling.
- Extensive driver support.
- Lifetime limited hardware warranty.

HP 27248A EISA LAN Adapter/32 TP

Features

- 32-bit EISA backplane connection.
- High throughput and low CPU utilization.
- 64 Kbytes of onboard static RAM for packet buffering.
- Burst DMA transfer (33-Mbyte/s transfer rate.
- RJ-45 jack for 10BaseT connection.
- Standard 15-pin AUI port.
- LED indicator for Transmit and Receive signals.
- Extensive driver support.
- Lifetime limited hardware warranty.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 1314°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

HP 27246A:
Dimensions:
10.5 cm by 8.6 cm (4.1 in. by 3.4 in.)
Weight:
116g (4.1 oz)

HP 27248A:
Dimensions:
22.9 cm by 12.1 cm (9.0 in. by 7.8 in.)
Weight:
147 g (5.2 oz)

Electrical Characteristics

HP 27246A:
1.20A @ 5 V typical;1.40A @ 5 V maximum

HP 27248A:
0.90A @ 5 V typical;2.00A @ 5 V maximum

Standards

Communications.
IEEE 802.3 Type 10BaseT
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 1
Immunity.
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

All HP EtherTwist LAN Adapters have a lifetime limited warranty.

Ordering Information

For MC LAN Adapter/I6 TP
Order HP 27246A

For EISA LAN Adapter/32 TPs
Order HP 27248A

HEWLETT® PACKARD

Hewlett-Packard's Electronic Messaging Solution

Technical Data

Choice without Compromise...

Businesses today are entering a new era, where links between work groups, business partners, and global enterprises have become critical to ensuring business success. Decision makers depend on reliable communication systems to transport the right information to the right people, at the right time. Now more than ever, companies have turned to messaging systems as a means for that communication. Industry statistics confirm this trend. By 1995, for instance, the Electronic Mail Association predicts that nearly fifteen billion electronic messages will be transmitted by more than twenty-five million users each year.

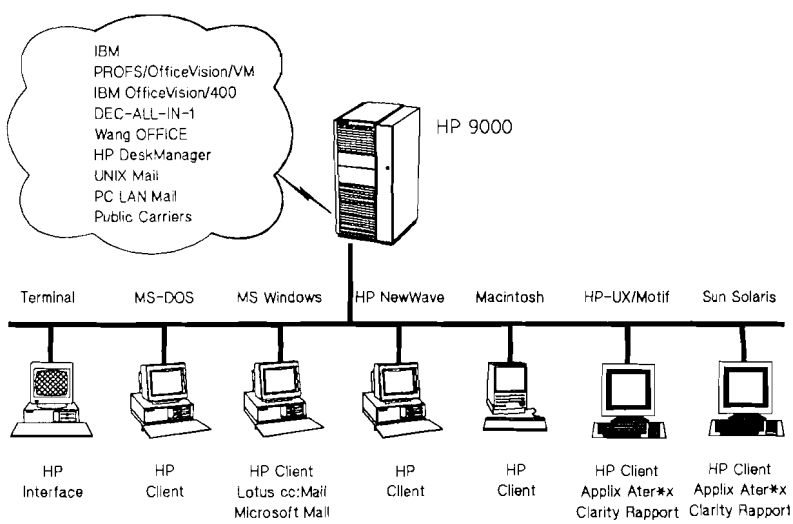
As companies prepare for the future, many are demanding greater flexibility and performance from this critical component of their enterprise. Often, however, they find that their mixture of legacy host/terminal and local-area network (LAN) based messaging systems do not meet their user's demands. These systems can't deliver the wide variety of data, text, voice, and image packages throughout their enterprise and across the world.

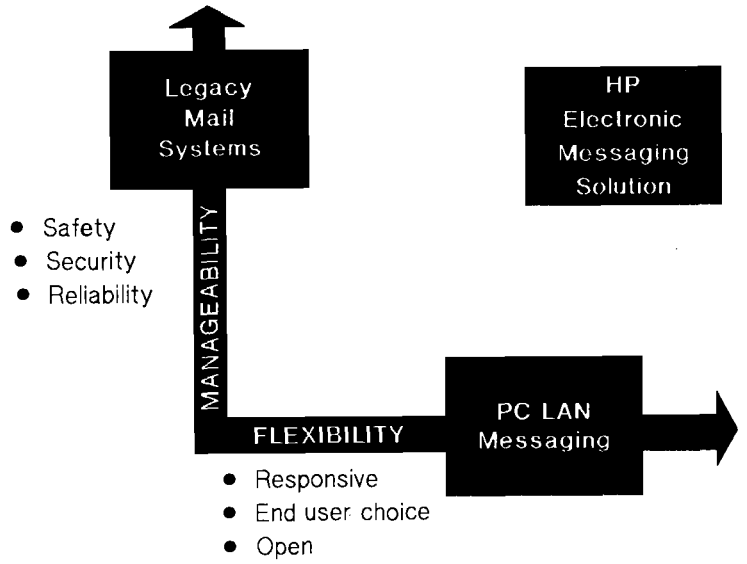
Their legacy based systems, while offering reliable service and centralized administration, lack flexibility and user choice.

Conversely, the LAN-based messaging systems found in many companies offer flexibility and user choice, but lack conformance to industry standards and robust management features. Both system types have created islands of information; barriers that slow or stop information flow.

As a consequence, users and administrators alike are looking for a messaging solution that bridges today's islands of automation, while creating an easily managed, safe, and flexible electronic highway for tomorrow.

HP Electronic Messaging Solution Topology





But choosing this messaging solution is a complex task. The solution chosen must solve today's problem while accommodating tomorrow's requirements as well. The existing technology investment in hardware, software, and training must be leveraged; and the new information technology must be easily integrated, managed, and upgraded.

HP's Cooperative Computing Solutions

Many companies are turning to HP's client/server computing to provide them with an integrated Electronic Messaging Solution that provides them with the flexibility, manageability, and safety that this mission-critical component of their enterprise demands.

Benefits

HP's Electronic Messaging Solution, based on HP OpenMail, HP X.400, and HP X.500, is a flexible and manageable UNIX® standards-based Cooperative Computing Solution. It offers the safety of single-vendor sponsored integration, consulting, and support. HP's Electronic Messaging Solution provides connectivity to all your local area network and legacy messaging systems, thereby enabling you to create a global messaging strategy that will ensure your business's competitiveness.

Our solution leverages your current investments in systems hardware, software, and user training while providing you with administrative tools that allow you to easily manage your messaging system.

Together, these qualities—flexibility, manageability, and safety—enable you to enjoy a substantial cost-of-ownership advantage over legacy and LAN-based messaging solutions.

Our Solution Is Flexible

As the provider of the top-rated commercial UNIX system, HP is well-known throughout the industry as a leader in standards-based systems. HP's client/server Electronic Messaging Solution allows you to choose your own clients, mail-enabled applications, transport, gateways, and conversion services. Thus our solution allows you to operate according to your particular business requirements and needs.

Our Solution Scales to Meet Your Company's Changing Needs

As your requirements for electronic information distribution grow and as the number and variety of users increases, you need a flexible solution that is scalable with processor size.

HP's Electronic Messaging Solution is capable of growing with your company and its needs. It can be sized to the messaging requirements of the largest enterprise or the smallest business unit.

Choice of Desktop Environment

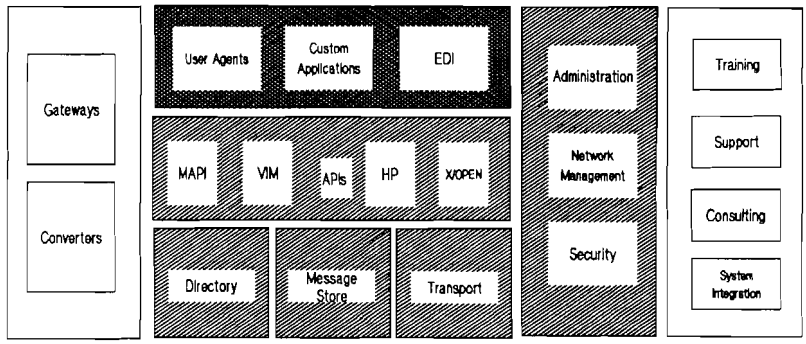
Ease of use and flexibility of choice are key requirements for end users. That's why HP's Electronic Messaging Solution provides support for common desktop platforms. What that means is that the choice of client, whether MS-DOS®, MS Windows®, UNIX, or Macintosh, is yours to make.

Because HP clients offer a similar look and feel across multiple desktops, you enjoy consistent user training and IT support throughout your enterprise.

In addition, you have a choice of industry-favorite clients. Hewlett-Packard's Electronic Messaging Solution allows your knowledge workers to choose industry leading, best-in-class desktop applications such as Microsoft Mail®, Lotus cc:Mail®, Applix Aster*x, and Clarity Rapport. Consequently, your users work with applications they are familiar with, and that provide the interface and functionality they require and expect in their work group environment.

Hewlett-Packard achieves this flexibility through our commitment and support for industry standard application programming interfaces (APIs), such as MAPI, X/Open, and VIM, that support international and adopted standard interfaces. That allows leading third party electronic mail and other messaging application developers to exploit the rich functionality of Hewlett-Packard's Electronic Messaging Solution.

HP Electronic Messaging Solution Architecture



The result? With HP's Electronic Messaging Solution, end users can continue to work with familiar, best-in-class desktop applications while IT departments provide the latest, standards-based, comprehensive messaging services that scale to support corporate wide network communications.

Choice of Mail-Enabled Applications

Many companies today are re-engineering their business processes, decentralizing their decision-making processes, and turning to group work.

Hewlett-Packard's Electronic Messaging Solution helps make group work a reality by providing the point of integration for mail-enabled applications. We provide this support in three ways.

First, we will support MAPI, X/Open, and VIM APIs. That means that you will be able to use any of your favorite VIM, MAPI, or X/Open mail-enabled desktop applications to take advantage of the store and forward capabilities of our Electronic Messaging Solution for guaranteed data delivery.

Second, our user agent and gateway APIs are being used to mail-enable client/server applications being developed by third-party software suppliers. For example, through one such implementation, users can maintain a personal calendar or diary, and schedule meetings, resources, and events across their enterprise.

Third, you can use those same APIs to mail-enable your own custom business applications, thereby facilitating person-to-application messaging, application-to-person messaging, or application-to-application messaging.

For example, with HP's Electronic Messaging Solution, your sales representatives can access a database to obtain current information electronically rather than accumulating piles of written literature; or an order processing system that detected an exception might mail or fax a report to a person for action.

Finally, your custom business application can submit and process orders within and between companies.

Choice of Gateways and Conversion Services

Because our solution natively supports X.400 and SMTP, most messages will flow easily across the enterprise. Users with existing messaging systems that don't support X.400 or SMTP needn't worry, however, because our solution offers you a choice of gateways to connect the many diverse mail systems found throughout the enterprise. As a consequence, users can concern themselves with their business document or message, not the kind of transport needed to deliver it.

With our fully tested and supported third-party gateway and conversion products and APIs, HP provides you with a powerful, flexible solution for interoperation with existing messaging systems.

Directory Services

With HP's directory, search mechanism services, directory synchronization, and look-up services, users can easily locate their intended recipient and distribute information to them without spending valuable time mastering specific addressing conventions, worrying about the recipient's messaging system, or even knowing how to spell the recipient's name.

Hewlett-Packard's Electronic Messaging Solution directory supports a wide range of fields (job title, phone number, and so on) thus facilitating user name resolution as well as integration with the directories of other messaging systems, so that our directory can act as the single corporate directory for your entire multivendor messaging environment.

Search Mechanisms

To make our Electronic Messaging Solution a versatile tool for users, we've provided a serial directory with the ability to do wildcard searching along with sophisticated probe algorithms to provide close matches to names entered by the user.

This sophisticated search mechanism is called soundex, or phonetic searching. In addition, an administrator can key a search field, thereby gaining increased performance on very large directories.

Directory Synchronization

Our directory synchronization allows users to send messages to anyone in the enterprise without the need to master arcane addressing conventions. Because the synchronization is automatic, you are also ensured that all addresses throughout your enterprise will always be up-to-date.

PhoneBook

Our Electronic Messaging Solution also includes PhoneBook, a lookup application that allows Microsoft Windows, Macintosh, and OSF® Motif® users to search information included in the directory. Users will find this "online phonebook" handy, not only to identify an addressee of an electronic mail message, but also to locate the telephone number, fax number, or mailstop of a fellow colleague.

Through these services and choices, HP's Electronic Messaging Solution provides the flexibility you need to leverage your existing systems, platforms, and user training and support. Our solution is also designed to grow with your enterprise as well.

HP's Electronic Messaging Solution not only provides you with the flexibility you have come to expect from your PC LAN messaging system; our solution also provides you with the power and manageability of the legacy mainframe system.

Our Solution Is Manageable

One key to reliable service is easy, centralized administration that doesn't require an army of extra computer support staff to keep it going. Hewlett-Packard's Electronic Messaging Solution provides you with powerful tools and resources that allow you to efficiently manage your global messaging solution.

OpenView Integration

Our client/server solution can be centrally managed with HP OpenView, the industry standard network and system management platform. By integrating HP OpenView with our Electronic Messaging Solution, we've enabled network managers to monitor distributed messaging servers, networking, and system processes from network maps on a single graphical workstation. Consequently, local administrative expertise is not needed at distributed or remote sites.

With HP OpenView, network managers can monitor their message store disk usage, message queues, and gateway status, as well as initiate administrative actions. Additional features let HP OpenView managers provide remote notification of process exceptions and resource constraints.

Powerful Administrative Tools

Administrative tools are an essential ingredient in keeping the communications network up and running. Hewlett-Packard's Electronic Messaging Solution provides not only routine administrative tools, such as maintaining user details, directory entries, and distribution lists, but also tools for remote administration, and remote task automation (using the messaging network to automatically kick off administrative processes on remote machines).

Additionally, HP's solution includes tools that provide exception reporting, and audit statistics for billing and for monitoring and designing network usage. These tools allow administrators to fix problems or configure and alter components (such as a specific gateway) without shutting the whole system down.

Preventative Maintenance

Hewlett-Packard's preventative maintenance software tools alert you to potential network problems before they affect performance. These tools enable administrators to set thresholds for critical success factors within the messaging network, thus allowing preventative action to be taken well in advance of a critical system crash.

To ensure message integrity, Hewlett-Packard's client and server components use a transaction-oriented protocol to communicate between PC and server, thus ensuring reliable transport. If any component fails, the system is in a position to detect that failure and recover completely. There is no chance that other users' data could be affected by such an event.

Troubleshooting Tools

HP's Electronic Messaging Solution troubleshooting tools provide you with the means to diagnose problems, and log system events and message traffic in order to test loopback of network links.

We've included queuing systems to ensure that data is never lost—even if links go down. Our exception reporting mechanisms alert administrators to failures in the system or long queues. Consequently, our Electronic Messaging Solution can detect anomalies such as message loops due to routing in a circle through the network.

People Mover

Electronic messaging users don't always stay in one place. In fact, users transfer between nodes on a network with some frequency. Each move used to mean additional work for the administrator, plus additional time. Now, however, users and their data can be moved easily with our Electronic Messaging Solution people mover utilities,

which enable administrators to move HP OpenMail users and their data easily and quickly between distributed nodes in the network.

Migration Services

HP's manageable Electronic Messaging Solution provides coexistence and migration services for the millions of current IBM PROF's and OfficeVision/VM users. We also offer migration planning, consulting, tools, and training to enable you to migrate messaging off the mainframe and onto our open systems backbone infrastructure. Using these tools, you can safely and quickly move user notelogs, intrays, and documents to HP OpenMail.

Safety

Hewlett-Packard's roots in the minicomputer market of the 1970s and the workstation and networking markets of the 1980s have created experience the company has brought to bear in creating our Electronic Messaging Solution. As an open systems-based computer manufacturer, Hewlett-Packard has, from the beginning, delivered solutions that cooperated with differing and often incompatible platforms—from the mainframe to the PC. This long experience has been tapped in creating Hewlett-Packard's Electronic Messaging Solution.

Our commitment to standards, from X.400 to DME, also ensures the safety of your investment and demonstrates our commitment to providing you with a messaging solution that will serve you well in the future.

Solution Support

Hewlett-Packard offers a wide variety of HP and third-party best-of-class messaging components from which to choose. Each component has been evaluated, pretested, integrated, and certified by Hewlett-Packard. Through its solution support partnerships, HP stands behind the full Electronic Messaging Solution. Thus you gain the flexibility of multivendor solutions that can be customized to your own business without sacrificing the safety and reliability that single-source solutions can offer.

HP Electronic Messaging: Choice without Compromise

Component	Product
Industry Favorite Clients	Applix Aster*x Clarity Rapport Lotus cc:Mail Microsoft Mail
HP Clients	MS-DOS MS Windows HP NewWave Apple Macintosh HP-UX Sun Solaris Terminals
Gateways and Convertors	Boston Software Works InterOFFICE SoftSwitch Central Worldtalk 400 Keyword KEYPak for the HP 9000 Systems Compatibility Outside In Denkart OpenMessage/OpenFax
Mail-Enabled Applications	JetForms Delrina Technology PerFORM PRO Dexotek Unison Beyond WinRules
Client/Server Networking	LAN Manager AppleTalk Novell Netware
Server/Server Networking	SMTP HP X.400
Platforms	HP-UX DEC ULTRIX Data General IBM AIX Sequent DYNIX / PTX SCO UNIX

Customizing Solutions to Fit Your Business

HP's Cooperative Computing Solutions work best when they are customized to meet your specific business needs. Our partnerships with key system integrators, and our own HP Professional Services Organization, ensure that the Electronic Messaging Solution you receive from us precisely fits your needs and requirements.

Transition to the Distributed Management Environment

Adding further credence to the safety of a Hewlett-Packard investment, Hewlett-Packard's Cooperative Computing Solutions will provide a transition path to the distributed management environment (DME). Management applications built on DME are expected to appear in mid-1995. HP is committed to providing the highest level of management capabilities to its customers while adhering to open standards, including DME. HP will continue its lead in providing application services management within a standards-based environment.

Meeting the Challenge

We think you will agree that our standards-based, fully scalable, flexible Electronic Messaging Solution provides organizations with the best solution to their current and future messaging needs. But key in any evaluation of a messaging solution is its value.

The benefit a solution provides compared with its cost is a measure of its true value to your company. Hewlett-Packard's Electronic Messaging Solution not only provides superior benefits, it also keeps the cost of ownership to a minimum. In fact, a recent Gartner Group study shows that Hewlett-Packard's solution can cost annually as little as $659 per user—a figure that compares well with the $1,336 per user annual cost the study found for a typical PC LAN messaging system.

Hewlett-Packard's client/server solution affords you choice without compromise. Because our Electronic Messaging Solution is flexible, your company can leverage current investments, integrate PC LAN environments, and reap the benefits of direct user connection. Because our solution is manageable your company has the power, safety, security, and reliability of the mini and mainframe.

Our solution also provides you with the safety of standards, open systems, and single-source integration, consulting, and support.

The flexibility, manageability, and safety of Hewlett-Packard's Electronic Messaging Solution gives you choice without compromise; making it today's best value in electronic messaging, and tomorrow's best bet.

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5091-8042E

HEWLETT® PACKARD

HP PC ARPA and Network Services for MS-DOS, Microsoft LAN Manager, and NetWare

Technical Data

Product Number
HP J2246A

HP PC ARPA and Network Services provide a PC running MS-DOS® with HP ARPA Services to host computers in a multivendor environment and HP Network Services to HP minicomputers. HP PC ARPA and Network Services can run on Microsoft® LAN Manager 2.1, 2.1a, and 2.2, NetWare ODI and NDIS, or as a standalone client networking product. This product also supports the Windows 3.X environment in all modes.

Note: The J2246A product combines the following products: HP Network Services 2.1/MS-DOS (D1811B), HP ARPA Services 2.1/MS-DOS (D1812B), HP Network Services 2.1 for Netware (D1819A), and HP ARPA Services 2.1 for Netware (D1823A).

For specifics on supported NDIS and ODI card drivers refer to the Product Requirements section.

HP Network Services provide a PC running MS-DOS with Network File Transfer (NFT), Terminal Access, and Network Interprocess Communication (NetIPC) to HP minicomputers. These services supply a complete and sophisticated set of communication facilities between the PC and the minicomputer, complementing Microsoft's LAN Manager and Novell's NetWare solutions. Also, PROBE is provided for HP 3000 Resource Sharing connectivity for Microsoft LAN Manager TCP/IP clients.

With HP ARPA Services, a PC running MS-DOS can communicate in a multivendor environment using the networking services defined by the Department of Defense Advanced Research Project Agency (ARPA) and Berkeley Software Distribution (BSD) UNIX® system.

Features and Benefits of the ARPA Services

- **File Transfer (FTP, MIL-STD 1780)**
  FTP is a family of commands for performing file and directory operations over the network. You can get or put files to a remote computer, using either ASCII or binary transfers. File transfers to HP 9000, HP 1000, HP 3000, Sun, DEC VAX, and IBM machines are supported.

- **Virtual Terminal (TELNET, MIL-STD 1782)**
  Teletype Network Protocol (TELNET) lets you use your local PC as a terminal to another computer on the network. The remote computer can be running UNIX or another operating system. A public-domain VT100 terminal emulator (Kermit) is included with this TELNET product. TELNET also supports HP AdvanceLink for DOS, HP AdvanceLink for Windows/NewWave, and compatible third party terminal emulators.

- **Berkeley Remote Commands (rcp, rsh)**
  Remote UNIX file copy (rcp) lets you copy files to or from your PC with a UNIX node over the network. Single files or whole directory tree structures can be copied in this way. Remote shell (rsh) lets you execute a command on a remote UNIX host.

- **Berkeley Sockets Run Time Development Support**
  Berkeley Sockets run time application support is included. Berkeley Sockets run time support, using the sockets interface provided with the HP PC Sockets Developer's Kit (D1827A), allow developers to create a program running on their PC that can communicate with a peer process running on another machine on the network. The Sockets Developer's Kit allows developers to create distributed Sockets applications in either the DOS or the Windows 3.0 and 3.1 environments.

  Note: The D1827A product is orderable by phoning 1-800-848-9283 or 303-353-7650 outside the U.S. This product only supports development to HP's sockets interface.

Features and Benefits of Network Services

- **Network File Transfer (NFT)**
  Network File Transfer allows a PC to transfer a file to or from an HP 3000, HP 9000, or HP 1000, or initiate a transfer between any two of these computers. The NFT operation uses the dscopy command, which can be issued from the keyboard or from within a program.

- **Terminal Access (VT)**
  Terminal Access provides a PC user with terminal access over the network to HP 3000s as if the PC were directly connected to the minicomputer. This terminal access uses HP AdvanceLink for DOS, HP AdvanceLink for Windows/NewWave, and compatible third party terminal emulators.

- **Network Interprocess Communication (NetIPC)**
  The NetIPC application program interface is fully supported by this product. With these interfaces, a number of distributed applications can use the processor power of the PC and the HP 3000, HP 9000, or HP 1000.

Other Features and Benefits

- **Supports Industry Standard TCP/IP Transport**
  Standards allow users to interoperate with other TCP/IP systems.

- **Internetting Support**
  This support allows PC users to access hosts locally on the network as well as remotely using the TCP/IP transport through routers and gateways. This allows users to access hosts anywhere in a TCP/IP based network.

- **Microsoft LAN Manager 2.1, 2.1a, and 2.2 support**
  Both Services can run on LM 2.1, 2.1a, and 2.2 clients and provide HP 3000 Resource Sharing connectivity ("net uses" on the HP 3000 Resource Sharing server) for Microsoft LAN Manager TCP/IP clients. PC clients can operate on Ethernet, Ethertwist (10BaseT), StarLAN10, and Token Ring based networks. (Refer to Product Requirements Section for NDIS drivers and cards supported.)

- **Netware 2.15c or later support**
  Both Services can run on Netware clients using NDIS or ODI MAC drivers. All ODI drivers must be ODINSUP compatible. PC clients can operate on Ethernet, Ethertwist (10BaseT), and Token Ring based networks. (Refer to Product Requirements Section for ODI drivers and cards supported.)

- **Microsoft Windows 3.0a and 3.1 and HP NewWave 3.0 and 4.0 Support**
  A Windows-based user interface to the Services, through dynamic link libraries, is also provided.

Product Requirements and Required Hardware

- **A supported PC with 640 Kbytes of memory (plus memory needed for the terminal emulator or application) from the following list:**
  - HP Vectra 286/12
  - HP Vectra 386/25
  - HP Vectra 486/25T
  - HP Vectra CS
  - HP Vectra ES 12
  - HP Vectra QS/16, 16S, 20
  - HP Vectra RS/16, 20, 20C, 25C
  - Compaq Deskpro 386/S, Model 60
  - Compaq Deskpro 386/25, Model 110
  - Compaq Deskpro 286, Model 40
  - Compaq Portable II
  - Compaq Portable III
  - IBM AT
  - IBM PS/2 (50, 50Z, 60, 70, 80)
  - IBM PS/2 (25, 30)
  - IBM PS/2 (30/286)

- **One of the following network interface cards to connect to the LAN:**
  Microsoft LAN Manager 2.1, 2.1a, and 2.2 Environment NDIS drivers for cards that are TCP/IP certified are supported. When NetBEUI is loaded those cards that are certified with LAN Manager over NetBEUI and Microsoft TCP/IP are supported.

MS-DOS Standalone or Netware Environment

The following table covers the support of NDIS and ODI drivers for cards that run in a MS-DOS standalone or Netware environment.

Note: HP has tested the interface cards listed below. Other Ethernet or Token Ring cards with NDIS or ODI drivers may work. HP support is only for the drivers and cards listed below.

AT Backplane Interface Card	Standalone NDIS	Netware NDIS	Netware ODI
HP 27250A ThinLAN	hplanb.dos (A.02.05)	same	hpisaodi.com v2.00 (920629)
HP 27210A/B ThinLAN	elnk.dos (1.1)	no	no
HP 27245A Ethertwist/8	hplanb.dos (A.02.05)	same	hpisaodi.com v2.00 (920629)
HP 27247A Ethertwist/16	hplanb.dos (A.02.05)	same	no
HP 27236A StarLAN10	elnk.dos (1.1)	same	no
HP 27240A StarLAN10 II	hplan.dos (A.02.00)	same	no
HP 27252A PCLAN TL Plus	hplanp.dos (A.00.00)	same	no
HP 27247B PCLAN TP Plus	hplanp.dos (A.00.00)	same	no
3Com 3C501 Etherlink	elnk.dos (1.1)	no	no
3Com 3C503 Etherlink II	elnkii.dos	same	3C503.com v1.22 (910614)
3Com 3C505 Etherlink Plus	elnkpl.dos	same	no
Western Digital/SMC EtherCard + WD8003E	smcmac.dos (1.19b)	same	smcplus.com v2.11 (920406)
NE2000 (Novell or Anthem/Eagle Tech)	no	no	ne2000.com v1.34 (910603)
IBM Token Ring Adaptors	ibmtok.dos (1.1)	no	token.com (1, 2, or 4/16) v1.12 (910614) (no 4/16)

MCA Backplane Interface Card	Standalone NDIS	Netware NDIS	Netware ODI
HP 27246A Ethertwist	hplan.dos (A.02.00)	same	no
HP 27241A StarLAN10	hplan.dos (A.02.00)	same	no
3Com 3C523 EtherLink	elnkmc.dos	same	no
Western Digital/SMC Ethercard + /A WD8003ET/A	macwd.dos (1.15b)	same	smcplus.com v2.11 (920406)
IBM TRN Adaptor/A and 4/16A	ibmtok.dos (1.1)	no	token.com v1.12 (910614)

Required Software

- DOS version 3.3, 4.01, 5.0, 6.0

Compatible Software Versions

- NetWare Version 2.15C or later. Netware clients must have NDIS or ODI MAC drivers. All ODI drivers must be ODINSUP compatible which means the driver works with LSL.COM version 1.2 or later.
- HP AdvanceLink for Windows/NewWave (Version A.03.14 or later), HP AdvanceLink for DOS (Version B.02.21 or later), or compatible third party product to provide terminal emulation. HP ARPA Services includes a public domain (Kermit) VT100 terminal emulator.
- Microsoft LAN Manager 2.1, 2.1a, or 2.2 Client
- Microsoft Windows version 3.0a or 3.1

Other Notes on Software Versions

This product does not support NFT and VT to a DEC VAX minicomputer (running Network Services for VAX, HP 50950A).

HP PC ARPA and Network Services is not supported with the following products:

- HP LAN Manager 1.X
- 3Com 3+Open
- Microsoft LAN Manager 2.0
- Microsoft LAN Manager using the DLC transport

Installation and Installation Support

HP PC ARPA and Network Services is a customer installable product. The customer can purchase installation from HP if desired.

Hardware Support Services

Provides customers with standard hardware support for their HP 1000, HP 3000, HP 9000, and HP PC hardware.

Software Support Services

HP Software Materials Update–Entitles the customer to receive updated software and documentation for any revisions to the product up to, but not including, the next upgrade.

HP ResponseLine Software Support–Provides all the services of HP BasicLine Software Support, plus unlimited access to the Response Center for problem resolution assistance.

Network Support Services

HP WireTest–Verifies the suitability of the customer's existing twisted-pair cabling for their network. By utilizing sophisticated tests, which quickly and accurately evaluate existing cabling, the customer can potentially save a substantial investment that would be required for rewiring.

Network Planning and Design–Provides customers with a comprehensive network strategy that supports their business objectives. HP Network consultants analyze the customer's communication requirements and create a detailed network design based on these requirements.

Network Startup–Provides customers with quick implementation of their network, a simplified service interface, verified network operation, and assured on-going supportability. Please refer to the HP Network Startup data sheet for more information.

NetAssure–Provides customers with fault isolation and assistance with problem resolution anywhere on their network. Please refer to the HP NetAssure data sheet for more information.

HP PCLAN–Provides Novell customers with a single source of support for NetWare and HP PC-based local area networks and personal computers and peripherals attached to the network.

Ordering Information

J2246A HP PC ARPA and Network Services for MS-DOS, Microsoft LAN Manager, and Netware

(Must order at least one option)
(Must order option 001 or 006 for 1 set of manuals and software)

Options

001 1 user license with manuals and software
002 Right-to-copy (RTC) for 8 additional users
003 RTC for 32 additional users
004 RTC for 128 additional users
005 RTC for 512 additional users
006 Upgrade from NS 2.1 (D1811B, D1819A), ARPA 2.1 (D1812B, D1823A), or NS LAN GW (D1807A); 1 user license with software and manuals
007 Upgrade from NS 2.1 (D1811B, D1819A), ARPA 2.1 (D1812B, D1823A), or NS LAN GW (D1807A); RTC for additional 1 user
008 Upgrade from NS 2.1 (D1811B, D1819A), ARPA 2.1 (D1812B, D1823A), or NS LAN GW (D1807A); RTC for additional 8 users
009 Upgrade from NS 2.1 (D1811B, D1819A), ARPA 2.1 (D1812B, D1823A), or NS LAN GW (D1807A); RTC for additional 32 users
010 Upgrade from NS 2.1 (D1811B, D1819A), ARPA 2.1 (D1812B, D1823A), or NS LAN GW (D1807A); RTC for additional 128 users
011 Upgrade from NS 2.1 (D1811B, D1819A), ARPA 2.1 (D1812B, D1823A), or NS LAN GW (D1807A); RTC for additional 512 users
012 Additional user manual

HP Commercial PC Software Support Services

H2015A+H00
HP ResponseLine
H2016A+S00 Software Material Update Service

Documentation

HP PC ARPA and Network Services includes:

J2246-90000 Installation Guide
J2246-90001 Error Messages and Troubleshooting Guide
J2246-90002 ARPA User Guide
J2246-90003 Network Services User Guide

Related Products

J2256A HP LAN Manager v2.2 for HP 9000 Series 700/800
J2240A HP NetWare v3.11 for HP 9000 Series 800
B1003C HP LAN Manager/X for the HP 9000 Series 300
B1011C HP LAN Manager/X for the HP 9000 Series 700/800
D1811B HP Network Services 2.1/MS-DOS
D1812B HP ARPA Services 2.1/MS-DOS
D1819A HP Network Services 2.1 for NetWare
D1823A HP ARPA Services 2.1 for NetWare
D1827A opt. 001 HP PC Sockets Developer's Kit 1.0
D2102B HP AdvanceLink for DOS
D2104C HP AdvanceLink for Windows/HP NewWave
Various HP NewWave Offices

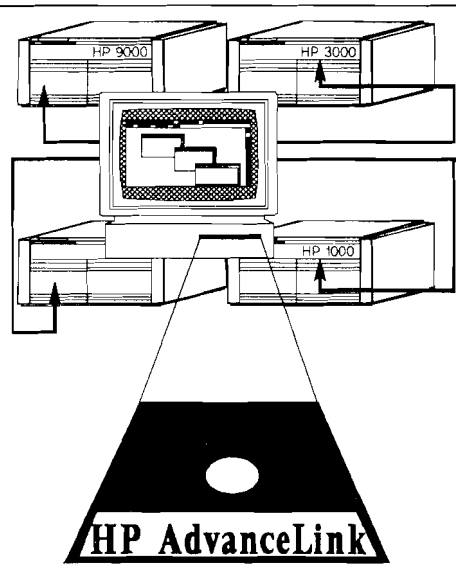
HEWLETT® PACKARD

HP AdvanceLink for MS-Windows and HP NewWave A.03.18

Technical Data

Product Numbers
HP D2104C, D2108C, D2114C, D2434C

HP AdvanceLink for MS-Windows® and HP NewWave is a comprehensive data communications product which enables you to integrate host/terminal applications with your client/server and personal computer applications. It provides emulation of HP and DEC terminals, allowing you to access and execute host software from your PC while in either MS-Windows or HP NewWave.



File Transfer

Fast, reliable file transfer simplifies the exchange of data between your PC and the host. AdvanceLink is supported on a variety of personal computers and supports Serial and LAN connections to the host computer.

Multitasking

HP AdvanceLink support of MS-Windows provides all the advantages of a graphical user interface, such as host connections via rescalable windows, pull-down menus and mouse usage to click on icons. The multitasking capability of MS-Windows permits you to establish multiple simultaneous host connections over Serial and LAN links.

Cut and Paste

Cut and paste support provides an even deeper level of PC to host application integration. Using the Cut and Paste commands from the menu box you can uplift data from one application and place in another application's Window.

DDE Support

Microsoft®'s DDE protocol enables you to set up automatic interactions between applications, one time transfers of information or ongoing conversations. HP AdvanceLink extends the range of DDE so that

you can exchange data not only with applications residing on your PC, but also with applications running on the host computer.

Command Language

Task automation through the extensive scripting language minimizes the work required to complete complex, frequent activities. Thus improving productivity and reducing training needs. TermTalk is HP AdvanceLink's command language providing over 150 commands, enabling you to create comprehensive scripts to, for example, log on users to applications and send, receive or print files.

HP NewWave

HP NewWave support provides further benefits beyond MS-Windows.
HP AdvanceLink can handle HP NewWave data objects, simplifying data transfer through Drag and Drop. The TermTalk scripting language has features in common with the Agent language and is able to invoke Agents.

HP AdvanceLink for MS-Windows

Features

Terminal Emulation

- HP 2392A
- HP 700/94
- HP 700/92
- HP ANSI
- DEC VT100

Display Features

- Scalable/fixed fonts
- Drag and drop of files or whole directories
- 26 line by 80 column display
- Support for 132 and 160 columns (directly displayed or scrolled, depending on monitor resolution)*
- Vertical and horizontal scrolling
- Support for alternate character sets
- Display enhancements: Inverse, Underline, Half-bright, Blink, Bold, Box and Security (non display)
- Display functions for visible control characters
- Support for function keys F1-F12
- Support for shifted function keys
- Multiple simultaneous sessions via serial or LAN connection
- Indicator icons for connection state, logging, keyboard lock, stop/go, script activity
- Virtual memory support
- Configurable display memory, up to 7200 lines
- Intelligent type ahead
- Log to directly connected or networked printer, clipboard or disk file
- Transmit only fields*
- Forms cache*
- Modified data tags*

* Supported only on the HP 700/94

File Transfer

- File transfer to HP 9000 or HP 3000
- XMODEM file transfer to HP 1000 and non-HP hosts
- Automatic calculation of blocksize for optimum performance
- Blocksize adjustable via TermTalk
- Data compression for faster transfer
- Support for 7 bit and sensitive networks
- Automatic character conversion for HP Roman8 for ANSI international characters

Command Language (TermTalk)

- English based, easy to use for non programmers
- Language compiler and interpreter
- Core language includes: user procedures, subscripts, unlimited variables, variable strings up to 32000 characters, arithmetic expression handling, string manipulation, logical operators, if/then/else instructions, looping, comments
- Language editor—files can be written, debugged and run within AdvanceLink
- Script encryption/decryption facility
- Host control facility—any TermTalk command can be issued from a host application through an escape sequence
- Scripts may be attached to function keys or a script menu for quick access
- Script recording—user can perform a task within AdvanceLink and a command file will be automatically created
- Conversion utility simplifies the translations of AdvanceLink for MS-DOS® command files for use with TermTalk
- Sample scripts

DDE Support

- Support for Microsoft's DDE in both client and server modes, allowing automatic one time transfers of data or ongoing conversations between applications
- DDE commands supported are: advise, request and poke; allowing an interface to TermTalk scripting and host application screen output.

HP NewWave

The following additional features are available when AdvanceLink is installed under HP NewWave:

- HP NewWave Agent task integration—an Agent can invoke a single TermTalk command, call a TermTalk file and TermTalk can invoke an Agent task
- Object handling—AdvanceLink can recognize and manipulate NewWave Objects as well as TermTalk containing Object Import and Export commands
- Drag and Drop—you can "drag" an Object across the desktop and "drop" it onto the AdvanceLink Connection Object to initiate file transfer. TermTalk can be used to create "drag and drop" command files to automate file transfer or other operations
- HP NewWave Help integration—you can invoke HP NewWave help from within AdvanceLink
- Baud rates from 300 to 19200
- Hayes compatible modem support
- Novell Netware to HP 3000 via HP Netware/iX or HP NS LAN gateway
- X.25 network via PAD 2334/5

Hardware Requirements

Host System:
HP 9000, HP 3000, HP 1000

Personal Computers:
HP Vectra, any 100% IBM compatible PC. 80386 or higher CPU is recommended.

Disk Drive:
One high density flexible disk drive and one hard disk drive.

Memory:
MS-Windows 3.0a/3.1 manages the memory usage of applications, HP AdvanceLink for MS-Windows will run in any memory configuration supported by MS-Windows 3.01a/3.1.

Monitor:
An EGA or VGA video adapter with a minimum of 128KB RAM. A color monitor is required for color graphics and text.

Software Requirements

Operating System:
MS-DOS 3.1 or later plus MS-Windows 3.0a/3.1, and for NewWave usage; HP NewWave 3.0/4.0/4.1.

Networking:

- Single LAN session to HP 3000 or HP 9000 via HP OfficeShare III*
- Multiple LAN sessions to HP 3000 via HP DOS Network Services 2.1
- Multiple LAN sessions to HP 9000 via HP LANManager HP DOS ARPA 2.1

* HP OfficeShare will require the presence of a PROBE server (at least one HP 9000 or HP 3000 running Network Services). If no PROBE is present then ARPA Services 2.1 must be installed on the PC.

Ordering Information

To order HP AdvanceLink for MS-Windows and HP NewWave, please contact your local HP sales office or HP Dealer.

D2104C HP Advance Link for MS-Windows and NewWave IBM format 5.25" and 3.5" disks, one set of manuals, and a license for a single user

D2108C HP AdvanceLink for MS-Windows and NewWave An upgrade from any previous version of HP AdvanceLink/ Windows/NewWave or AdvanceLink for MS-DOS to the current version. IBM format 5.25" and 3.5" disks and manual update

D2114C HP AdvanceLink for MS-Windows and NewWave Single Right to Copy License

D2434C HP AdvanceLink for MS-Windows and NewWave Single Right to Copy Upgrade License from any previous version of HP AdvanceLink/ Windows/NewWave or AdvanceLink for DOS to the current version.

Contractual Support Options

H2015A+H00
HP ResponseLine for commercial PC software. Telephone assistance for resolving problems with HP PC software and several popular third party software products, answering product usage questions and reporting software problems.

H2001+H00 HP ResponseLine for Commercial Systems Software. Integrated PC office option (#0F8) includes ResponseLine coverage for your HP PC operating systems and software products.

H2011+H00 HP ResponseLine for HP 9000 Systems Software. Integrated PC office option (#0F8) includes ResponseLine coverage for your HP PC operating systems and software products.

Network Capability—version A.03.18

Host Requiring HP Terminal Emulation	PC Connectivity	Protocol	AdvanceLink Connection to Select	Windows Modes Supported 3.0a	3.1
Any Host:	Serial Port	RS 232C	COM1-4	S,E	S,E
(HP 3000, HP 9000,	Serial Port	RS 422	COM1-4	S,E	S,E
HP 1000,	Int 14 Driver	—	INT 14 1-2	S,E	S,E
DEC VAX, UNIX)	Eicon Redirector	X.25	COM1-4	S,E	S,E
HP 3000	HP OfficeShare III	VT	AdvanceNet	E*	E*
	HP Network Services 2.0	VT	AdvanceNet	E	E
	HP Network Services 2.1	VT	AdvanceNet	S',E	S,E
HP 3000 with	HP ARPA Services 2.0	Telnet	BAPI	E	E
Wallongong	HP ARPA Services 2.1	Telnet	BAPI	E	S,E
ARPA Services	3Com LAN Manager	Telnet	BAPI	E	E
HP 9000	HP OfficeShare III	CVT Telnet	HP Telnet		E*
	HP ARPA Services 2.0	Telnet	BAPI	E	E
	HP ARPA Services 2.1	Telnet	BAPI	E	S,E
	3Com LAN Manager	Telnet	BAPI	E	E
	NetManage's NEWT	Telnet	NEWT Telnet	S,E	S,E
	Frontier's SuperTCP	Telnet	SuperTCP Telnet	S,E	S,E
Other UNIX or	HP ARPA Services 2.0	Telnet	BAPI	E	E
TCP/IP Systems	HP ARPA Services 2.1	Telnet	BAPI	E	S,E
HP 1000, Sun,	3Com LAN Manager	Telnet	BAPI	E	E
DEC, VAX,	NetManage's NEWT	Telnet	NEWT Telnet	S,E	S,E
Apollo, etc.	Frontier's SuperTCP	Telnet	SuperTCP Telnet	S,E	S,E

S = Standard Mode, S' = Standard Mode requires MS-Windows 3.00a, E = Enhanced Mode,
VT = Virtual Terminal, CVT = Character Virtual Terminal, * = Single LAN Session

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HEWLETT® PACKARD

HP AdvanceLink for MS-DOS

Technical Data

Product Number
HP D2102B

HP AdvanceLink for MS-DOS® is a comprehensive data communications product that enables you to integrate host/terminal applications with your client/server and personal computer applications. It provides emulation of HP and DEC terminals, allowing you to access and execute host software from your PC. Fast, reliable file transfer simplifies exchange of data between your PC and the host. Task automation minimizes the work required to complete complex or frequent activities, improving productivity and reducing training needs.

HP AdvanceLink is supported on a variety of personal computers and supports serial and LAN connections to the host computer.

HP AdvanceLink for MS-DOS, the original and best known member of the AdvanceLink family, provides monochrome and color graphics terminal emulation in addition to block mode alpha-numeric emulation, file transfer, and task automation. The other member of the family, HP AdvanceLink for MS-Windows and HP NewWave, is also available for these further two environments.

AdvanceLink for MS-DOS Features

Full block/line mode emulation of HP 2392A, HP 2393A, HP 2627A, including ANSI mode.

Display Features

- 26 line by 80 column display
- Horizontal scroll up to 160 columns plus vertical scrolling
- Support for all alternate character sets
- HP terminal display enhancements
- Display functions for visible control characters
- Programmable function keys
- Intelligent type ahead
- Forms cache
- Copy to disk—to copy the screen contents to any MS-DOS file
- Read disk—to display the contents of an MS-DOS file
- Color text (EGA/VGA screens)
- Logging to printer or disk file

Network Compatibility

- Direct RS-232-C or RS-422 connection via COM1, COM2, COM3, and COM4. (COM3/COM4 only supported using HP dual serial card.)
- Remote modem connection via internal or external modem (COM1/2 only)
- HP LAN Manager via HP DOS Network Services 2.0/2.1 (HP 3000)
- HP LAN Manager via HP DOS ARPA Services 2.0/2.1 (HP 9000)
- Novell NetWare to HP 3000 via HP NetWare/XL or HP NS LAN gateway
- HP OfficeShare via HP OfficeShare III
- X.25 network via PAD
- PBX switches and dial back security systems
- Eicon Technology X.25 network adapter card support for standalone or NetBIOS compatible LANs (including Novell and HP)

File Transfer

- PC to PC or host

- HP 3000 and HP 9000 computer (from HP-UX 8.0 onwards) data compression
- Labeled file transfer (up to 2000 bytes) with HP 3000
- Comprehensive PC backup with HP 3000 data compression
- File transfer to HP 9000 (with HP-UX 8.0 or later)
- Network transparency mode for efficient X.25 file transfers
- XMODEM for file transfer to non-HP hosts (e.g., DEC VAX)

Extensive Command Language

- Over 80 commands
- Command file encryption
- Remote computer control of AdvanceLink
- Program execution control
- Access to MS-DOS applications via "hot key"

Integration with HP NewWave

- Encapsulation provides iconic representation of AdvanceLink and its command files

Hardware Requirements

Host system
HP 3000, HP 9000, HP 1000RTE, or HP 260

Computer
HP Vectra, any 100 percent IBM compatible personal computer

Disk drive
One high-density (at least 720KB) and one low-density flexible disk drive, or one flexible disk drive and one hard disk drive

Memory
Minimum requirement (including MS-DOS 3.3) in alphanumeric mode is 270KB and, in graphics mode, is 430K

Monitor
An EGA or VGA video adapter (with a minimum of 128KB RAM) with color monitor is required for color graphics and text as well as 26 screen lines.

Software Requirements

Operating system
MS-DOS 2.1 or later
MS-DOS 3.3 or later is required for MS-DOS program execution from AdvanceLink

Networking
- HP LAN Manager via DOS Network Services 2.0/2.1 provides terminal access to HP 3000
- HP LAN Manager via DOS ARPA Services 2.0/2.1 provides terminal access to HP 9000, HP 1000RTE, and DEC VAX
- HP OfficeShare via OfficeShare III provides terminal access to HP 3000 or HP 9000

Ordering Instructions

To order the following products, contact your HP sales office or your local HP dealer.

MS-DOS Environment

D2102B AdvanceLink, single copy IBM PC format, 5¼-inch and 3½-inch disks

D2102-60001 Single user upgrade from any previous version of AdvanceLink/DOS

D2112B AdvanceLink single user license certificate

D2432B User license upgrade from any previous version of AdvanceLink for MS-DOS (68333L, 68333Q, 68333J, 68333S) to the current version (D2112B)> Single user license certificate only

Contractual support options

H2015A + H00
HP ResponseLine for commercial PC software; Telephone assistance for resolving problems with HP PC software and several popular third party software products, answering product usage questions, and reporting software problems.

H2001+ H00 HP ResponseLine for Commercial Systems Software;
OF8 Integrated PC office option (#OF8) includes ResponseLine coverage for your HP PC operating system and software products

H2011+ H00 HP ResponseLine for HP 9000 systems software; integrated
OF8 PC office option (#OF8) includes HP ResonseLine coverage for your HP PC operating system and software products

HEWLETT® PACKARD

HP EtherTwist Network Transceivers

Technical Data

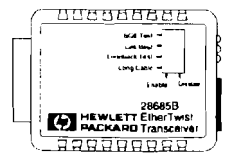
Product Numbers
HP 28685B, 28641B, 28683A

HP Transceivers allow network devices that have an AUI port to attach to standard Ethernet/IEEE 802.3 network cables. The transceivers come in three different models, for connecting to twisted-pair, thin coaxial, or fiber-optic cable. All three transceivers are compact devices that can attach directly to the AUI port of a LAN adapter, hub, bridge, router, or other network device. Each transceiver includes an AUI retainer, for making sure that the connections to the AUI port is secure.

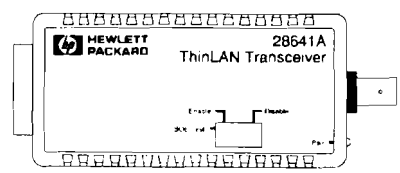
Common Features

The HP transceivers all do the following:

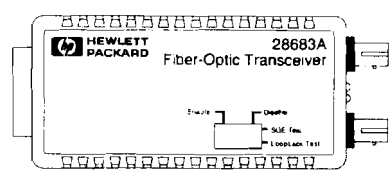
- Allow connection to standard network cables (twisted-pair, thin coaxial, or fiber-optic) for devices that support an AUI port.
- Provide an AUI connector, one other cable connector (twisted-pair, thin coaxial, or fiber-optic), and electronics in a compact, lightweight unit.
- Take power from the host device's AUI port (no separate power connection).
- Attach directly (no cable) to a device's AUI port. (Cable connection is possible where extremely tight clearances prevent direct attachment of the unit.)
- Support both Ethernet and IEEE 802.3.
- Operate transparently to network operating system (NOS) software.



HP 28685B EtherTwist Transceiver for adapting an AUI port to twisted-pair cable



HP 28641B ThinLAN Transceiver for adapting an AUI port to thin coaxial cable



HP 28683A Fiber-Optic Transceiver for adapting an AUI port to fiber-optic cable

Comparative Features

	HP 28685B EtherTwist	HP 28641B EtherTwist	HP 28683A EtherTwist
Ports	RJ-45 AUI	BNC AUI	ST (Tx, Rx) AUI
Switches	SQE Test Loopback Test Link Beat Long Cable	SQE Test	SQE Test Loopback Test
LEDs	Power Transmit Receive Collision Polarity Link Beat	Power	Power Collision
Warranty	lifetime	lifetime	lifetime

Optical Characteristics

	HP 28683A Fiber-Optic Transceiver
Optical receiver	-30 dBm typical; -27 dBm minimum
Optical transmitter	-12 dBm typical; -17 dBm minimum
Optical budget	10 dB (62.5/125-mm fiber) 6 dB (50/125-mm fiber)
Wavelength	820 nm

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 1131°F)
Relative Humidity:
15% to 95% @ 40°C (104 F)
noncondensing

Physical Characteristics

HP 28685B:
Dimensions:
6.9 cm by 4.3 cm by 2.4 cm (2.7 in. by 1.7 in. by 1.0 in.)
Weight:
57 g (2.0 oz)

HP 28641B:
Dimensions:
9.5 cm by 4.3 cm by 2.4 cm (3.8 in. by 1.7 in. by 1.0 in.)
Weight:
85g (3.0 oz)

HP 28683A:
Dimensions:
9.5 cm by 4.3 cm by 2.4 cm (3.8 in. by 1.7 in. by 1.0 in.)
Weight:
75 g (2.6 oz)

Electrical Characteristics

HP 28685B:
Voltage:
9.0-15.8 V
Power:
1.0W typical 2.6W maximum

HP 28641B:
Voltage:
10.2-15.8V
Power:
2.0W typical 2.6W maximum

HP 28683A:
Voltage:
10.5-15.8V
Power:
1.8W typical 2.4W maximum

Optical Characteristics
(See table.)

Standards

Communications:
HP 28685B:
IEEE 802.3 Type 10BaseT
HP28641B:
IEEE 802.3 Type 10Base2
HP 28683A:
IEEE 802.3 FOIRL

Safety.
UL 1950
CSA 950
Verified to IEC 950/EN60950

Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 2

Immunity:
ESD:
IEC 801-2:1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

All HP EtherTwist Transceivers have a lifetime limited warranty.

HP 28685B EtherTwist Transceiver

Features

- Provides compatibility with IEEE 802.3 Type 10BaseT networks.
- Connects to twisted-pair cable via 9-pin modular (RJ-45) jack. Attaches to network device (hub, bridge, etc.) via standard 15-pin AUI connector.
- Supports 22, 24, or 26 AWG unshielded twisted-pair cable. Shielded twisted-pair cable can also be used with proper adapter.
- Supports 100 meters of twisted-pair cable to any AUI-compatible device. Using low-loss cable and connecting to another HP 28685B transceiver with the long-cable switch on, enables cabling distances up to 225 meters.
- Provides user-selectable switches for link beat, SQE test, loopback test, and long cable function.
- Provides six LEDs for quick indication of power, collision detection, polarity, transmission activity, receive activity, and link status.

HP 28641B ThinLAN Transceiver

Features

- Provides compatibility with IEEE 802.3 Type 10Base2 networks.
- Connects to thin coaxial cable via ThinLAN (BNC) port. Attaches to network device (hub, bridge, etc.) via standard 15-pin AUI connector.
- Provides user-selectable SQE test switch.
- Provides LED power indication for quick notification that the transceiver is functioning.
- Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.

HP 28683A Fiber-Optic Transceiver

Features

- Provides compatibility with IEEE 802.3 FOIRL standard.
- Connects to fiber-optic cable via two ST connectors (Tx and Rx). Attaches to network device (hub, bridge, etc.) via standard 15-pin AUI connector.
- Supports both 62.5/125-m and 50/125-m fiber-optic cable.
- Supports up to 2 km of fiber-optic cable distance (with 10-dB cable attenuation).
- Provides user-selectable switches for loopback test and SQE test.
- Provides LEDs for quick visual indication of power, transmission activity, collision detection, and light status.

Ordering Information

HP 28685B EtherTwist Transceiver

HP 28641B ThinLAN Transceiver

HP 28683A Fiber-Optic Transceiver

HEWLETT® PACKARD

The HP EtherTwist Family of Network Hubs

Technical Data

Product Numbers
HP 29691A, 28684B, 28688B, J2355A, 28699A, 28692A, 28682A

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections—
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management—
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use—
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

Common Features

All hubs

Except as noted,
HP EtherTwist hubs do the following:

- Support Ethernet and IEEE 802.3.
- Operate transparently to network operating system (NOS) software.
- Support thin coaxial connections via BNC port; fiber-optic or thick coaxial connections via transceiver to AUI port (except Hub/8); or twisted-pair cascading.
- Support up to 100m of twisted-pair cable on each twisted-pair port; low-loss cable can allow greater distances. Voice and data signals can run in the same bundle.
- Provide an RS-232 console port, (all except Hub/8) for configuring ports and viewing hub statistics.
- Provide LEDs for Port Status, Activity, Collisions, Fault, and Power. Hub Plus/24 S adds Security LED.
- Provide a self-test.
- Segment malfunctioning ports automatically; restore ports automatically when fault is corrected.
- Detect and compensate for polarity faults in twisted-pair wiring.
- Mount in standard 19" rack (Hub/8 requires shelf), on wall, or on shelf or table. Brackets included.
- Install easily in minutes.
- Allow upgrade via flash EEPROM.
- Provide lifetime limited warranty (5 years onsite).

Plus hubs

HP EtherTwist hubs with "Plus" in their names all do the following:

- Support SNMP/IP and SNMP/IPX network management under HP OpenView network management products and management via standard SNMP MIB browsers.
- Support HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
- Allow one redundant link per hub for backup over a separate path.
- Hub Plus/24 S's 1 Mbyte of RAM ensures compatibility with developing future network management standards.

Comparative Features

	Hub/8	Hub/12	Hub Plus	Hub Plus/24 S	Hub Plus/48	ThinLAN Hub Plus	Fiber-Optic Hub Plus
Ports							
twisted-pair	8	12	12	24	48	–	–
BNC (thin coaxial)	1	1	1	1	1	9	1
AUI	–	1	1	1	1	1	1
fiber-optic (ST pairs)	–	–	–	–	–	–	8
Modular adapter (breaks out 50-pin twisted-pair ports to RJ-45 jacks)	N/A	included	included	order HP 28638A	order HP 28638A		
RS-232 console port		•	•	•	•	•	•
HP EASE traffic sampling		•	•	•	•	•	•
SNMP/IP/IPX management		upgrade with HP J2351A	•	•	•	•	•
Configurable for backup link		upgrade with HP J2351A	•	•	•	•	•
Configurable for port security				•			
Rack space required	1 unit (on shelf)	1 unit (1.75")	1 unit (1.75")	2 units (3.5")	2 units (3.5")	2 units (3.5")	1 unit (1.75")
Warranty (industry-leading)	lifetime 5 yrs onsite	lifetime 5 yrs onsite	lifetime 5 yrs onsite	lifetime 5 yrs onsite	lifetime 5 yrs onsite	lifetime 5 yrs onsite	lifetime 5 yrs onsite

HP 29691A EtherTwist Hub/8

Entry-level hub for networks where cost is critical and network management is not required.

HP 28684B EtherTwist Hub/12

Inexpensive, unmanaged hub for small workgroups. This hub can be upgraded to a fully managed hub.

HP 28688B EtherTwist Hub Plus

A full-featured managed hub for small to large departments or for combining multiple hubs together.

HP J2355A EtherTwist Hub Plus/24 S

Managed hub for small to large workgroups. Also provides advanced features, such as security, increased memory, and an i960 processor.

HP 28699A EtherTwist Hub Plus/48

Best-value managed hub for medium to large departments. Mix 12-, 24-, or 48-port hubs for required port counts in large workgroups.

HP 28692A ThinLAN Hub Plus

Managed hub for environments that are fully cabled with thin coax, or as the center of a thin coaxial backbone.

HP 28682A Fiber-Optic Hub Plus

Managed hub for electrically noisy environments, of for a backbone where noise immunity, security, or long cables is important. Preferred for campus environments.

HEWLETT® PACKARD

HP EtherTwist Hub/8

Technical Data

Product Number
HP 28691A

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections–
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management–
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use—
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

HP EtherTwist Hub/8 Features

o = feature unique to this hub
• = feature shared with other hubs

o Provides 8 twisted-pair ports using RJ-45 connectors, and 1 thin coaxial (BNC) port.
• Offers compatibility with the IEEE 802.3 Type 10BaseT standard: supports 10-Mbit/s link speed and 100-m twisted-pair cable lengths (typical); greater distances are possible with low-loss cable.
• Supports voice and data signals in the same cable bundle.
• Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
• Includes self-test for fault isolation; detects polarity faults in twisted-pair cables, and reverses polarity to compensate.
• Provides LEDs for Port Status, Activity, Collisions, Fault, and Power.
• Segments malfunctioning ports automatically; restores ports automatically when fault is corrected.
• Mounts easily on a wall, table, or rack shelf. Brackets included.
• Installs in minutes.

Specifications

Environmental Characteristics

Operating Temperature:
5°C to 40°C (41°F to 104°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

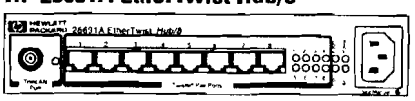
Dimensions:
21.3 cm by 15.1 cm by 4.6 cm (8.4 in. by 5.9 in. by 1.8 in.)
Weight:
1.0 kg (2.2 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.2 A max.	0.1 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP EtherTwist Hub/8 automatically adjusts to any voltage from 90 to 240 volts.

HP 29691A EtherTwist Hub/8



Standards

Communications:
IEEE 802.3 Type 10BaseT IEEE 802.3 Type 10Base2
Safety.
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 28691A EtherTwist Hub/8 has a lifetime limited warranty.

Ordering Information

HP 28691A EtherTwist Hub/8

HEWLETT PACKARD

HP EtherTwist Hub/12

Technical Data

Product Number
HP 28684B

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections—
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management—
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use—
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

HP EtherTwist Hub/12 Features

o = feature unique to this hub
• = feature shared with other hubs

o Provides 12 twisted-pair ports using 50-pin connector, 1 thin coaxial (BNC) port, and 1 AUI port; the AUI port connects (via transceiver) to thick or thin coaxial, fiber-optic, or twisted-pair cable. All port's are active (AUI and BNC ports function independently).

The Hub/12 includes a 50-pin to RJ-45 modular adapter.

o Is upgradeable to a fully managed hub. The customer-installable Hub/12 Upgrade Kit (HP J2351A) transforms the Hub/12 into an HP EtherTwist Hub Plus (HP 28688B). This, in turn, allows upgrading of the hub via software download to the hub's flash EEPROM.

- Offers compatibility with the IEEE 802.3 Type 10BaseT standard: supports 10-Mbit/s link speed and 100-m twisted-pair cable lengths (typical); greater distances are possible with low-loss cable.
- Supports voice and data signals in the same cable bundle.
- Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
- Provides an RS-232 console port for configuring ports and viewing hub statistics. A terminal or emulator can connect to this port either directly or via modem.
- Includes self-test for fault isolation; detects polarity faults in twisted-pair cables, and reverses polarity to compensate.
- Provides LEDs for Port Status, Activity, Collisions, Fault, and Power.
- Segments malfunctioning ports automatically; restores ports automatically when fault is corrected.
- Mounts easily in standard 19" rack (with cables facing front or back) using one unit (1.75") of vertical rack space; on wall (flat or on end); or on shelf or table. Brackets included.
- Installs in minutes.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

Dimensions:
42.6 cm by 23.5 cm by 4.4 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:
100-120 V ac 200-240 V ac
Current:
0.5 A max. 0.5 A max
Frequency:
50/60 Hz 50/60 Hz

The HP EtherTwist Hub/12 automatically adjusts to any voltage from 90 to 240 volts.

Standards

Communications:
IEEE 802.3 Type 10BaseT
IEEE 802.3 Type 10Base2
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

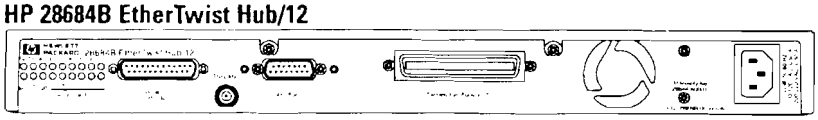
Warranty

The HP 28684B EtherTwist Hub/12 has a lifetime limited warranty.

Ordering Information

HP 28684B EtherTwist Hub/12 (includes one HP 28638A Modular Adapter)

HP 28684B EtherTwist Hub/12



HEWLETT® PACKARD

HP EtherTwist Hub *PLUS*

Technical Data

Product Number
HP 28688B

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections—
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management—
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use—
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

HP EtherTwist Hub *PLUS* Features

○ = feature unique to this hub
• = feature shared with other hubs

○ Provides 12 twisted-pair ports using 50-pin connector, 1 thin coaxial (BNC) port, and 1 AUI port; the AUI port connects (via transceiver) to thick or thin coaxial, fiber-optic, or twisted-pair cable. All ports are active (AUI and BNC ports function independently).

The Hub Plus includes a 50-pin to RJ-45 modular adapter.

- Offers compatibility with the IEEE 802.3 Type 10BaseT standard: supports 10-Mbit/s link speed and 100-m twisted-pair cable lengths (typical); greater distances are possible with low-loss cable.
- Supports voice and data signals in the same cable bundle.
- Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
- Provides an RS-232 console port for configuring ports and viewing hub statistics. A terminal or emulator can connect to this port either directly or via modem.
- Includes self-test for fault isolation; detects polarity faults in twisted-pair cables, and reverses polarity to compensate.
- Provides LEDs for Port Status, Activity, Collisions, Fault, and Power.
- Segments malfunctioning ports automatically; restores ports automatically when fault is corrected.
- Allows one redundant link per hub for backup over a separate path.
- Supports SNMP/IP and SNMP/IPX network management under HP OpenView Windows network management products; supports SNMP/IP management under HP OpenView UNIX®; supports management via standard SNMP MIB browsers.
- Supports HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
- Mounts easily in standard 19" rack (with cables facing front and back) using one unit (1.75") of vertical rack space; on wall (flat or on end); or on self or table. Brackets included.
- Installs in minutes.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

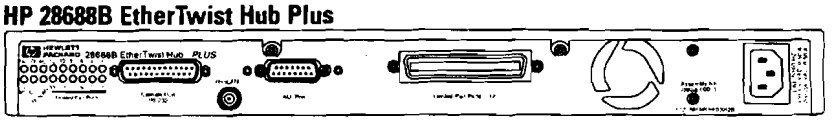
Dimensions:
42.6 cm by 23.5 cm by 4.4 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:
100-120 V ac 200-240 V ac
Current:
0.5 A max. 0.5 A max
Frequency:
50/60 Hz 50/60 Hz

The HP EtherTwist Hub Plus automatically adjusts to any voltage from 90 to 240 volts.

HP 28688B EtherTwist Hub Plus



Standards

Communications:
IEEE 802.3 Type 10BaseT
IEEE 802.3 Type 10Base2
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CO, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 28688B EtherTwist Hub Plus has a lifetime limited warranty.

Ordering Information

HP 28688B EtherTwist Hub Plus (includes one HP 28638A Modular Adapter)

HEWLETT® PACKARD

HP EtherTwist *PLUS* Hub/24 S

Technical Data

Product Number
HP J2355A

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections–
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management–
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use–
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

HP EtherTwist *PLUS* Hub/24 S Features

o = feature unique to this hub
• = feature shared with other hubs

o Provides 24 twisted-pair ports via 50-pin connectors, 1 thin coaxial (BNC) port, and I AUI port; the AUI port connects (via transceiver) to thick or thin coaxial, fiber-optic, or twisted-pair cable. All ports are active (AUI and BNC ports function independently).

A 50-pin to RJ-45 modular adapter is available separately–order HP 28638A.

o Provides full workgroup security via intruder prevention, eavesdrop prevention, and hub password.
o Allows security to be set at port, hub, or global level when using HP Interconnect Manager/Windows.
o Includes Intel i960 RISC processor, 1 Mbyte RAM, and 256 Kbytes flash EPROM-ample resources for now and the future.
o Supports BOOTP protocol for IP servers.
o Supports RFC 1368 repeater MIB.
• Offers compatibility with the IEEE 802.3 Type 10BaseT standard: supports 10-Mbit/s link speed and 100-m twisted-pair cable lengths (typical); greater distances are possible with low-loss cable.
• Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
• Provides an RS-232 console port for configuring ports and viewing hub statistics. A terminal or emulator can connect to this port either directly or via modem.
• Includes self-test for fault isolation; detects polarity faults in twisted-pair cables, and reverses polarity to compensate.
• Provides LEDs for Security, Port Status, Activity, Collisions, Fault, and Power.
• Segments malfunctioning ports automatically; restores ports automatically when fault is corrected.
• Allows one redundant link per hub for backup over a separate path.
• Supports SNMP/IP/IPX network management under HP OpenView Windows; supports SNMP/IP management under HP OpenView UNIX®; supports management via standard SNMP MIB browsers.
• Supports HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
• Mounts easily in standard 19" rack (with cables facing front or back) using two units (3.5") of vertical rack space; on wall (flat or on end); or on shelf or table. Brackets included.
• Installs in minutes.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)

Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

Dimensions:
42.6 cm by 23.5 cm by 4.4 cm (16.8 in. by 9.3 in. by 1.7 in.)

Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.5 A max.	0.5 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP EtherTwist Hub Plus/24 S automatically adjusts to any voltage from 90 to 240 volts.

Standards

Communications.
IEEE 802.3 Type 10BaseT
IEEE 802.3 Type 10Base2

Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950

Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1

Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD

Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

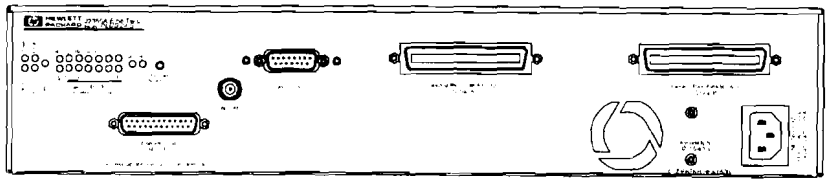
The HP J2355A EtherTwist Hub Plus/24 S has a lifetime limited warranty.

Ordering Information

HP J2355A EtherTwist Hub Plus/24 S.

To adapt 50-pin connectors to 12 RJ-45 jacks, order two HP 28638A Modular Adapters.

HP J2355A EtherTwist Hub Plus/24 S



HEWLETT® PACKARD

HP EtherTwist Hub *PLUS*/48

Technical Data

Product Number
HP 28699A

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections—
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management—
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use—
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

HP EtherTwist Hub *PLUS*/48 Features

○ = feature unique to this hub
• = feature shared with other hubs

○ Provides 48 twisted-pair ports using 50-pin connectors, 1 thin coaxial (BNC) port, and 1 AUI port,; the AUI port connects (via transceiver) to thick or thin coaxial, fiber-optic, or twisted-pair cable. All ports are active (AUI and BNC ports function independently).

A 50-pin-plug to modular-plug (RJ-45) adapter is available separately: order HP 28638A.

○ Acts as one repeater count to any of the attached 48 ports in accordance with IEEE 802.3 guidelines.
• Offers compatibility with the IEEE 802.3 Type 10BaseT standard: supports 10-Mbit/s link speed and 100-m twisted-pair cable lengths (typical); greater distances are possible with low-loss cable.
• Supports voice and data signals in the same cable bundle.
• Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
• Provides an RS-232 console port for configuring ports and viewing hub statistics. A terminal or emulator can connect to this port either directly or via modem.
• Includes self-test for fault isolation; detects polarity faults in twisted-pair cables, and reverses polarity to compensate.
• Provides LEDs for Port Status, Activity, Collisions, Fault, and Power.
• Segments malfunctioning ports automatically; restores ports automatically when fault is corrected.
• Allows one redundant link per hub for backup over a separate path.
• Supports SNMP/IP and SNMP/IPX network management under HP OpenView Windows network management products; supports SNMP/IP management under HP OpenView UNIX; supports management via standard SNMP MIB browsers.
• Supports HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
• Mounts easily in standard 19" rack (with cables facing front or back) using two units (3.5") of vertical rack space; on wall (flat or on end); or on shelf or table. Brackets included.
• Installs in minutes.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

Dimensions:
42.6 cm by 23.5 cm by 8.9 cm (16.8 in. by 9.3 in. by 3.5 in.)
Weight:
3.8 kg (8.3 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.6 A max.	0.5 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP EtherTwist Hub Plus/48 automatically adjusts to any voltage from 90 to 240 volts.

Standards

Communications:
IEEE 802.3 Type 10BaseT
IEEE 802.3 Type 10Base2
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

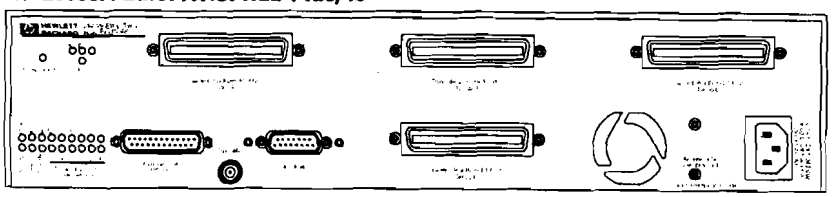
The HP 28699A EtherTwist Hub Plus/48 has a lifetime limited warranty.

Ordering Information

HP 28699A EtherTwist Hub Plus/48

To adapt 50-pin connectors to 12 RJ-45 jacks, order four HP 28638A Modular Adapters.

HP 28699A EtherTwist Hub Plus/48



HEWLETT® PACKARD

HP ThinLAN Hub *PLUS*

Technical Data

Product Number
HP 28692A

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections—
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management—
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use—
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

HP ThinLAN Hub *PLUS* Features

○ = feature unique to this hub
• = feature shared with other hubs

○ Provides 9 ThinLAN coaxial (BNC) ports and 1 AUI port; the AUI port connects (via transceiver) to thick or thin coaxial, fiber-optic, or twisted-pair cable. All ports are active (AUI and BNC ports function independently).
○ Offers compatibility with the IEEE 802.3 Type 10Base2 standard: supports 10-Mbit/s link speed and 185-m coaxial cable lengths.
• Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
• Provides an RS-232 console port for configuring ports and viewing hub statistics. A terminal or emulator can connect to this port either directly or via modem.
• Includes self-test, port diagnostics, automatic cable fault detection, and loopback test for cable testing.
• Provides LEDs for Port Status, Activity, Collisions, Fault, and Power.
• Segments malfunctioning ports automatically; restores ports automatically when fault is corrected.
• Allows one redundant link per hub for backup over a separate path.
• Supports SNMP/IP and SNMP/IPX network management under HP OpenView Windows network management products; supports SNMP/IP management under HP OpenView UNIX; supports management via standard SNMP MIB browsers.
• Supports HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
• Mounts easily in standard 19" rack (with cables facing front or back) using two units (3.5") of vertical rack space; on wall (flat or on end); or on shelf or table. Brackets included.
• Installs in minutes.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

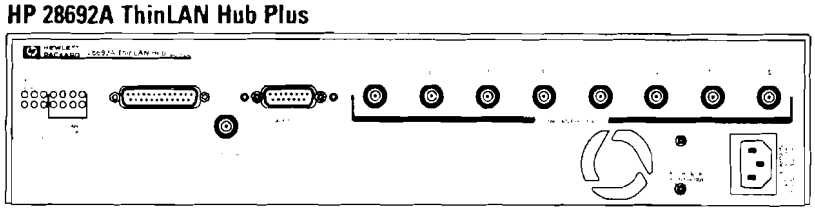
Dimensions:
42.6 cm by 23.5 cm by 8.9 cm (16.8 in. by 9.3 in. by 3.5 in.)
Weight:
4.0 kg (8.8 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.8 A max.	0.6 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP ThinLAN Hub Plus automatically adjusts to any voltage from 90 to 240 volts.

HP 28692A ThinLAN Hub Plus



Standards

Communications:
IEEE 802.3 Type 10Base2
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 2
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 28692A ThinLAN Hub Plus has a lifetime limited warranty.

Ordering Information

HP 28692A ThinLAN Hub Plus

HEWLETT® PACKARD

HP Fiber-Optic Hub *PLUS*

Technical Data

Product Number
HP 28682A

Whether your workgroup is large or small, self-contained or integrated into a larger organization, HP's EtherTwist hubs provide the ideal means to connect your workgroup to an Ethernet/IEEE 802.3 network. These hubs offer a range of port counts and types; most come with full network management features; and all have an excellent cost per port.

Hewlett-Packard has long been known for the reliability of its products, and the EtherTwist hubs carry on that tradition. Because the reliability of these hubs is so strong, we back them with an industry-leading lifetime limited warranty, with onsite service for the first five years.

Flexible Connections—
For small organizations HP offers the EtherTwist Hub/8 and Hub/12—unmanaged hubs with 8 and 12 twisted-pair ports, respectively. The Hub/12 is a good choice if your organization is likely to grow, as it can easily be upgraded to include full network management functions. Both hubs allow easy connection to additional hubs.

Where network management is important, HP offers managed hubs in 12, 24, and 48 twisted-pair ports. The 24-port hub includes advanced features such as an i960 processor and security and is ready to accommodate future network management standards. The 48-port hub is an excellent choice for large departments, and it offers the best price per managed port. Twisted-pair connections can be made via 50-pin Telco connectors (for easy connection to your cross-connect panels) or via individual RJ-45 jacks.

For networks that use backbones of coaxial or fiber-optic cable, HP provides a 9-port thin coaxial hub and an 8-port fiber-optic hub.

All of the HP hubs include a BNC connector for attachment of thin coaxial cable, which can be used as an external bus to connect several hubs in a single, simultaneously active location (such as a rack). In addition, all hubs except the Hub/8 have a standard AUI port, which allows connection of an extra twisted-pair, thin coaxial, or fiber-optic cable via transceiver.

Network Management—
The "Plus" designation on most hub models indicates that these hubs have the ability to be managed by SNMP and are compatible with MIB-II. Plus hubs also include instrumentation firmware called HP EASE (Embedded Advanced Sampling Environment), which allows the hubs to sample and report, on traffic patterns in the network.

Managed hubs can be managed by any SNMP-compatible management station, including industry-leading HP OpenView stations.

Ease of Use—
HP EtherTwist scalable hubs are "plug-and-play" devices in most typical network installations, with simple configuration steps for using the more advanced features. As your organization grows, adding new capacity is easy: just add a new hub to the stack, connect, it to the others with standard twisted-pair or thin coaxial cable, and plug in the power.

HP Fiber-Optic Hub *PLUS* Features

o = feature unique to this hub
• = feature shared with other hubs

o Provides 8 fiber-optic ports (ST connectors), 1 thin coaxial (BNC) port, and 1 AUI port; the AUI port connects (via transceiver) to thick or thin coaxial, fiber-optic, or twisted-pair cable. All ports are active (AUI and BNC ports function independently).
o Offers compatibility with the IEEE 802.3 FOIRL standard: supports 10-Mbit/s link speed; both 62.5/125-μm and 50/125-μm optical fiber; and 1-km cable lengths (or more, depending on network configuration).
• Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
• Provides an RS-232 console port for configuring ports and viewing hub statistics. A terminal or emulator can connect to this port either directly or via modem.
• Includes self-test, port diagnostics and loopback test for cable testing.
• Provides LEDs for Port Status, Activity, Collisions, Fault, and Power.
• Segments malfunctioning ports automatically; restores ports automatically when fault is corrected.
• Allows one redundant link per hub for backup over a separate path.
• Supports SNMP/IP and SNMP/IPX network management under HP OpenView Windows network management products; supports SNMP/IP management under HP OpenView UNIX; supports management via standard SNMP MIB browsers.
• Supports HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
• Mounts easily in standard 19" rack (with cables facing front or back) using one unit (1.75") of vertical rack space; on wall (flat or on end); or on shelf or table. Brackets included.
• Installs in minutes.

Optical Characteristics	62.5/125-μm Fiber	50/125-μm Fiber
Wavelength:	820 nm	820 nm
Budget:	10 dB transmitter	6 dB transmitter
Power:	12 dBm typical 17 dBm minimum	16.5 dBm typical 21 dBm minimum
Receiver sensitivity:	30 dBm typical 27 dBm minimum	30 dBm typical 27 dBm minimum

Specifications

Optical Characteristics
(See table below.)

Environmental Characteristics
Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

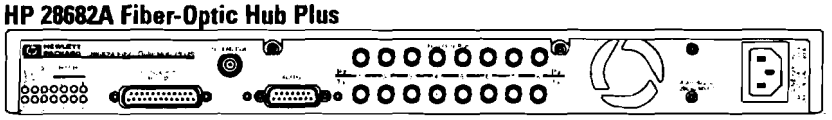
Physical Characteristics
Dimensions:
42.6 cm by 23.5 cm by 4.4 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.5 A max.	0.4 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP Fiber-Optic Hub Plus automatically adjusts to any voltage from 90 to 240 volts.

HP 28682A Fiber-Optic Hub Plus



Standards

Communications:
IEEE 802.3 FOIRL
IEEE 802.3 Type 10Base2
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
FTZ 1046/84 (VDE Level B)
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 28682A Fiber-Optic Hub Plus has a lifetime limited warranty.

Ordering Information

HP 28682A Fiber-Optic Hub Plus

HEWLETT® PACKARD

HP EtherTwist Network Bridges

Technical Data

Product Numbers
HP 28681A, 28673A, 28674B

HP bridges are all "learning" bridges that accomplish the standard tasks assigned to bridges: connecting separate LANs; extending a single LAN beyond its topological limits; and improving network performance by eliminating unnecessary traffic. The Bridge LB is a low-cost local bridge that, provides "near-media-speed" performance and a standard configuration that fits the needs of most small networks. It is a simple, "plug-and-play" device: just plug in the network cables and the power cord and the bridge starts operating.

The Bridge MB is a full-featured local bridge that offers full media-speed performance, management functions, and a variety of operating modes. The Bridge RB is similar in performance and functions to the MB model, but is used in wide area applications. Both of these bridges support SNMP/IP and SNMP/IPX management functions that work with HP's network management software. Both support the IEEE Spanning Tree Protocol, which allows redundant bridges to be set up for fault tolerance. And both bridges come preconfigured with settings that work optimally in most network situations, these too, are "plug-and-play" bridges.

High Performance—
The Bridge MB and the Bridge RB can filter and forward data packets at "media speed"—as fast as the network can operate. This lets you divide a large LAN into smaller subnets without creating a bottleneck in the network. In addition, the bridges conserve network capacity (bandwidth) by isolating local traffic and forwarding only packets that have destinations on the other side of the bridge. The Bridge LB operates at about 90% of media speed, and is appropriate for smaller networks with lower traffic loads.

Fault Tolerance—
The MB and RB bridges use the IEEE 802.1 Spanning Tree Protocol. This allows Ethernet/802.3 LANs to be bridged in an arbitrary topology that includes alternative or redundant paths. If a primary bridge fails, a backup bridge automatically takes over and ensures continued data transmission between LANs.

Network Management—
HP's network management software products can centrally monitor and control any number of MB and RB bridges in an extended LAN environment. These bridges also contain the HP EASE traffic sampling firmware, which is used by several of HP's network management programs. In addition, the bridges' console ports provide for out-of-band management of several bridge parameters from a terminal or PC, through either a direct connection or a remote connection using a modem.

HP 28681A 10:10 LAN Bridge LB
Low-cost local bridge for uncomplicated networks of medium size

HP 28673A 10:10 LAN Bridge MB
High-performance, local, spanning tree bridge for large, fault-tolerant networks

HP 28674B Remote Bridge RB
High-performance, spanning tree bridge for multisite networks

Common Features

All bridges

All HP EtherTwist bridges do the following:

- Automatically learn station addresses (in learning mode) by examining network traffic, and maintain a table of those addresses.
- Filter and forward packets at or near the full media speed of the network.
- Maintain end-to-end data integrity. The bridges check each packet to determine packet integrity, and do not forward corrupt packets.
- Provide LEDs for easy recognition of the bridge's operating status.
- Install easily, with plug-and-play operation in most common network situations.
- Support both Ethernet and IEEE 802.3.
- Operate transparently to network operating system software.
- Mount in a standard 19" rack, on a wall, or on a table or shelf. Each bridge takes one unit (1.75") of vertical rack space.

Bridge MB and Bridge RB

In addition, the Bridge MB and Bridge RB do the following:

- Support the IEEE 802.1 Spanning Tree Protocol, allowing a topology that contains redundant bridges. If an active bridge fails, a backup badge can automatically take over and continue transmitting data.
- Allow "wildcard" filtering of packets based on source or destination or on data fields in the packets.
- Support SNMP/IP and SMNP/IPX network management under HP OpenView network management products and management via standard SNMP MIB browsers.
- Support HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
- Provide console (RS-232) port for out-of-band bridge management from a terminal or PC. This port also allows downloading of product updates to the bridge firmware.

Comparative Features

	HP 28681A 10:10 LAN Bridge LB	HP 28673A 10:10 LAN Bridge MB	HP 28674B 10:10 LAN Bridge RB
Ports			
AUI/BNC	1	1	1
AUI only	1	1	–
WAN	–	–	1
Performance	90% of media speed	media speed	media speed
Address table size	256 entries	512 entries	512 entries
Operating modes	Learning	Learning Learning/spanning tree Secure Secure/spanning tree	Learning Learning/ spanning tree Secure Secure/spanning tree
Wildcard filters	–	2	2
RS-232 console port		•	•
HP EASE traffic sampling		•	•
SNMP/IP/IPX management		•	•
Warranty	3 years (onsite)	3 years (onsite)	3 years (onsite)

HEWLETT® PACKARD

HP 10:10 LAN Bridge LB

Technical Data

Product Number
HP 28681A

HP bridges are all "learning" bridges that accomplish the standard tasks assigned to bridges: connecting separate LANs; extending a single LAN beyond its topological limits; and improving network performance by eliminating unnecessary traffic. The Bridge LB is a low-cost local bridge that, provides "near-media-speed" performance and a standard configuration that fits the needs of most small networks. It is a simple, "plug-and-play" device: just plug in the network cables and the power cord and the bridge starts operating.

The Bridge MB is a full-featured local bridge that offers full media-speed performance, management functions, and a variety of operating modes. The Bridge RB is similar in performance and functions to the MB model, but is used in wide area applications. Both of these bridges support SNMP/IP and SNMP/IPX management functions that work with HP's network management software. Both support the IEEE Spanning Tree Protocol, which allows redundant bridges to be set up for fault tolerance. And both bridges come preconfigured with settings that work optimally in most network situations, these too, are "plug-and-play" bridges.

High Performance—
The Bridge MB and the Bridge RB can filter and forward data packets at "media speed"—as fast as the network can operate. This lets you divide a large LAN into smaller subnets without creating a bottleneck in the network. In addition, the bridges conserve network capacity (bandwidth) by isolating local traffic and forwarding only packets that have destinations on the other side of the bridge. The Bridge LB operates at about 90% of media speed, and is appropriate for smaller networks with lower traffic loads.

Fault Tolerance—
The MB and RB bridges use the IEEE 802.1 Spanning Tree Protocol. This allows Ethernet/802.3 LANs to be bridged in an arbitrary topology that includes alternative or redundant paths. If a primary bridge fails, a backup bridge automatically takes over and ensures continued data transmission between LANs.

Network Management—
HP's network management software products can centrally monitor and control any number of MB and RB bridges in an extended LAN environment. These bridges also contain the HP EASE traffic sampling firmware, which is used by several of HP's network management programs. In addition, the bridges' console ports provide for out-of-band management of several bridge parameters from a terminal or PC, through either a direct connection or a remote connection using a modem.

HP 28681A 10:10 LAN Bridge LB
Low-cost local bridge for uncomplicated networks of medium size

HP 28673A 10:10 LAN Bridge MB
High-performance, local, spanning tree bridge for large, fault-tolerant networks

HP 28674B Remote Bridge RB
High-performance, spanning tree bridge for multisite networks

HP 10:10 LAN Bridge LB Features

- Provides one port with AUI connector and one with choice of AUI or BNC connector. This allows direct connection to thin coaxial cable and connection via transceiver to twisted-pair, thin coaxial, thick coaxial, or fiber-optic cable.
- Automatically learns station addresses by examining network traffic, and maintains an address table of the last 256 active stations.
- Forwards 13,373 packets per second and filters 26,700 packets per second. This is approximately 90% of the maximum ("media") speed of an Ethernet LAN, and easily handles maximum traffic loads for a normally operating network.
- Maintains end-to-end data integrity; does not forward corrupt packets.
- Supports both Ethernet and IEEE 802.3 and operates transparently to network operating system (NOS) software.
- Provides LEDs for easy recognition of the budge's operating status and for troubleshooting. LEDs indicate power, activity, collisions, self-test status, and faults.
- Installs easily—simply connect the network and power cables and the bridging function begins immediately and automatically. No configuration is needed; the bridge is a "plug-and-play" device that is self-configuring.
- Mounts in a standard 19" rack (with cables facing front or back), on a wall (flat or on end), or on a table or shelf. The bridge takes up one unit (1.75") of vertical rack space. Brackets included.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

Dimensions:
42.6 cm by 23.5 cm by 4.4 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:

100-120 V ac	200-240 V ac

Current:

0.5 A max.	0.4 A max

Frequency:

50/60 Hz	50/60 Hz

The HP 10:10 LAN Bridge LB automatically adjusts to any voltage from 90 to 240 volts.

Standards

Communications:
IEEE 802.3
IEEE 802.3 Type 10Base2
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

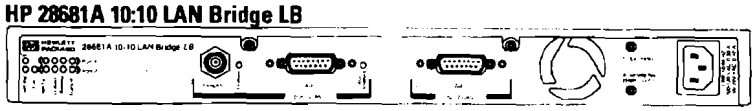
Warranty

The HP 28681A 10:10 LAN Bridge LB is warranted for three years against defects.

Ordering Information

HP 28681A 10:10 LAN Bridge LB

HP 28681A 10:10 LAN Bridge LB



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HEWLETT® PACKARD

HP 10:10 LAN Bridge MB

Technical Data

Product Number
HP 28673A

HP bridges are all "learning" bridges that accomplish the standard tasks assigned to bridges: connecting separate LANs; extending a single LAN beyond its topological limits; and improving network performance by eliminating unnecessary traffic. The Bridge LB is a low-cost local bridge that, provides "near-media-speed" performance and a standard configuration that fits the needs of most small networks. It is a simple, "plug-and-play" device: just plug in the network cables and the power cord and the bridge starts operating.

The Bridge MB is a full-featured local bridge that offers full media-speed performance, management functions, and a variety of operating modes. The Bridge RB is similar in performance and functions to the MB model, but is used in wide area applications. Both of these bridges support SNMP/IP and SNMP/IPX management functions that work with HP's network management software. Both support the IEEE Spanning Tree Protocol, which allows redundant bridges to be set up for fault tolerance. And both bridges come preconfigured with settings that work optimally in most network situations, these too, are "plug-and-play" bridges.

High Performance–
The Bridge MB and the Bridge RB can filter and forward data packets at "media speed"—as fast as the network can operate. This lets you divide a large LAN into smaller subnets without creating a bottleneck in the network. In addition, the bridges conserve network capacity (bandwidth) by isolating local traffic and forwarding only packets that have destinations on the other side of the bridge. The Bridge LB operates at about 90% of media speed, and is appropriate for smaller networks with lower traffic loads.

Fault Tolerance–
The MB and RB bridges use the IEEE 802.1 Spanning Tree Protocol. This allows Ethernet/802.3 LANs to be bridged in an arbitrary topology that includes alternative or redundant paths. If a primary bridge fails, a backup bridge automatically takes over and ensures continued data transmission between LANs.

Network Management–
HP's network management software products can centrally monitor and control any number of MB and RB bridges in an extended LAN environment. These bridges also contain the HP EASE traffic sampling firmware, which is used by several of HP's network management programs. In addition, the bridges' console ports provide for out-of-band management of several bridge parameters from a terminal or PC, through either a direct connection or a remote connection using a modem.

HP 28681A 10:10 LAN Bridge LB
Low-cost local bridge for uncomplicated networks of medium size

HP 28673A 10:10 LAN Bridge MB
High-performance, local, spanning tree bridge for large, fault-tolerant networks

HP 28674B Remote Bridge RB
High-performance, spanning tree bridge for multisite networks

HP 10:10 LAN Bridge MB Features

- Operates at, "media speed", filtering and forwarding packets as fast as the network can operate.
- Provides one port with AUI connector and one with choice of AUI or BNC connector.
- Automatically learns station addresses by examining network traffic (in learning mode), and uses address filtering to eliminate excess traffic on the network.
- Allows filtering based on combinations of stations configured into the address table (in secure mode), to provide greater security.
- Allows "wildcard" filtering of packets based on source or destination addresses or on data fields in the packets.
- Maintains end-to-end data integrity; does not forward corrupt packets.
- Supports the IEEE 802.1 Spanning Tree Protocol, allowing a topology that contains redundant bridges. If an active bridge fails, a backup bridge can automatically take over and continue transmitting data.
- Supports SNMP/IP and SNMP/IPX network management under HP OpenView network management products, as well as management via standard SNMP MIB browsers.
- Supports HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
- Provides RS-232 console port for out-of-band bridge management from a terminal or PC. This port also allows downloading of firmware updates.
- Provides LEDs to indicate the bridge's operating status and for troubleshooting. LEDs indicate power, activity, self-test status, network and bridge failure.
- Supports both Ethernet and IEEE 802.3, and operates transparently to network operating system (NOS) software.
- Installs easily and operates with minimal configuration. In most common network situations, the bridge operates as a "plug-and-play" device with no configuration needed.
- Mounts in a standard 19" rack (with cables facing front or back), on a wall (flat or on end), or on a table or shelf. The bridge takes up one unit (1.75") of vertical rack space. Brackets included.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

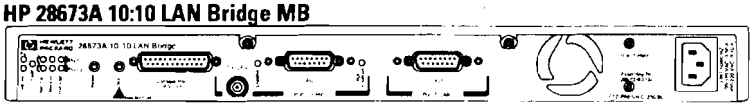
Dimensions:
42.6 cm by 23.5 cm by 4.4 cm (1 6.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:
100-120 V ac 200-240 V ac
Current:
0.5 A max. 0.4 A max
Frequency:
50/60 Hz 50/60 Hz

The HP 10:10 LAN Bridge MB automatically adjusts to any voltage from 90 to 240 volts.

HP 28673A 10:10 LAN Bridge MB



Standards

Communications:
IEEE 802.3
IEEE 802.3 Type 10Base2
IEEE 802.1 Spanning Tree Protocol
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 28673A 10:10 LAN Bridge MB is warranted for three years against defects.

Ordering Information

HP 28673A 10:10 LAN Bridge MB

HEWLETT® PACKARD

HP Remote Bridge RB

Technical Data

Product Number
HP 28674B

HP bridges are all "learning" bridges that accomplish the standard tasks assigned to bridges: connecting separate LANs; extending a single LAN beyond its topological limits; and improving network performance by eliminating unnecessary traffic. The Bridge LB is a low-cost local bridge that, provides "near-media-speed" performance and a standard configuration that fits the needs of most small networks. It is a simple, "plug-and-play" device: just plug in the network cables and the power cord and the bridge starts operating.

The Bridge MB is a full-featured local bridge that offers full media-speed performance, management functions, and a variety of operating modes. The Bridge RB is similar in performance and functions to the MB model, but is used in wide area applications. Both of these bridges support SNMP/IP and SNMP/IPX management functions that work with HP's network management software. Both support the IEEE Spanning Tree Protocol, which allows redundant bridges to be set up for fault tolerance. And both bridges come preconfigured with settings that work optimally in most network situations, these too, are "plug-and-play" bridges.

High Performance—
The Bridge MB and the Bridge RB can filter and forward data packets at "media speed"—as fast as the network can operate. This lets you divide a large LAN into smaller subnets without creating a bottleneck in the network. In addition, the bridges conserve network capacity (bandwidth) by isolating local traffic and forwarding only packets that have destinations on the other side of the bridge. The Bridge LB operates at about 90% of media speed, and is appropriate for smaller networks with lower traffic loads.

Fault Tolerance—
The MB and RB bridges use the IEEE 802.1 Spanning Tree Protocol. This allows Ethernet/802.3 LANs to be bridged in an arbitrary topology that includes alternative or redundant paths. If a primary bridge fails, a backup bridge automatically takes over and ensures continued data transmission between LANs.

Network Management—
HP's network management software products can centrally monitor and control any number of MB and RB bridges in an extended LAN environment. These bridges also contain the HP EASE traffic sampling firmware, which is used by several of HP's network management programs. In addition, the bridges' console ports provide for out-of-band management of several bridge parameters from a terminal or PC, through either a direct connection or a remote connection using a modem.

HP 28681A 10:10 LAN Bridge LB
Low-cost local bridge for uncomplicated networks of medium size

HP 28673A 10:10 LAN Bridge MB
High-performance, local, spanning tree bridge for large, fault-tolerant networks

HP 28674B Remote Bridge RB
High-performance, spanning tree bridge for multisite networks

HP Remote Bridge RB Features

- Operates at "media speed", filtering and forwarding packets as fast as the network can operate.
- Provides one port with choice of AUI or BNC connector and one WAN connection via the HP universal interface port with the appropriate 5-meter interface cable (RS-232, RS-422/449, V.35, or X.21). The bridge automatically senses which cable is connected. (An external DSU/CSU unit is required for each bridge.)
- Supports wide area link speeds between 9.6 Kbit/s and 2.048 Mbit/s.
- Automatically learns station addresses by examining network traffic (in learning mode), and uses address filtering to eliminate excess traffic on the network.
- Allows filtering based on combinations of stations configured into the address table (in secure mode), to provide greater security.
- Allows "wildcard" filtering of packets based on source or destination addresses or on data fields in the packets.
- Maintains end-to-end data integrity; does not forward corrupt packets.
- Supports the IEEE 802.1 Spanning Tree Protocol, allowing a topology that contains redundant bridges. If an active bridge fails, a backup bridge can automatically take over and continue transmitting data.
- Supports SNMP/IP and SNMP/IPX network management under HP OpenView network management products, as well as management via standard SNMP MIB browsers.
- Supports HP EASE (Embedded Advanced Sampling Environment) traffic sampling.
- Provides RS-232 console port for out-of-band bridge management from a terminal or PC. This port also allows downloading of firmware updates.
- Provides LEDs to indicate the bridge's operating status and for troubleshooting. LEDs indicate power, activity, self-test status, network and bridge failure.
- Supports both Ethernet and IEEE 802.3, and operates transparently to network operating system (NOS) software.
- Installs easily and operates with minimal configuration. In most common network situations, the bridge operates as a "plug-and-play" device with no configuration needed.
- Mounts in a standard 19" rack (with cables facing front or back), on a wall (flat or on end), or on a table or shelf. The bridge takes up one unit (1.75") of vertical rack space. Brackets included.
- Includes appropriate WAN (synchronous) interface cable, orderable by product option number.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

Dimensions:
42.6 cm by 23.5 cm by 4.4 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:

100-120 V ac	200-240 V ac

Current:

0.5 A max.	0.4 A max

Frequency:

50/60 Hz	50/60 Hz

The HP Remote Bridge RB automatically adjusts to any voltage from 90 to 240 volts.

Standards

Communications:
CCITT V.35
IEEE 802.3
IEEE 802.3 Type 10Base2
IEEE 802.1 Spanning Tree Protocol
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 2

Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 28674B Remote Bridge RB is warranted for three years against defects.

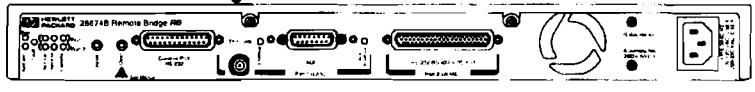
Ordering Information

HP 28674B Remote Bridge RB

The HP 28674B includes a WAN (synchronous) interface cable. Select the cable type by ordering the appropriate option.

Option	Cable
001	V.35
002	S-232
003	X.21
004	S-422

HP 28674B Remote Bridge RB



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HEWLETT PACKARD

X.25/PAD–Multiplexer

Technical Data

Product Number
HP 2335A

The HP 2335A-X.25/84 Multiplexer is a high-performance and high-reliability stand-alone device which offers connection via an X.25 link between one or more central computers and up to 16 terminals, PCs in terminal emulation mode, or printers.

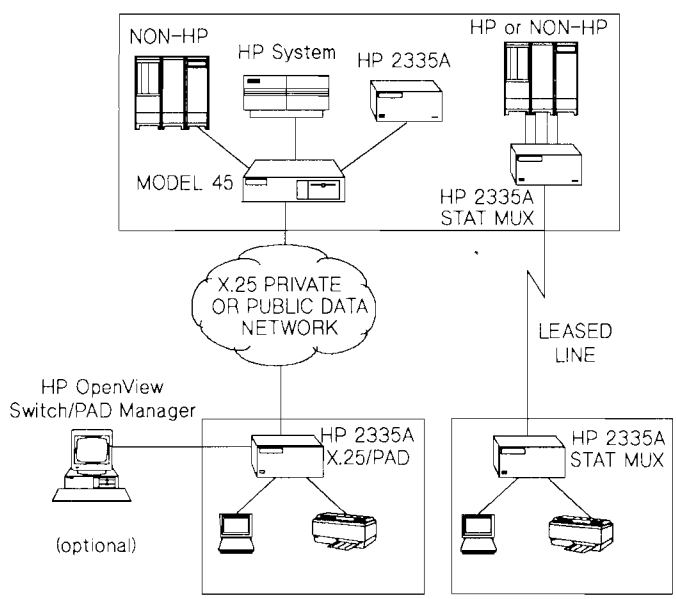
The HP 2335A operates as an X.25 Packet Assembler/ Disassembler (X.25 PAD) for asynchronous device connection to a public or private X.25 network, or it can be used in statistical multiplexer configuration over a leased line. It provides full X.25/84 functionality.

The HP 2335A can work with the HP Model 45 multiprotocol switch. You can manage both devices from an HP OpenView PC.

The HP 2335A can also be used and managed as part of the HP Private Packet Network (HP PPN).

The HP 2335A has a high-speed link supporting up to 64 Kb/s on the RS-232-C link.

The HP 2335A handles 41 packets per second (128 bytes each) and minimum 100 packets per second (1 byte each) for character mode applications. The HP 2335A X.25/84 can be connected to Digital VAX™ computers and to HP 3000, HP 9000, and HP 1000 computers.



Features and Benefits

- High performance
  - Up to 41 packets per second (128 bytes each)
  - Over 100 packets per second (1 byte each)
  - Data compression
  - Special printer term type on HP 3000 for high throughput
  - Line speed up to 64 Kbp/s
- High reliability
  - 4th generation of X.25 PAD
  - Theoretical hardware MTBF: 219,000 hours
  - Proven firmware in over 15,000 installed units
- Low-cost solution
  - Expandable from 4 to 16 terminals in groups of 4
  - Can be used as X.25 PAD or statistical multiplexer
  - Host port contention
- Ease-of-use
  - Menu-driven configuration
  - Step-by-step User's Guide
  - Default configuration for statistical multiplexer
  - Test port configuration and diagnostics (password protected) accessible from any terminal
  - Symbolic host computer addressing up to 16 names
  - User-defined welcome message (up to 20 characters)
  - User-defined PAD message header (10 characters)
  - Up to three groups of pool ports can be defined
- Security
  - Automatic connection to preconfigured computer port
  - Single port reset command and full HP 2335A reset command
  - Local User Group (LUG) definition
- Multivendor
  - Support for DEC VAX computers
- Worldwide support
  - Certified on over 25 international public networks
- Reduced network operation costs
  - Manageable together with HP Model 45 from an HP OpenView PC

Functional Specifications

Synchronous Port Specifications

The synchronous interface is supported at all speeds from 1200 bps to 64,000 bps with external clocking.

The HP 2335A has one RS-232-C, CCITT V24/V28 synchronous full-duplex composite interface to connect it to a remote site via:

- Analog leased line
- Digital leased line
- Dial-up line
- X.25 Packet Switching Network (public or private)

A hardwired connection for the synchronous composite link is not supported: synchronous, full-duplex, short-haul modems, or a modem eliminator should be used.

Speeds of 4800, 9600, or 19,200 bps can be selected with internal clocking (modems supported and recommended are described later in this data sheet).

Asynchronous Port Specifications

The HP 2335A has a 4-port interface that supports full-duplex, asynchronous RS-232-C, CCITT V.24/V.28 point-to-point connections. Up to four interfaces can be installed in each HP 2335A, allowing up to 16 connections. These connections can be made to devices or hosts that are local or remote.

- Transfer data rates: 75, 110, 150, 300, 1200, 2400, 4800, 9600, or 19,200 bps
- Auto-parity (odd, even) and auto-speed (up to 19,200 bps)
- Binary transfer with no flow control can be done in blocks of maximum 128 bytes
- Xon/Xoff or ENQ/ACK flow control and HP block mode handshake methods are available

X.3, X.28, X.29 Specifications

The HP 2335A follows the CCITT X.3/X.28/X.29 1984 recommendations which allow it to act as a private Packet Assembler/Disassembler (PAD). The standard 22 X.3 parameters are supported, and 15 additional HP-defined local parameters are available for enhanced functionality with HP devices. These local HP parameters are:

- Parity
- Local block mode control
- Compatibility with ATP/ADCC (cluster only)
- Block mode terminator (forward packet)
- Data compaction
- Error message to host
- Break at application level
- Information message

- Control asynchronous modem signals
- Auto-speed and auto-parity
- Block mode buffer size
- Asynchronous modem signal timer
- HP hand-check support
- HP 2335A byte count
- Choice of remote profile

X.25 Specifications
The HP 2335A has an X.25 interface which is fully compatible with the 1984 version of the CCITT X.25 recommendation:

Level 1: Physical Layer
- X.21 bis, RS-232-C, CCITT V24/V28 (up to 64 Kbps)

Level 2: Data Link Layer
- LAP-B protocol operates as DCE or DTE
- Module 8 sequence number
- Window size (1-7)

Level 3: Network Level
- Switched Virtual Circuit (SVC) or Permanent Virtual Circuit (PVC)
- Up to 17 simultaneous virtual circuits
- Window size (1-7)
- Packet size (128 bytes)
- Supports D, M, and Q bits

Other Supported Facilities:
- Window size negotiation
- Incoming and Outgoing calls barred
- One way outgoing and incoming SVC
- Closed User Group (CUG)
- Bilateral closed user group
- Bilateral closed outgoing
- Reverse charging request and acceptance
- Packet size negotiation
- Flow control parameter negotiation
- Throughput class negotiation
- Call redirection
- Hunt group
- Network User Identifier (NUI)
- Extended calling address
- Extended called address

Network Management
In stand-alone environments the HP 2335A can be managed locally via an attached terminal. An HP OpenView network management software running on an HP OpenView PC is also available to manage networks based on HP2334A/2335As and Model 45s. It provides easy-to-use monitoring and control functions using a standard HP OpenView graphical interface.

In addition, a complete integration with HP OpenView DTC Manager release 6.0 is provided, allowing system and network management to be performed from a single PC.

For more information, please refer to the "HP OpenView Switch/PAD Manager" and "HP OpenView DTC Manager" data sheets.

Supported and Recommended Products

Terminals		
HP 2392A	HP 2393A	HP 2394A
HP 2397A	HP 2622A	HP 2623A
HP 2624B	HP 2626A	HP 2627A
HP 2628A	HP 3081A	HP 700/22
HP 700/41	HP 700/43	HP 700/44
HP 700/92	HP 700/94	
VT 100	VT 220	
VT 241	VT 320	
HP Vectra CS/ES/RS/QS		
Printers		
HP 2235B	HP 2563B	HP 2564B
HP 2566B	HP 2567B	HP 2684A
HP 2686A	HP 2932A	HP 2934A
LA 210	LA 75	LN 03
LN 03 Plus		

Computer Interfaces	STAT MUX (Async)	X.25 PAD (Sync)
HP 3000	ATP	INP & HP 24405A
	HP 2345A/DTC	HP 2345A #3xx, 2346D/E/F/G
	HP 2340A/DTC	HP 2340A 340, 2343D
HP 9000	HP 40299A	HP 36941A
	HP 27128A	HP 36960A
	HP 27160A	
	HP 98626A	
	HP 98228A	
	HP 98644A	
	TS8 (HP 2342A)	
	HP 98638A	
	HP 98196A	
	HP 98190A	
HP 1000	MUX	HP 91751A/R &
	HP 12075A	
	HP 12250A	
VAX 7xx	DMF 32	KMS 11
	DHU 11	DMF 32
	DMZ 32 (CK-DM 732)	
MICROVAX- II	DZV 11	KMV 1A
	DZQ 11	DPV 11
	DHV 11	
	DHQ 11	
	CXY 08	
MICROVAX 3xxx	CX408	KMV 1A
	DPV 11	
MICROVAX 2000	RS-232-C Line	DST 32
	DEC 423 Lines	DHT 32 Lines
MICROVAX 3100	RS-232-C Line	DSH 32
	DEC 423 Lines	
	DSH 32 Lines	
VAX 6xxx	DMB 32	KMS 1P
VAX 8xxx	DHB 32 (EIA 232)	

Applications Supported

- PCs
  AdvanceLink (2392)
  AdvanceMail (HP Vectra)

- Computers (STAT MUX)
  Character node
  VPlus block node (HP 3000)
  Binary
- Computers (X.25/PAD)
  Character node
  VPlus block node (HP 3000)

Recommended Modems

- Async Modems
  HP 37212A
  HP 35141A
- Sync Modems
  Racal Milgo Alpha 96
  Bell 2096A
- Async/Sync Modems
  HP 92203A (Codex V.32 2264)
  Codex 2620, 2640 (HP 32066A), 2680
  Codex 3380A, 3380B
  Codex 3500 DSU/CSU

HP Private Packet Network

- Model 45 X.25 Switch and Multiprotocol PAD
- Model 75 Multiprotocol X.25 Switching Node

Certified X.25 Packet Switching Networks
Please contact your local HP Representative for up-to-date information.

- North America
  Canada (Datapac)
  US (Telenet, Tymnet)
- Europe
  Austria (Datex-P)*
  Belgium (DCS)
  Denmark (Datapak)
  France (Transpac)
  Germany F.R. (Datex-P)
  Ireland (Eirpac)
  Italy (Itapac)*
  Luxemburg (Luxpac)
  Netherlands (Datanet1)
  Norway (Datapak)
  Spain (Iberpac)
  Sweden (Datapak)
  UK (PSS)
- Other Countries
  Australia (Austpac)
  Brazil (Renpac)*
  Hong Kong (Datapak, Intelpak)
  Israel (Isranet)
  Japan (Venus-P)
  Malaysia (Maypac)
  Mexico (Telepac)*
  Singapore (Telepac0
  South Africa (Saponet-p)
  South Korea (Datacom-net)
  Taiwan (Pacnet)

* Certification is still in progress.

Customer Installation and Configuration

The customer is responsible for the installation of the HP 2335A. The HP 2335A User's Guide is needed to install and configure the HP 2335A.

The initial configuration may be set up by a Hewlett-Packard Customer Engineer by ordering the HP NetStartup product.

The add-on HP 40262A, HP 40262B 4-port interface, or any upgrade kit may be installed by a Hewlett-Packard Customer Engineer on a time-and-materials basis.

Environmental Characteristics

Temperature Free Space Characteristics
Operating: 0° to +55°C
Non-operating: -40° to +70°C

Relative Humidity (non-condensing)
Operating: 5% to 95% at 40°C during 24 hours
Non-operating: 90% at 65°C to 95% at 40°C

Altitude
Operating: 4,600 meters (14,700 ft)
Non-operating: 15,300 meters (50,000 ft)

Vibration
0.0001 g2/Hz, 5-500 Hz, 3 axis for 10 minutes
Dwell at resonance: 10 minutes

Physical Characteristics
Size: 153 mm H x 325 mm W x 260 mm L (6.03 in H x 12.81 in W x 10.24 in L)
Net weight: 6 kg (13 lbs)
Shipping weight: 9 kg (20 lbs)
Input voltage: 90 to 132 volts
With option 015: 198 to 264 volts
Input frequency: 47 to 63 Hz
Power consumption: 30 watts typical

Approvals
RFI (Radio Frequency Interference): FTZ1046/84 and FCC class A, VCCI and SABS. Configurations including peripherals with high RFI levels may not be supported or may require on-site verification in some countries.

Safety: UL 478 for EDP and office equipment, CSA C22.2 number 220-m1987. Compliance with international standard IEC380, IEC435.

Datacom certification approval: Australia, Belgium, UK, Germany, Japan, and Scandinavia.

Ordering Information

HP 2335A HP 2335A-X.25 Multiplexer

Options

123	4 modem connect ports
G23	*4 modem connect ports in Germany
263	19-inch rack mount kit

Note: You must order at least one Option 123.

HP 40262A Additional 4 modem connect ports for HP 2335A
HP 40262B* Additional 4 modem connect ports for HP 2335A in Germany
HP 40263A 19-inch rack mount kit for HP 2335A
HP 40235A Upgrade kit between HP 2335A and new version HP 2335A X.25/84
Option 001 New version HP 2335A/84 documentation

Ordering Cables

For detailed information on cables, please refer to Appendix F of the HP 2335A User's Guide. The cable on the synchronous link is included in the HP 2335A.

HP 40220A Cable between HP 2335A and ATP/DTC printer ports

HP 40221A** Cable between HP 2335A and ATP/DTC terminal ports
HP 40230A 25-pin cable for HP 3-pin interface (ATP, DTC)

* Terminal/printer attached to HP 2335A via modem, for Germany only.

**Cable between HP 2335A and ATP/DTC printer ports using Term Type 18 HP 40220A.

Documentation

02335-90021 HP 2335A Reference Manual
02335-90022 HP 2335A User's Guide
02335-90017 HP 2335A Quick Reference Guide
5958-3602 X.25, the PSN Connection

HEWLETT® PACKARD

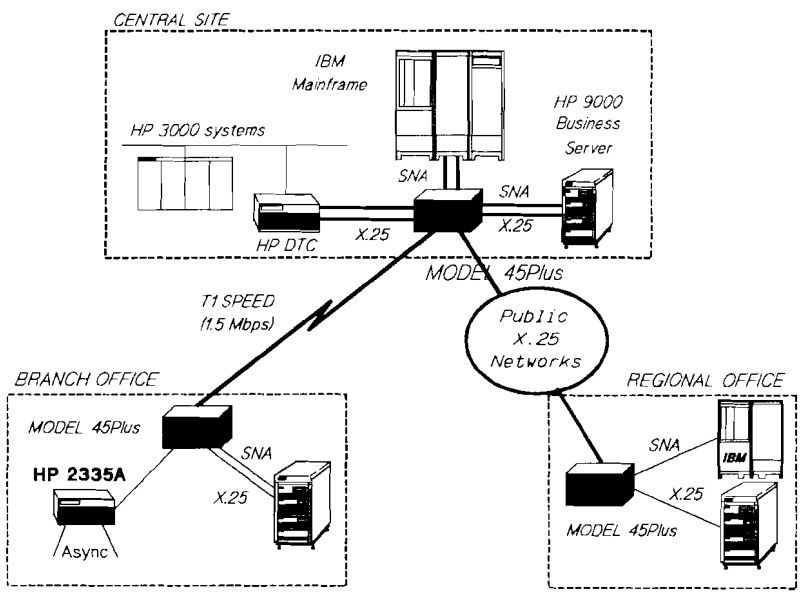
HP Model 45 Plus – Multiprotocol X.25 Switching Node

Technical Data

Product Number
HP J2000C, J2001C

The HP Model 45 Plus is a new generation of high-speed X.25 switching node and multiprotocol PAD. It connects HP and non-HP systems together as well as concentrates devices with different protocols.

The HP Model 45 Plus can operate as a standalone switch, also multiple HP Model 45s can be interconnected to form a small network. It can also provide very cost effective multiprotocol PAD access to large public (Telenet, Transpac, PSS, Datex-P, etc.) or existing private X.25 packet networks.



Features and Benefits

- Simple entry level solution for high-speed multivendor networking.
- Reduced communication and equipment costs (concentration of multiple X.25, SNA/SDLC, asynchronous lines, on one or more X.25 access lines).
- Strong IBM SNA/SDLC features allowing to integrate HP 3000/9000 systems within IBM Mainframe environment.
- Flexible connection to public X.25 data networks (Telenet, Transpac, PSS, Datex-P, etc.) or private X.25 networks, with alternate leased line back-up features.
- State-of-the art connectivity with a wide choice of interfaces like RS-232/V.24, V.35, X.21, and RS-449 standards for high-speed networking.
- High performance multiprotocol links up to 1.5 Mbps (T1 speed) with up to 2500 packets per second on 30 ports,
- Full satellite links performance with packet size configurable up to 1024 bytes.

- High reliability obtained with Surface Mounted Technology (SMT). Estimated Mean-Time-Between-Failure: 35 years.
- Alternate leased line back-up over public or private data networks.
- Managed by HP OpenView Switch/PAD Manager, allowing to manage HP DTCs, HP Hubs and Bridges, HP systems, HP 2335A PADs, and HP Model 45 Pluses from the **same** HP OpenView network management platform.
- Customer installable and rack-mountable in standard HP 19" racks.
- Complete compatibility between the current 4-port Line Processor card and the **new** 6-port Advanced Line Processor card. The **new** 6-port ALP card can be installed on the previous HP Model 45 platforms (HP J200XA), at the condition that a 4 ports LP card remains plugged in the HP J200XA.

Functional Description

The HP Model 45 Plus is a combined X.25 switching node and multiprotocol PAD supporting X.25, SNA/SDLC, and asynchronous protocols. It consists of one or more 6 port multiprotocol Advanced Line Processor (ALP) cards. Individual ports on a ALP card can be configured for any of the supported protocols (X.25, SNA/SDLC, and asynchronous).

The Model 45 Plus can operate as a standalone, intersystem, and terminal switch and as a multiprotocol line concentrator to a public network.

Configuration, control, and monitoring functions can be performed, locally or remotely, via an ANSI terminal or an attached PC monitor and keyboard.

It can also be interconnected with other HP Model 45 Plus's to form a small network linking the systems and terminals at distributed customer sites.

X.25 Switching and Routing

The HP Model 45 Plus provides an integral X.25 communication interface and the following packet switching capabilities:

- Static Routing Table with flexible X.121 address scheme based on Called Address (usual) and/or Calling Address (for security) and/or Call User Data (extended addressing) with call looping prevention.
- Hunt Group facility to associate up to 8 ports in a group, 4 algorithms Round Robin providing load levelling, Least LCN used with throughput, Alternate Route on Line Busy, Alternate Route on Line Failure.
- Powerful address translation gateway allowing multiple operations (extract from original called/calling/cud, remove, pass, add digits) for the called add, user data, and pass/remove for the calling address and facilities fields.

SNA/SDLC PAD

The HP Model 45 Plus features an integral SNA/SDLC PAD which enables communication between remote IBM SNA Control Units and an IBM SNA Mainframe over an X.25 public or private network. Configurable PAD types include the TPAD and the HPAD for any port of an Advanced Line Processor card. The logical channel connection between an HPAD and TPAD can be either a Permanent Virtual Circuit (PVC) or a Switched Virtual Circuit (SVC).

The SNA/SDLC Terminal PAD, or SNA TPAD, acts as a gateway between SNA users over an X.25 network. It offers communication between remote SNA Control Units (IBM, HP 3000, or HP 9000) and an IBM host or other mainframe computers with the NPSI software or connected to the X.25 network through an SNA HPAD.

Both the SNA TPAD and the SNA HPAD perform flow control, automatic call setup and packetizing of SNA information frames. The SNA TPAD and HPAD perform local polling with the attached SNA device, thus keeping network traffic to a minimum. The HPAD supports up to 16 SNA TPAD connections and each TPAD port can support one Control Unit.

Asynchronous PAD

The HP Model 45 Plus features an integral asynchronous PAD which facilitates transparent communication between remote terminals or printers to one or more central computers over an X.25 network. Any or all of the ports on the ALP card can be configured as an asynchronous PAD port. For price reasons, it is recommended to use an HP 2335A Asynchronous PAD if there are more than 3 asynchronous connections.

Network Management

The HP Model 45 Plus is fully managed by HP OpenView Switch/PAD Manager, allowing to manage the HP Model 45 Plus from the same HP OpenView network management platform than HP DTCs, HP Hubs and Bridges, HP systems, and HP 2335A Asynchronous PADs. The following features are provided:

- Configuration with local console or remotely from any HP Model 45 Plus console or PAD user or HP OpenView Switch/PAD manager including remote node reboot, software configuration update.
- Local/Remote password security.
- Real time Alarms/Events collecting (including heartbeat) to an HP Model 45 Plus designed as collecting node or to HP OpenView Switch/PAD manager.
- Alarm Reporting on X.121 address, serial port, parallel port.
- ASCII file configuration report.
- Packet level trace (available in remote).
- Modem signals for any port (available in remote).
- Line Status, performance display, connection display, statistics at line processor and port level (available in remote).
- File transfer facility between HP Model 45 Plus's.

Functional Specifications

HP Model 45 Plus
HP J2000C (Max. 18 ports) :

- 6-18 synchronous/asynchronous ports.
- Power:
  - 50 W typical
  - 85 W maximum with 110/220 V supply
- Input Voltage:
  - Auto-ranging power supply
  - 90-132 V lower range over 47 to 63 Hz
  - 198-264V upper range over 47 to 63 Hz
- System Dimensions: 15.0 in. wide x 15.6 in. deep x 4.0 in. high (38.1 cm * 39.7 cm * 10.2 cm)
- System weight:
  - 69.23 Kg (Box + ALP card – HP J2000C)
  - 0.98 Kg (6-port MAP cable – HP J2030A)
  - 0.23 Kg (ALP card alone – HP J2004B)

HP Model 45 Plus
HP J2001B (Max. 30 ports) :

- 6-30 synchronous/asynchronous ports.
- Power:
  - 52 W typical
  - 100 W maximum with 110/220V supply
- Input Voltage:
  - Auto-ranging power supply
  - 90-132 V lower range over 47 to 63 Hz
  - 198-264V upper range over 47 to 63 Hz
- System Dimensions: 17.3 in. wide * 16.1 in. deep * 6.6 in. high (44 cm * 41 cm * 17 cm)
- System weight:
  - 11.53 Kg (Box + ALP card – HP J2000C)
  - 0.98 Kg (6-port MAP cable – HP J2030A)
  - 0.23 Kg (ALP card alone – HP J2004B)

General Specifications

- Up to 6 configurable ports per ALP card.
- RS-232-C (CCITT V.24/V.28), V.35, X.21,and RS-449 interfaces.
- DTE/DCE configurable at the port level.
- Maximum aggregate throughput = 512 kbps per ALP card.
- Maximum supported line speeds:
  - RS232 (up to 19.2 kb/s)
  - V35 (up to 64 kb/s)
  - X21 (up to 512 kb/s)
  - RS449 (up to 1.5 Mb/s)
- Maximum throughput of 1.5 Mbps in monoport utilization.
- Supports switched virtual circuits (SVC) and permanent virtual circuits (PVC).

- Supports up to 2048 simultaneous VC's (up to 300 PVC's).
- Performance:
  - up to 2500 in/out packets/s (128 bytes)
  - up to 100 call setup per second
- X.25, SNA/SDLC, Asynchronous protocols defined port per port.
- All software on one floppy disk for easy software update.
- Transfer file function.
- Menu driven user interface.
- Dynamic configuration changes.
- Rack-mountable with HP standard kit.
- Customer installable.

X.25 Interface specifications

Level 1:
- RS-232/V.24 interface
- V.35 interface
- X.21 interface
- RS-449 interface
- Single port (0 or 1) can provide clock up to 1.5 Mbit
- All ports may be configured as DTE or DCE without opening the HP Model 45 Plus.

Level 2:
- CCITT 1988 conformance
- LAP-B protocol
- Mod 8 or 128, window 1 – 127
- Logical DCE or DTE
- Frame size up to 10xx X 8 bits

Level 3:
- Packet size up to 1024 bytes (128,256,..1024)
- Up to 2048 simultaneous active virtual circuits
- SVC or PVC (LCN from 1 to 4095)
- X.25 Facilities Supported:
  - Transparent to the User Facilities Field.
  - Complete facility Field can be changed when acting as a gateway (address translation facility)

SNA/SDLC Interface specifications

Level 1
- IBM SDLC full-duplex mode
- Throughput Class up to 64 k for SDLC frames up to 4Kbytes
- Support NRZ or NRZI encoding
- Point-to-Point operation for TPAD connections

Level 2
- IBM SDLC half-duplex mode
- SNA Permanent Virtual Circuits support (up to 300)
- Configurable SDLC station address
- Configurable SDLC frame size up to 4105 bytes.
- QLLC protocol (local polling), support HPAD/TPAD connections, NPSI/TPAD, and HPAD/QLLC connections
- Autocall on TPAD or HPAD with retry timer
- Host-to-host with NPAD mode
- Transparent mode with XPAD mode
- SNA/SDLC ports can operate as DTE or DCE (provides clocking)

Asynchronous Interface specifications

- Implements CCITT X.3 parameters (18 standard parameters).
- Implements CCITT X.28 PAD services signal plus one extra command.
- Implements CCITT X.29 including optional X.29 reselection.
- M-bit sending configurable.
- Throughput Class from 50bps to 38.4Kbps, autobaud facility from 1200 to 19.2 Kpbs.
- Configurable window (up to 127) and packet size (up to 1024 bytes).
- Local login password security with logout timer.
- Predefined profiles.
- Profile defined per port or per subscriber.
- Abbreviated addressing for Async PAD users.
- Configurable welcome message.
- Help commands.
- Supports character mode and VPLUS applications for back-to-back use.

Safety Compliance

UL 1950
EN 60950
CSA C22.2 No. 950

EMC: Electromagnetic Compatibility

FCC Part 15, Subpart J, Class B
VCCI Class 2
EN 55022 Class B
CICSPR22 Class B
IEC 801.2/3/4

Environmental Characteristics

- Temperature:
  - Operating: 40° to 104°F (5°C to 40°C) – HP J2000C (18 ports)
  - 40° to 104°F (5°C to 40°C) – HP J2001B (30 ports)
  - Non-operating: -40° to 158°F (-40° to 70°C) .
- Altitude:
  - Operating: 0 ft to 15,000 ft (0 to 4,570 meters)
  - Non-operating: 0 ft to 50,000 ft (0 to 15,250 meters)
- Relative Humidity:
  - Operating: 15% to 95% RH (non-condensing) – HP J2000C
  - Non-operating: 15% to 80% RH (non-condensing) – HP J2001B

Certified Public Networks

Certified:	Country	Public Data Network
	USA	US Sprint/Telenet
		BT North Am. Tymnet
	UK	PSS
	Germany	Datex-P
	Spain	Iberpac
	Italy	Itapac
	Austria	Datex-P
	Holland	Datanet1
	Belgium	DCS
	Sweden	Datapak
	Finland	Datapak
	Norway	Datapak
	Luxembourg	Luxpac
	Taiwan	Pacnet
Self-certification:	France	Transpac
	Switzerland	Telepac
	Portugal	Telepac
	Canada	Datapac
	Australia	Austpac
	Denmark	Datapak
	Singapore	Telepac
	South-Korea	Dacom-net
	New Zealand	Pacnet
	Hong-Kong	Intelpak
Currently in Progress:	Japan	Venus-P
	USA	DDN
	Mexico	Telepac
	Brazil	Renpac
	Hungary	Please
	South-Africa	Saponet
	Malaysia	Maypac
	China	Chinapac

* Please check with your local HP organization to confirm latest approval information.

Ordering Inforlmation

HP Model 45 Plus - 18 Ports Version

HP J2000C 6 Port Multiprotocol switch (includes one multiprotocol ALP card, X.25, Async, SNA/SDLC software, and manuals)
HP J2004B Additional 6 Port multiprotocol ALP card (X.25, Async, SNA/SDLC). Maximum = 2.
HP J2007B Monitor/Keyboard Package (includes VGA Monitor and Keyboard) - Optional
HP J2030A RS-232 MAP cable (6 RS232 ports)
HP J2031A V.35 MAP cable (2 V.35/4 RS232 ports)
HP J2032A X.21 MAP cable (2 X.21/4 RS232 ports)
HP J2033A RS-449 MAP cable (2 RS449/4 RS232 ports)

Note 1: when ordering J2000C or J2001B, you must also order one MAP cable, either J2030A, J2031A, J2032A or J2033A.

HP Model 45 Plus - 30 Ports Version

HP J2001C 6 Port Multiprotocol switch (includes one multiprotocol ALP card, X.25, Async, SNA/SDLC software, and manuals)
HP J2004B Additional 6 Port multiprotocol ALP card (X.25, Async, SNA/SDLC). Maximum = 4.
HP J2007B Monitor/Keyboard Package (includes VGA Monitor and Keyboard) - Optional
HP J2030A RS-232 MAP cable (6 RS232 ports)
HP J2031A V.35 MAP cable (2 V.35/4 RS232 ports)
HP J2032A X.21 MAP cable (2 X.21/4 RS232 ports)
HP J2033A RS-449 MAP cable (2 RS449/4 RS232 ports)

Conversion Kit From HP Model 45 To HP Model 45 Plus

HP J2005B Conversion kit from HP Model 45 to HP Model 45 Plus (includes one multiprotocol ALP card, software, and manuals).

Note 1: When ordering J2005B, you must also order one MAP cable, either J2030A, J2031A, J2032A, or J2033A.

Note 2: This J2005B conversion kit can be installed on the previous HP Model 45 platforms (J200XA) at the condition that a 4 port LP card remains plugged in the J200XA.

Support Services

J2000C/J2001C + 16A
Network Startup for HP Model 45 Plus

J2000C/J2001C + 16B
NetAssure for HP Model 45 Plus

J2000C/J2001C + 02A
HP Successline/Priority (9h/5 days)

HEWLETT® PACKARD

HP ISDN Link/700

Technical Data

Product Numbers
HP J2104A, J2105A, J2108A, J2109A

Introduction

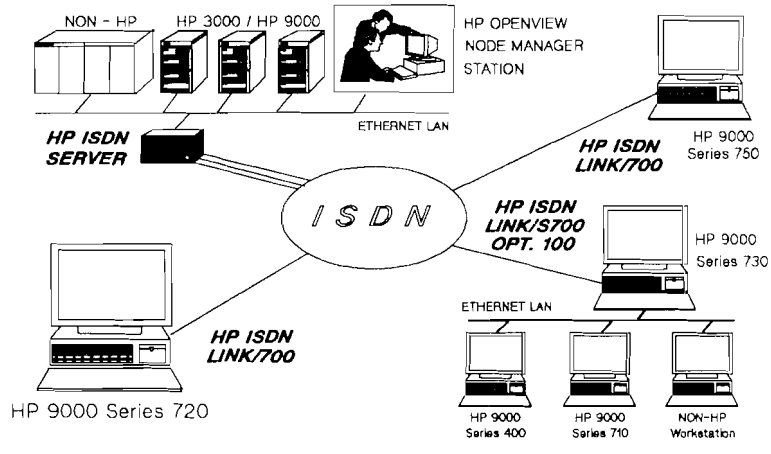
What is ISDN ?
ISDN is an evolution of the telephone network. It provides digital transmission of voice, data, and image on the same physical line.

The ISDN Basic Rate Interface (BRI) is a line with 2 x 64 kb/s digital channels, named B (Bearer) channels, which can simultaneously transmit voice, user data or images in a circuit-switching mode.

Key Features

ISDN circuit switching provides users with several advantages:

- Cost-savings for data communications (pay for call duration, not for volume), in particular for file transfer over wide area networks.
- 64 kb/s reliable data transmission over each ISDN B channel.
- Fast dial-up call establishment.
- Flexible bandwidth allocation by opening one or several 64 kb/s circuits.
- Access security, by identifying callers.



Product highlights

The HP ISDN Link/700 product for the HP 9000 Series 700 provides network connections to public or private ISDN networks.

This product allows HP Series 700-to-HP Series 700, as well as HP Series 700 to non HP ISDN product compliant with RFC877 for X.25 encapsulation over B channel, communications over ISDN networks, through the use of the de facto standard TCP/IP. The HP 9000 Series 700 workstation connected to the ISDN network can communicate with any HP or non-HP system which implements the TCP/IP protocol and which encapsulates IP packets according to RFC877. Also, with HP J2105A or J2108A ordered , the HP 9000 Series 700 workstation equipped with an ISDN Link (HP J2104A or J2109A) can act as a non-dedicated IP router for

the other HP or non-HP stations attached to the LAN.

Major benefits

Optimizes communication costs

ISDN tarification is based on the telephone tariffs system. The cost is related to the duration of the call rather than the volume of data transferred. This enables the HP 9000 Series 700 workstations, equipped with the HP ISDN Link/700, to cost-effectively transfer information to remote, distributed sites. In addition, built-in features like programmable inactivity timers and multiplexing of multiple sessions over the same B channel allow the user to effectively minimize the communication costs.

Transparency for the end-user

Because the ISDN Link/700 is based on the TCP/IP standard, any HP-UX application running on top of TCP/IP can transfer information to remote workstations or computers over ISDN, transparently. ISDN call set-up and call clearing are also entirely automated based on the contents of the configuration files.

Flexible bandwith allocation

One to six 64 kbps B channels can be allocated for a single ISDN communication between two HP 9000 Series 700 workstations. File transfers can therefore be performed at up to 384 kb/s.

Network security

A list of authorized ISDN callers can be configured for the HP 9000 Series 700 workstation and calls from unauthorized callers are refused.

Centralized management through HP OpenView Node Manager

The HP ISDN Link/700 can be configured and controlled from a remote HP OpenView Node Manager station. It supports the SNMP network management protocol.

Product description

The HP ISDN Link/700 includes all the necessary hardware and software to connect an HP 9000 Series 700 workstation to the ISDN and run TCP/IP based networking software such as ARPA Services, Berkeley Sockets or HP's Network Services. These networking software products are not part of the HP ISDN Link/700 product and are either provided with the HP Series 700 workstation or must be purchased separately.

The hardware includes an ISA/EISA compatible Basic Rate Interface card with its ISDN cable (RJ45 connectors) to connect to the public or private ISDN line. Software is provided on CD-ROM or DAT.

A specific software product must be purchased to allow the HP ISDN Link/700 to act as a local, non-dedicated, IP router/gateway for the workstations and computers connected to the LAN.

When multiple, distributed HP 9000 Series 700 workstations need to access a central site over an ISDN network, it is recommended to use multiple BRIs in the Series 700 to act as a call concentrator for the remote stations to access the computers on the central site LAN.

ISDN certifications

At the time this document is printed, the status of ISDN certifications is the following:

France	N2
US	AT&T's 5ESS N-ISDN1
Germany	TR6
UK	TNR1
Italy	in progress
Switzerland	SwissNet1 SwissNet2 in progress
Denemark	in progress
Belgium	ALINE
Japan	INS-64

For more information about the status of certifications in these countries, as well as in non-listed countries, please contact your HP Sales Engineer.

Supported hardware and software

Hardware

At the time this document is printed, the HP ISDN Link/700 is supported on the HP Series 715, 720, 725, 730, 735, 745i, 750, and 755 workstations. Note that for use in some workstations, the EISA extender option must be ordered with the workstation. It is also possible to install up to three ISDN BRI cards in the EISA backplane (only two for the 745i) for the Series 725, 750, and 755.

Software

Operating system HP-UX 8.07 or later.

Warranty

Warranty is 1 year (code 5C).

Physical characteristics

Dimensions

35.3 cm x 12.7 cm (14 in. x 5 in)

Operating Temperature

10° to 40°C (50° to 104°F)

Power consumption

17 W maximum.

Installation policy

The customer is responsible for the installation of the HP ISDN Link/700 product. Before installing the product, the customer should obtain and verify the correct operation of the ISDN line.

Ordering information

HP J2104A HP ISDN Link/700 plug-in ISA/EISA card RJ45 cable and User Guide included, supports only ISDN 64kb/s channels.

AAH Software on Digital Audio Tape (DAT)
AAU CD-ROM certificate.
1AW additional card without software and manual.

HP J2105A TCP/IP-to-ISDN Gateway/Router Software for Series 700 equipped with HP J2104A.

AAH Software on Digital Audio Tape (DAT)
AAU CD-ROM certificate.

HP J2109A HP ISDN Link/700 plug-in ISA/EISA card RJ45 cable and User Guide included, support both ISDN 64kb/s and ISDN 56kb/s channels.

AAH Software on Digital Audio Tape (DAT)
AAU CD-ROM certificate.
1AW additional card without software and manual

HP J2108A TCP/IP-to-ISDN Gateway/Router Software for Series 700 equipped with HP J2109A.

AAH Software on Digital Audio Tape (DAT).
AAU CD-ROM certificate

Note: At the time this document is being printed, J2109A and J2108A are only supported in the U.S.

HEWLETT® PACKARD

HP ISDN Server
HP ISDN Link/MS-DOS

Technical Data

Product Numbers
HP J2101A, J2102A, J2103A

What are the HP ISDN Server and HP ISDN Link/MS-DOS?

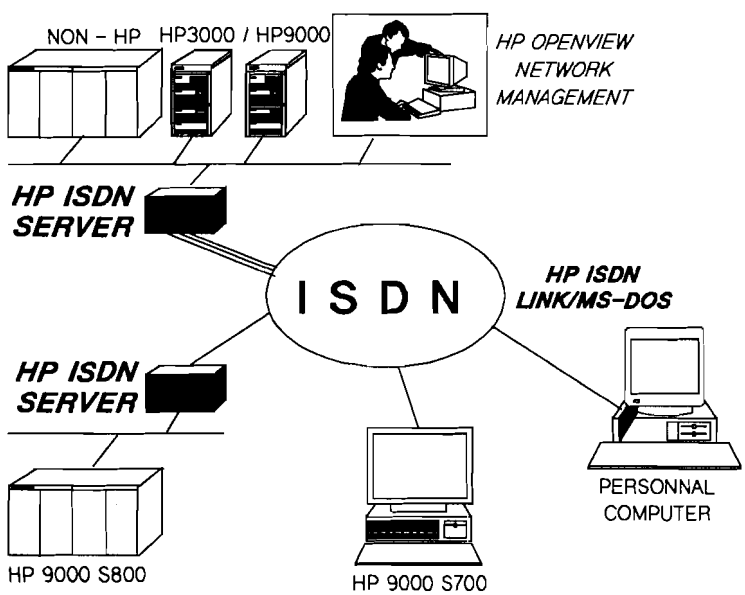
The HP ISDN Server and the HP ISDN Link/MS-DOS are two products from Hewlett-Packard that allow computers and PCs to be connected over the ISDN (Integrated Services Digital Network) and take advantage of ISDN circuit switching services. The HP ISDN product family also includes the HP ISDN Link/S700 for HP 9000 S700 workstations (please refer to P/N J2104A).

The ISDN is an evolution of the telephone network. It provides digital transmission of voice, data, and images on the same line. The ISDN Basic Rate Interface is a line with 2 digital channels at 64 kb/s, named B (Bearer) channels, which simultaneously transmit voice, data, or images on both channels in a circuit-switching mode.

Compared to other data communications technologies, ISDN circuit switching provides users with many advantages:

- 64-kb/s reliable data transmission over each ISDN B channel
- Fast dial-up call establishment
- Flexible bandwidth allocation, by opening one or several 64-kb/s circuits
- Access security, by its ability to identify the ISDN caller

The HP ISDN Server and the HP ISDN Link/MS-DOS extend the capabilities of a LAN to remote locations. These two HP products use ISDN switched circuits for LAN-to-LAN, LAN-to-standalone-PC as well as LAN-to-standalone-S700 workstation connections.



The HP ISDN Server connects a TCP/IP LAN to an ISDN. From the HP ISDN Server, TCP/IP data can be sent over the ISDN to another HP ISDN Server, enabling computers on different LANs to exchange data as if they were on the same LAN. The HP ISDN Server transmits over one or several multiplexed 64-kb/s circuits and provides a total bandwidth ranging from 64 to 384 kb/s. It also acts as a "call concentrator" for remote HP 9000 S700 workstations and PCs, equipped with an ISDN Link, that need to concurrently access computers connected to the same central LAN.

The HP ISDN Link/MS-DOS connects the HP Vectra PC to an ISDN. Between an HP ISDN Link MS-DOS and an HP ISDN Server, TCP/IP data can be sent over one ISDN 64-kb/s circuit, allowing a remote standalone PC to access the LAN as if it were connected locally.

A good example of an application that benefits from these advantages is HP AIMS (Advanced Image Management System). HP's ISDN products allow HP AIMS users located on remote sites to access a central image database and, within a few seconds, retrieve image files over an ISDN dial-up connection.

ISDN Connectivity Based on the TCP/IP Standard

The HP ISDN Server and the HP ISDN Link/MS-DOS provide ISDN connectivity to computers and PCs using networking protocols based on the de facto TCP/IP industry-standard protocol. Such computers include the HP 3000, the HP 9000, and non-HP computers supporting TCP/IP, provided that interoperability tests have been performed. The benefits of ISDN connectivity based on TCP/IP standards are:

- Total application transparency. No modification is required to applications running on computers and PCs for connection to ISDN, provided that these applications run over TCP/IP and Ethernet networking protocols.
- Total compatibility with existing TCP/IP networks. The HP ISDN Server and the HP ISDN Link/MS-DOS act as IP nodes and extend the TCP/IP networking capabilities to the ISDN without requiring any modification to other IP nodes on the network.
- Multivendor communications. The ISDN connectivity offered on the HP 3000 and HP 9000 extends to non-HP computers, provided that these computers support TCP/IP networking, and interoperability tests have been performed.

Features and Benefits

1. HP ISDN Server

Cost-effective ISDN access concentration
In environments involving multiple, distributed HP 9000 S700 workstations (please refer to P/N J2104A, ISDN Link/S700) and PCs which need to access central sites, the HP ISDN Server is a cost-effective solution to concentrate the connection requests from these remote stations.

Standards
Data routing between LAN and ISDN B channel switched circuits is based on the TCP/IP industry-standard protocol.

Flexible ISDN communications to access ISDN nodes in the network
The HP ISDN Server can perform simultaneous and independent full-duplex transmission over up to six B channels to different ISDN nodes in the network, on both incoming and outgoing calls. Channel allocation, dialing, call establishment, and disconnection are automated and transparent to users and applications.

Optimization of ISDN communication costs
A programmable timer is set that disconnects the ISDN communication when data transmission stops. This minimizes the communication duration and cost. Automatic reconnection is performed if data traffic starts again.

Scalable bandwidth allocation, from 64 kb/s to 384 kb/s
Up to six 64-kb/s B channels can be allocated for one ISDN communication between two HP ISDN Servers with multiplexed transmission over the allocated B channels. The number of channels allocated for ISDN communications in each specific direction is defined in the configuration of the HP ISDN Servers.

Network security
The HP ISDN Server can identify the ISDN callers and refuse calls from unauthorized callers. A list of authorized ISDN callers is defined in the configuration utility of the HP ISDN Server.

Flexible local and central network management to save operating costs
Network management capabilities include:

a. Local management. The HP ISDN Server provides configuration, diagnostics, and statistics utilities that are all accessible locally.
b. Central management from an OpenView Network Node Manager Server. Provision for SNMP implementation is embedded in the product. Furthermore, network administrators can access all configuration, diagnostics, and statistics utilities from the OpenView Network Node Manager Server, using Telnet.
c. Remote management from any system in the network that supports Telnet and TCP/IP. Through a Telnet session, network administrators can remotely access all configura-tion, diagnostics, and statistics utilities. This can be done using either the ISDN or LAN link, from any location in the TCP/IP network. Security is assured by an administrator's password logon.
d. Side stream remote management. An asynchronous port with dial-up modem support is available on the HP ISDN Server that allows a remote administrator to access all configuration, diagnostics, and statistics utilities from an asynchronous terminal through a dial-up connection.

2. HP ISDN Link/MS-DOS

Standards
The HP ISDN Link/MS-DOS implements the industry-standard interface NDIS (Network Driver Interface Specification). On top of this interface, the HP ISDN Link/MS-DOS supports Hewlett-Packard's TCP/IP-based PC networking products. The stack of networking protocols of the HP ISDN Link/MS-DOS is compatible with that of the HP ISDN Server, allowing transparent communication between the PC and the TCP/IP LAN through an ISDN network and an HP ISDN Server.

Application transparency
The HP ISDN Link/MS-DOS supports the following Hewlett-Packard networking products for MS-DOS PCs: HP LAN Manager MS-DOS client software, HP ARPA Services/MS-DOS, and HP Network Services. This allows users to transparently run over ISDN existing applications developed with the industry-standard LAN Manager, ARPA Services, and Berkeley Sockets or with Hewlett-Packard's Network Services. The applications do not need to be modified for data to be transmitted over ISDN, but behave as if the PC was connected to a Local Area Network.

Flexible ISDN dial-up
The HP ISDN Link/MS-DOS can perform full-duplex transmission over one B channel to any ISDN node in the network, on incoming and outgoing calls. Dialing, call establishment, and disconnec-tion can be either initiated by the user or performed automat-ically by the ISDN Link/MS-DOS as data transmission is required by the applications.

Optimization of ISDN communication costs
A programmable timer is set that disconnects the ISDN communication when data transmission stops. This minimizes the communication duration and cost. Automatic reconnection is performed if data traffic starts again.

Product Description

The HP ISDN Server is a full system with keyboard and monitor that includes all necessary hardware and software to perform Internet IP routing between the ISDN and the LAN. It is shipped with pre-loaded system software. It includes one ISDN Basic Rate Interface and can accommodate up to three ISDN Basic Rate Interfaces. Each interface comes with a 3-meter ISDN cable. The ISDN Server includes a LAN Interface card that supports ThinLAN and ThickLAN cables.

The HP ISDN Link/MS-DOS includes all the necessary hardware and software to connect an HP Vectra PC to the ISDN and run ARPA Services or LAN Manager. The hardware includes a PC XT/AT compatible Basic Rate Interface, with a 3-meter ISDN cable.

Supported Hardware and Software

The HP ISDN Server supports communications between HP 3000 Series 900, HP 9000 Series 800 and 300 with the following requirements:

- HP 3000 Series 900 operating system: MPE XL 2.2 or later
  - ThinLAN 3000/XL Link: HP 36923A
  - NS 3000/XL Network Services: HP 36920A
  - ARPA Services/XL: HP 36957A
- HP 9000 Series 800 and 300: Operating system: HP-UX 7.0 or later
  - LAN/9000 Link: HP 36967A
  - ARPA Services/9000: HP B1030A and B1014A
  - LAN Manager/X: HP B1011A amd B1003A

The HP ISDN Link/MS-DOS supports the HP Vectra PCs with following software configurations:

- Operating system: MS-DOS 3.3, 4.1, 5.0
  Windows 3.0A is supported with DOS 5.0 only
- One at least of the following Network Services is required:
  - ARPA Services 2.0/MS-DOS: HP D1812B
  - LAN Manager 1.1 for MS-DOS clients: HP D1809B, D1810B, B1011A, B1003A
  - NS 2.1/MS-DOS: HP D1811B
  - Expanded Memory is recommended

For support of configurations with non-HP computers, NETASSURE Support Services are needed to gain Field and Response Center Support.

Installation

Hewlett-Packard will install the HP ISDN Server (J2101A) and the additional ISDN Basic Rate Interfaces (J2103A). This installation is included in the purchase price. The customer is responsible for installation and verification of the ISDN lines and of the LAN.

The HP ISDN Link/MS-DOS (J2102A) is installed by the customer.

Warranty

Warranty for both products is 90 days.

Physical Characteristics

HP ISDN Server (complete system, including monitor, keyboard, 1 LAN card and 1 ISDN interface):
Dimensions: 42.5 cm wide × 39 cm deep × 47.2 cm high. (16.7 in × 15.4 in × 18.6 in)
Weight: 27 kg (59 lbs)
Input voltage: 220 V or 110 V
Power consumption: 240 W maximum
Operating temperature: 5° to 40°C (41° to 104°F)

HP ISDN Link/MS-DOS
Dimensions: 35.3 cm × 12.7 cm (14 in × 5 in)
Operating temperature: 10°C to 40°C (50°F to 104°F)
Power consumption:
17 W maximum

ISDN Certifications

Both the J2101A, the J2102A, the J2102A, and the J2103A are based on the HP J2100A ISDN Basic Rate Interface that needs to obtain an ISDN certification for connection to the public ISDN.

At the time this document was printed, these products are certified for use in the following countries:

France:	Numeris - VN2
Germany:	1TR6
UK:	ISDN2
Japan:	INS64
US:	AT&T 5ESS

These products can also be connected to ISDN PBXs that comply to the above mentioned protocol versions. For support of ISDN PBXs, NETASSURE Support Services are needed to gain Field and Response Center Support.

Certification of these products for the following countries is pending: Australia, Belgium, Italy, USA (NT DMS100), Switzerland.

For support in other countries and on other ISDN switches, please contact your Sales Engineer.

Ordering Information

J2101A: HP ISDN Server.
It includes one LAN interface and one ISDN Basic Rate Interface.

0E2 Set for 110 V operation
0E3 Set for 220 V operation

One and only one of the options 0E2 and 0E3 must be selected.

1BF Configures the HP ISDN Server for ThinLAN. BNC and AUI connectors provided. No MAU or cable provided.
1BJ Configures the HP ISDN Server for ThinLAN and ThickLAN. BNC and AUI connectors provided. AUI cable and MAU provided.

One and only one of the options 1BF or 1BJ must be selected.

100 Configures the HP ISDN Server with 1 or 2 additional ISDN Basic Rate Interface, in addition to the ISDN Basic Rate Interface included in the standard configuration.
(For example, for an ISDN Server with 3 ISDN Basic Rate Interfaces, 220 V operation, and ThinLAN attachment, you must order: one J2101A, option 0E3, option 1BF, two options 100.)

J2102A: HP ISDN Link/MS-DOS.
Plug-in AT compatible PC card, and software. One HP ISDN Link/MS-DOS maximum can be installed in the HP Vectra.
J2103A: HP ISDN Link/Server.
Additional plug-in ISDN Basic Rate Interface for HP ISDN Server. This option is similar to the option 100 of the J2101A, and must be used when ordering an additional ISDN Basic Rate Interface separately from the J2101A. The J2101A can accommodate a maximum of 2 additional ISDN Basic Rate Interfaces, including the options 100 and the J2103As.

Documentation

The following manual is included with the HP J2101A, HP ISDN Server:
System Administrator's Guide (P/N J2101-90001)

The following manuals are included with the HP J2102A, HP ISDN Link/MS-DOS:
System Administrator's Guide (P/N J2101-90001)
Quick Reference Card (P/N J2102-90001)

HEWLETT® PACKARD

HP EtherTwist Routers

Technical Data

Product Numbers
HP 27287A, 27290A, 27289A, 27288A, 27285A, 27286A

The HP EtherTwist routers offer high-performance routing and bridging in a variety of port configurations. These full-featured routers are suitable for use in simple or complex network configurations, either within a single site or between geographically distant locations. The HP routers use the same form factor as the HP EtherTwist family of "rack-and-stack" hubs, and provide the performance, ease of use, reliability, and cost-effectiveness that characterize HP's network components.

Expanding Product Line— The HP router family now includes a variety of routers for different applications:

- *Access routers (Router FR and SR).* Access routers provide connections for the field office to the regional or central site. In this environment, performance depends on the speed of the WAN link. HP's access routers use Motorola 68020 processors to provide media-speed access to wide area links. These routers offer Ethernet-to-WAN (synchronous) connections.
- *Local routers (Router LR and BR).* Local routers provide segmentation of the local site. In this environment, performance depends on the media technology employed. To provide media-speed access across Ethernet segments or high aggregate throughput for FDDI, the local routers use Motorola 68040 processors. These routers offer Ethernet-to-Ethernet and Ethernet-to-FDDI connections.
- *Combination routers (Router ER and TR).* In some cases, both local routing and wide area access are required. For these applications, HP provides Ethernet-to-Ethernet and Ethernet-to-token ring local connections along with dual WAN (synchronous) connections.

High Performance— The HP routers employ Motorola 68040 and 68020 processors and a multiple-bus architecture for excellent performance, even in multiprotocol networks with high traffic loads. For situations where performance is important, the 68040-based local routers offer full media speed (14,880 packets per second, based on 64-byte packets) between any two Ethernet ports, with aggregate throughput for the entire router in excess of 20,000 packets per second.

Concurrent Multiprotocol Routing and Bridging–
All HP routers support concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet Phase IV, and Xerox XNS. For packets that cannot be routed, the HP routers can function simultaneously as MAC-layer bridges with Spanning Tree Protocol. Where port arrangements permit, the HP routers support IEEE source routing via a token ring port; Ethernet-to-FDDI bridging (translational bridging); and Ethernet-to-Ethernet (transparent bridging) across an FDDI connection.

Ease of Use–
Despite the inherent complexities of routing, the HP routers approach the level of "plug-and-play" operation. The Quick-Config utility, available at the console port, allows the router's basic parameters to be set by answering a short series of questions; a split screen displays the current configuration and provides context-sensitive help. A detailed configuration editor is available for fine-tuning of the configuration. Extensive router management is available through the console port (RS-232) or via Telnet (in-band) access over the network. The HP Interconnect Manager applications, under both Windows® and UNIX®, allow control of the router's SNMP parameters.

Excellent Value–
HP routers provide high performance, extensive features, traditional HP reliability, and ease of use—at prices that are below the competition.

Common Features

All routers

All routers do the following:

- Provide concurrent multiprotocol routing and bridging.
- Offer five standard routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet IV, and Xerox XNS.
- Operate concurrently as a bridge using the IEEE 802.1 Spanning Tree Protocol. In addition, the Router TR offers IEEE Source Routing on its token ring port.
- Support the BOOTP relay agent for passing initialization requests between devices on the network.
- Provide network security and isolation by allowing user-configurable filtering based on type of service, protocol, subnet address, and/or network node address.
- Offer standards-based network management using the Simple Network Management Protocol (SNMP). This protocol is supported by HPs OpenView network management software on both DOS® and UNIX platforms. In addition, router management is available through the router's console (RS-232) port and via Telnet (in-band) access over the network.
- Allow easy configuration using the Quick-Config option on the terminal menu. A complete configuration editor is available for detailed tuning of the configuration.
- Include a computer-based tutorial (CBT) for a self-paced training overview of router operation.

FR, SR, ER, and TR routers

In addition, the routers with WAN ports do the following:

- Allow X.25 transfer from all WAN ports.
- Support Frame Relay and SMDS.
- Support synchronous pass-through.
- Connect to most popular ISDN terminal adapters using a standard V.25 bis protocol.
- Automatically sense which type of WAN interface is connected.
- Support WAN link speeds between 19.2 Kbit/s and 2.048 Mbit/s.
- Allow remote software updates via TFTP.
- Support Point-to-Point Protocol (PPP) for multivendor WAN connection.
- Use dial backup circuit support to provide an alternate path when the primary circuit path fails (Router ER, SR, and TR only).

Comparative Features

	27287A Router LR	27290A Router BR	27289A Router FR	27288A Sourter SR	27285A Router ER	27286A Router TR
Ports						
WAN (synchronous)	–	–	1	3	2	2
AUI (Ethernet)	–	–	–	–	2	1
AUI/BNC (Ethernet)	4	4	1	1	–	–
token ring	–	–	–	–	–	1
DAS FDDI	–	–	–	–	–	–
Concurrent multiprotocol routing and bridging.	•	•	•	•	•	•
Management via SNMP, Telnet, and RS-232 console port	•	•	•	•	•	•
Rack space required	2 units (3.5")	2 units (3.5")	1 unit (1.75")	1 unit (1.75")	1 unit (1.75")	1 unit (1.75")
Warranty	3 years (onsite)	3 years (onsite)	3 years (onsite)	3 years (onsite)	3 years (onsite)	3 years (onsite)

HP 27287A Router LR
Multiport router for single-site Ethernet connections.

HP 27290A Router BR
Multiport, single-site Ethernet router with SAS/DAS FDDI connection.

HP 27289A Router FR
Router with single WAN port, for connection from remote field site to regional or central site.

HP 27288A Router SR
Router with multiple WAN ports, for connection from regional or central site to multiple remote field sites.

HP 27285A Router ER
Easy-to-use router for large Ethernet networks, supporting primary and secondary WAN links.

HP 27286A Router TR
Easy-to-use router for large, mixed Ethernet/token ring networks, supporting primary and secondary WAN links.

HEWLETT® PACKARD

HP Router BR

Technical Data

Product Number
HP 27290A

The HP EtherTwist routers offer high-performance routing and bridging in a variety of port configurations. These full-featured routers are suitable for use in simple or complex network configurations, either within a single site or between geographically distant locations. The HP routers use the same form factor as the HP EtherTwist family of "rack-and-stack" hubs, and provide the performance, ease of use, reliability, and cost-effectiveness that characterize HP's network components.

Expanding Product Line— The HP router family now includes a variety of routers for different applications:

- *Access routers (Router FR and SR).* Access routers provide connections for the field office to the regional or central site. In this environment, performance depends on the speed of the WAN link. HP's access routers use Motorola 68020 processors to provide media-speed access to wide area links. These routers offer Ethernet-to-WAN (synchronous) connections.
- *Local routers (Router LR and BR).* Local routers provide segmentation of the local site. In this environment, performance depends on the media technology employed. To provide media-speed access across Ethernet segments or high aggregate throughput for FDDI, the local routers use Motorola 68040 processors. These routers offer Ethernet-to-Ethernet and Ethernet-to-FDDI connections.
- *Combination routers (Router ER and TR).* In some cases, both local routing and wide area access are required. For these applications, HP provides Ethernet-to-Ethernet and Ethernet-to-token ring local connections along with dual WAN (synchronous) connections.

High Performance— The HP routers employ Motorola 68040 and 68020 processors and a multiple-bus architecture for excellent performance, even in multiprotocol networks with high traffic loads. For situations where performance is important, the 68040-based local routers offer full media speed (14,880 packets per second, based on 64-byte packets) between any two Ethernet ports, with aggregate throughput for the entire router in excess of 20,000 packets per second.

Concurrent Multiprotocol Routing and Bridging–
All HP routers support concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet Phase IV, and Xerox XNS. For packets that cannot be routed, the HP routers can function simultaneously as MAC-layer bridges with Spanning Tree Protocol. Where port arrangements permit, the HP routers support IEEE source routing via a token ring port; Ethernet-to-FDDI bridging (translational bridging); and Ethernet-to-Ethernet (transparent bridging) across an FDDI connection.

Ease of Use–
Despite the inherent complexities of routing, the HP routers approach the level of "plug-and-play" operation. The Quick-Config utility, available at the console port, allows the router's basic parameters to be set by answering a short series of questions; a split screen displays the current configuration and provides context-sensitive help. A detailed configuration editor is available for fine-tuning of the configuration. Extensive router management is available through the console port (RS-232) or via Telnet (in-band) access over the network. The HP Interconnect Manager applications, under both Windows® and UNIX®, allow control of the router's SNMP parameters.

Excellent Value–
HP routers provide high performance, extensive features, traditional HP reliability, and ease of use—at prices that are below the competition.

HP Router BR Features

- Provides 4 ports with a choice of AUI or BNC connector for Ethernet/802.3 LAN connection.
- Supports connection to FDDI through Fixed Shroud Duplex (FSD) Media Interface Connector (MIC) receptacles at data rates of 100 Mbit/s.
- Supports Class A Dual Attachment Stations (DAS), Class B Single Attachment Stations (SAS), and dual homing.
- Supports multimode fiber for FDDI distances of up to 2 km over 50/125- or 62.5/125-micron fiber.
- Includes a DIN-6 connector for attachment to an external optical bypass switch.
- Provides concurrent multiprotocol routing and bridging.
- Includes five standard routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet IV, and Xerox XNS.
- Operates concurrently as a bridge using the IEEE 802.1 Spanning Tree Protocol.
- Supports standard protocols for FDDI-FDDI and Ethernet-FDDI bridging; also allows routing between Ethernet/802.3 LANs across an FDDI backbone and to end systems on the FDDI backbone.
- Supports the BOOTP relay agent for passing initialization requests between devices on the network.
- Employs Motorola 68040 (25 MHz) processor and multiple-bus architecture.
- Provides "media speed" Ethernet-to-Ethernet port forwarding rate for bridging and IP routing (14,880 pps, using 64-byte packets). Aggregate throughput of 20,000 pps.
- Stores all software in flash EEPROM, for reliability and convenient software updating over the network.
- Offers network management using the SNMP protocol; in addition, provides router management through the router's console (RS-232) port and via Telnet (in-band) access over the network.
- Provides network security and isolation through user-configurable filtering based on service type (e.g. port, socket), protocol, subnet address, and/or network node address.
- Configures easily using the Quick-Config program. A complete configuration editor is available for detailed configuration.
- Mounts in a standard 19" rack, using 2 rack units (3.5") of vertical rack space. All necessary mounting hardware is included.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

Dimensions:
42.6 cm by 23.5 cm by 8.9 cm (16.8 in. by 9.3 in. by 3.5 in.)
Weight:
4.9 kg (10.9 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
1.0 A max.	0.6 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP Router BR automatically adjusts to any voltage from 90 to 240 volts.

Standards

Communications:
IEEE 802.3, Type 10Base2, Type 10Base5
Ethernet version 1.0 and 2.0
IEEE 802.1 Spanning Tree Protocol, version 9
IEEE 802.1D Transparent Bridging
IEEE 802.1H Translational Bridging
ANSI X3.139/ISO 9314-2
ANSI X3.148/ISO 9314-1
ANSI X3.166/ISO 9314-3
SMT 6.2
RFC 1188
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3:1984 3 V/m

Warranty

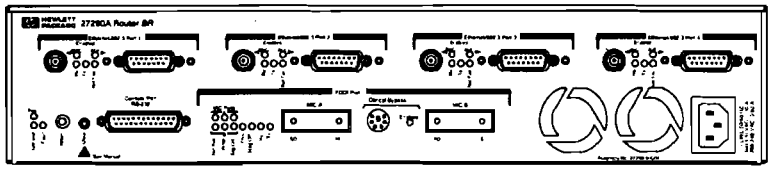
The HP 27290A Router BR is warranted for 3 years against defects.

Ordering Information

HP 27290A Router BR
These additional products can be ordered from HP Support Materials Operations (SM0):

5063-2488 Optical Bypass Switch
5063-2489 FDDI MIC Cable (1 meter)

HP 27290A Router BR



HEWLETT® PACKARD

HP Router FR

Technical Data

Product Number
HP 27289A

The HP EtherTwist routers offer high-performance routing and bridging in a variety of port configurations. These full-featured routers are suitable for use in simple or complex network configurations, either within a single site or between geographically distant locations. The HP routers use the same form factor as the HP EtherTwist family of "rack-and-stack" hubs, and provide the performance, ease of use, reliability, and cost-effectiveness that characterize HP's network components.

Expanding Product Line— The HP router family now includes a variety of routers for different applications:

- *Access routers (Router FR and SR).* Access routers provide connections for the field office to the regional or central site. In this environment, performance depends on the speed of the WAN link. HP's access routers use Motorola 68020 processors to provide media-speed access to wide area links. These routers offer Ethernet-to-WAN (synchronous) connections.
- *Local routers (Router LR and BR).* Local routers provide segmentation of the local site. In this environment, performance depends on the media technology employed. To provide media-speed access across Ethernet segments or high aggregate throughput for FDDI, the local routers use Motorola 68040 processors. These routers offer Ethernet-to-Ethernet and Ethernet-to-FDDI connections.
- *Combination routers (Router ER and TR).* In some cases, both local routing and wide area access are required. For these applications, HP provides Ethernet-to-Ethernet and Ethernet-to-token ring local connections along with dual WAN (synchronous) connections.

High Performance— The HP routers employ Motorola 68040 and 68020 processors and a multiple-bus architecture for excellent performance, even in multiprotocol networks with high traffic loads. For situations where performance is important, the 68040-based local routers offer full media speed (14,880 packets per second, based on 64-byte packets) between any two Ethernet ports, with aggregate throughput for the entire router in excess of 20,000 packets per second.

Concurrent Multiprotocol Routing and Bridging–
All HP routers support concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet Phase IV, and Xerox XNS. For packets that cannot be routed, the HP routers can function simultaneously as MAC-layer bridges with Spanning Tree Protocol. Where port arrangements permit, the HP routers support IEEE source routing via a token ring port; Ethernet-to-FDDI bridging (translational bridging); and Ethernet-to-Ethernet (transparent bridging) across an FDDI connection.

Ease of Use–
Despite the inherent complexities of routing, the HP routers approach the level of "plug-and-play" operation. The Quick-Config utility, available at the console port, allows the router's basic parameters to be set by answering a short series of questions; a split screen displays the current configuration and provides context-sensitive help. A detailed configuration editor is available for fine-tuning of the configuration. Extensive router management is available through the console port (RS-232) or via Telnet (in-band) access over the network. The HP Interconnect Manager applications, under both Windows® and UNIX®, allow control of the router's SNMP parameters.

Excellent Value–
HP routers provide high performance, extensive features, traditional HP reliability, and ease of use—at prices that are below the competition.

HP Router FR Features

- Provides 1 port with a choice of AUI or BNC connector for Ethernet/802.3 LAN connection; provides 1 synchronous WAN connection using the appropriate 5-meter interface cable (RS-232, RS-422/449, V.35, X.21). The router automatically senses which cable is connected. Wide area link speeds between 19.2 Kbit/s and 2.048 Mbit/s are supported.
- Provides concurrent multiprotocol routing and bridging.
- Includes five standard routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet IV, and Xerox XNS.
- Operates concurrently as a bridge using the IEEE 802.1 Spanning Tree Protocol.
- Allows transfer of data through X.25 public data networks (PDN) and defense data networks (DDN) on the WAN port.
- Supports Frame Relay WAN connections as well as SMDS access.
- Connects to popular ISDN terminal adapters using the industry-standard V.25 bis protocol.
- Automatic dial connection based on destination IP address.
- Supports Point-to-Point Protocol (PPP) for connection to multivendor WAN environments.
- Supports the BOOTP relay agent for passing initialization requests between devices on the network.
- Allows remote software updates over the network via TFTP.
- Offers standards-based network management using the Simple Network Management Protocol (SNMP); in addition, provides router management through the router's console (RS-232) port and via Telnet (in-band) access over the network.
- Provides network security and isolation through user-configurable filtering based on service type (e.g. port, socket), protocol, subnet address, and/or network node address.
- Configures easily using the Quick-Config program. A complete configuration editor is available for detailed configuration.
- Mounts in a standard 19" rack, using 1 rack unit (1.75") of vertical rack space. All necessary mounting hardware is included.
- Includes a computer-based tutorial (CBT) for a self-paced training overview of router operation.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

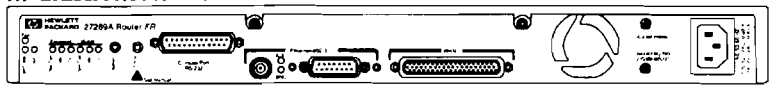
Dimensions:
42.6 cm by 23.5 cm by 4.3 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.60 A max.	0.45 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP Router FR automatically adjusts to any voltage from 90 to 240 volts.

HP 27289A Router FR



Standards

Communications:
IEEE 802.3, Type 10Base2, Type 10Base5
Ethernet version 1.0 and 2.0
IEEE 802.1 Spanning Tree Protocol, version 9
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 2
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 27289A Router FR is warranted for 3 years against defects.

Ordering Information

HP 27289A Router FR

The HP 27289A product includes a WAN (synchronous) cable. Select the cable type by ordering the appropriate option.

Option	Cable	If ordered separately
001	V.35	28606-63008
002	RS-232	28606-63006
003	X.21	28606-63001
004	RS-422	28606-63005

HEWLETT® PACKARD

HP Router SR

Technical Data

Product Number
HP 27288A

The HP EtherTwist routers offer high-performance routing and bridging in a variety of port configurations. These full-featured routers are suitable for use in simple or complex network configurations, either within a single site or between geographically distant locations. The HP routers use the same form factor as the HP EtherTwist family of "rack-and-stack" hubs, and provide the performance, ease of use, reliability, and cost-effectiveness that characterize HP's network components.

Expanding Product Line— The HP router family now includes a variety of routers for different applications:

- *Access routers (Router FR and SR).* Access routers provide connections for the field office to the regional or central site. In this environment, performance depends on the speed of the WAN link. HP's access routers use Motorola 68020 processors to provide media-speed access to wide area links. These routers offer Ethernet-to-WAN (synchronous) connections.
- *Local routers (Router LR and BR).* Local routers provide segmentation of the local site. In this environment, performance depends on the media technology employed. To provide media-speed access across Ethernet segments or high aggregate throughput for FDDI, the local routers use Motorola 68040 processors. These routers offer Ethernet-to-Ethernet and Ethernet-to-FDDI connections.
- *Combination routers (Router ER and TR).* In some cases, both local routing and wide area access are required. For these applications, HP provides Ethernet-to-Ethernet and Ethernet-to-token ring local connections along with dual WAN (synchronous) connections.

High Performance— The HP routers employ Motorola 68040 and 68020 processors and a multiple-bus architecture for excellent performance, even in multiprotocol networks with high traffic loads. For situations where performance is important, the 68040-based local routers offer full media speed (14,880 packets per second, based on 64-byte packets) between any two Ethernet ports, with aggregate throughput for the entire router in excess of 20,000 packets per second.

Concurrent Multiprotocol Routing and Bridging–
All HP routers support concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet Phase IV, and Xerox XNS. For packets that cannot be routed, the HP routers can function simultaneously as MAC-layer bridges with Spanning Tree Protocol. Where port arrangements permit, the HP routers support IEEE source routing via a token ring port; Ethernet-to-FDDI bridging (translational bridging); and Ethernet-to-Ethernet (transparent bridging) across an FDDI connection.

Ease of Use–
Despite the inherent complexities of routing, the HP routers approach the level of "plug-and-play" operation. The Quick-Config utility, available at the console port, allows the router's basic parameters to be set by answering a short series of questions; a split screen displays the current configuration and provides context-sensitive help. A detailed configuration editor is available for fine-tuning of the configuration. Extensive router management is available through the console port (RS-232) or via Telnet (in-band) access over the network. The HP Interconnect Manager applications, under both Windows® and UNIX®, allow control of the router's SNMP parameters.

Excellent Value–
HP routers provide high performance, extensive features, traditional HP reliability, and ease of use—at prices that are below the competition.

HP Router SR Features

- Provides 1 port with a choice of AUI or BNC connector for Ethernet/802.3 LAN connection; provides 3 synchronous WAN connections using the appropriate 5-meter interface cable (RS-232, RS-422/449, V.35, X.21). The router automatically senses which cable type is connected. Wide area link speeds between 19.2 Kbit/s and 2.048 Mbit/s are supported.
- Provides concurrent multiprotocol routing and bridging.
- Includes five standard routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet IV, and Xerox XNS.
- Operates concurrently as a bridge using the IEEE 802.1 Spanning Tree Protocol.
- Allows transfer of data through X.25 public data networks (PDN) and defense data networks (DDN) on all WAN ports.
- Supports Frame Relay WAN connections as well as SMDS access.
- Connects to popular ISDN terminal adapters using the industry-standard V.25 bis protocol.
- Automatic dial connection based on destination IP address.
- Allows load balancing between three WAN links of equal band-width for best use of leased lines.
- Uses dial backup circuit support to provide an alternate path when the primary circuit path fails.
- Supports synchronous pass-through to allow certain IBM SNA and other traffic to use common internet services.
- Supports Point-to-Point Protocol (PPP) for connection to multivendor WAN environments.
- Supports the BOOTP relay agent for passing initialization requests between devices on the network.
- Allows remote software updates over the network via TFTP
- Offers standards-based network management using the Simple Network Management Protocol (SNMP); in addition, provides router management through the router's console (RS-232) port and via Telnet (in-band) access over the network.
- Provides network security and isolation through user-configurable filtering based on service type (e.g. port, socket), protocol, subnet address, and/or network node address.
- Configures easily using the Quick-Config program. A complete configuration editor is available for detailed configuration.
- Mounts in a standard 19" rack, using 1 rack unit (1.75") of vertical rack space. All necessary mounting hardware is included.
- Includes a computer-based tutorial (CBT) for a self-paced

training overview of router operation.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

Dimensions:
42.6 cm by 23.5 cm by 4.3 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:

100-120 V ac	200-240 V ac

Current:

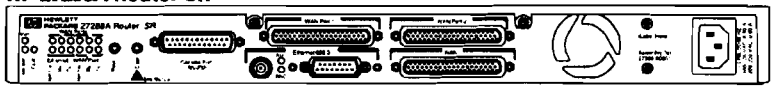
0.9 A max.	0.6 A max

Frequency:

50/60 Hz	50/60 Hz

The HP Router SR automatically adjusts to any voltage from 90 to 240 volts.

HP 27288A Router SR



Standards

Communications:
IEEE 802.3, Type 10Base2, Type 10Base5
Ethernet version 1.0 and 2.0
IEEE 802.1 Spanning Tree Protocol, version 9
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 2
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 27288A Router SR is warranted for 3 years against defects.

Ordering Information

HP 27288A Router SR

The HP 27288A product includes 3 WAN (synchronous) cables. Select the cable type by ordering the appropriate option.

Option	Cable	If ordered separatel)
001	V.35	28606-63008
002	RS-232	28606-63006
003	X.21	28606-63001
004	RS-422	28606-63005

HEWLETT® PACKARD

HP Router LR

Technical Data

Product Number
HP 27287A

The HP EtherTwist routers offer high-performance routing and bridging in a variety of port configurations. These full-featured routers are suitable for use in simple or complex network configurations, either within a single site or between geographically distant locations. The HP routers use the same form factor as the HP EtherTwist family of "rack-and-stack" hubs, and provide the performance, ease of use, reliability, and cost-effectiveness that characterize HP's network components.

Expanding Product Line— The HP router family now includes a variety of routers for different applications:

- *Access routers (Router FR and SR).* Access routers provide connections for the field office to the regional or central site. In this environment, performance depends on the speed of the WAN link. HP's access routers use Motorola 68020 processors to provide media-speed access to wide area links. These routers offer Ethernet-to-WAN (synchronous) connections.
- *Local routers (Router LR and BR).* Local routers provide segmentation of the local site. In this environment, performance depends on the media technology employed. To provide media-speed access across Ethernet segments or high aggregate throughput for FDDI, the local routers use Motorola 68040 processors. These routers offer Ethernet-to-Ethernet and Ethernet-to-FDDI connections.
- *Combination routers (Router ER and TR).* In some cases, both local routing and wide area access are required. For these applications, HP provides Ethernet-to-Ethernet and Ethernet-to-token ring local connections along with dual WAN (synchronous) connections.

High Performance— The HP routers employ Motorola 68040 and 68020 processors and a multiple-bus architecture for excellent performance, even in multiprotocol networks with high traffic loads. For situations where performance is important, the 68040-based local routers offer full media speed (14,880 packets per second, based on 64-byte packets) between any two Ethernet ports, with aggregate throughput for the entire router in excess of 20,000 packets per second.

Concurrent Multiprotocol Routing and Bridging–
All HP routers support concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet Phase IV, and Xerox XNS. For packets that cannot be routed, the HP routers can function simultaneously as MAC-layer bridges with Spanning Tree Protocol. Where port arrangements permit, the HP routers support IEEE source routing via a token ring port; Ethernet-to-FDDI bridging (translational bridging); and Ethernet-to-Ethernet (transparent bridging) across an FDDI connection.

Ease of Use–
Despite the inherent complexities of routing, the HP routers approach the level of "plug-and-play" operation. The Quick-Config utility, available at the console port, allows the router's basic parameters to be set by answering a short series of questions; a split screen displays the current configuration and provides context-sensitive help. A detailed configuration editor is available for fine-tuning of the configuration. Extensive router management is available through the console port (RS-232) or via Telnet (in-band) access over the network. The HP Interconnect Manager applications, under both Windows and UNIX, allow control of the router's SNMP parameters.

Excellent Value–
HP routers provide high performance, extensive features, traditional HP reliability, and ease of use—at prices that are below the competition.

HP Router LR Features

- Provides 4 ports with a choice of AUI or BNC connector. This allows direct connection of thin coaxial cable, or connection via transceiver of twisted-pair, thick coaxial, or fiber-optic cable.
- Provides concurrent multiprotocol routing and bridging.
- Includes five standard routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet IV, and Xerox XNS.
- Operates concurrently as a bridge using the IEEE 802.1 Spanning Tree Protocol.
- Supports the BOOTP relay agent for passing initialization requests between devices on the network.
- Employs Motorola 68040 (25 MHz) processor and multiple-bus architecture.
- Provides "media speed" Ethernetto-Ethernet port forwarding rate for bridging and IP routing (14,880 pps, based on 64-byte packets). Aggregate throughput of 20,000 PPS.
- Stores all software in flash EEPROM, for reliability and convenient software updating over the network.
- Offers standards-based network management using the Simple Network Management Protocol (SNMP); in addition, provides router management through the router's console (RS-232) port and via Telnet (in-band) access over the network.
- Provides network security and isolation through user-configurable filtering based on service type (e.g. port, socket), protocol, subnet address, and/or network node address.
- Configures easily using the QuickConfig program. A complete configuration editor is available for detailed configuration.
- Mounts in a standard 19" rack, using 2 rack units (3.5") of vertical rack space. All necessary mounting hardware is included.
- Includes a computer-based tutorial (CBT) for a self-paced training overview of router operation.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

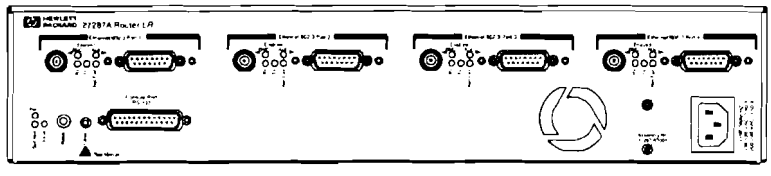
Dimensions:
42.6 cm by 23.5 cm by 8.9 cm (1 6.8 in. by 9.3 in. by 3.5 in.)
Weight:
4.2 kg (9.3 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.9 A max.	0.6 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP Router LR automatically adjusts to any voltage from 90 to 240 volts.

HP 27287A Router LR



Standards

Communications:
IEEE 802.3, Type 10Base2, Type 10Base5
Ethernet version 1.0 and 2.0
IEEE 802.1 Spanning Tree Protocol, version 9
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class A
EN 55022 (1988) Class A
VCCI Class 1
Immunity:
ESD:
IEC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3:1984 3 V/m

Warranty

The HP 27287A Router LR is warranted for 3 years against defects.

Ordering Information

HP 27287A Router LR

HEWLETT® PACKARD

HP Router TR

Technical Data

Product Number
HP 27286A

The HP EtherTwist routers offer high-performance routing and bridging in a variety of port configurations. These full-featured routers are suitable for use in simple or complex network configurations, either within a single site or between geographically distant locations. The HP routers use the same form factor as the HP EtherTwist family of "rack-and-stack" hubs, and provide the performance, ease of use, reliability, and cost-effectiveness that characterize HP's network components.

Expanding Product Line— The HP router family now includes a variety of routers for different applications:

- *Access routers (Router FR and SR).* Access routers provide connections for the field office to the regional or central site. In this environment, performance depends on the speed of the WAN link. HP's access routers use Motorola 68020 processors to provide media-speed access to wide area links. These routers offer Ethernet-to-WAN (synchronous) connections.
- *Local routers (Router LR and BR).* Local routers provide segmentation of the local site. In this environment, performance depends on the media technology employed. To provide media-speed access across Ethernet segments or high aggregate throughput for FDDI, the local routers use Motorola 68040 processors. These routers offer Ethernet-to-Ethernet and Ethernet-to-FDDI connections.
- *Combination routers (Router ER and TR).* In some cases, both local routing and wide area access are required. For these applications, HP provides Ethernet-to-Ethernet and Ethernet-to-token ring local connections along with dual WAN (synchronous) connections.

High Performance— The HP routers employ Motorola 68040 and 68020 processors and a multiple-bus architecture for excellent performance, even in multiprotocol networks with high traffic loads. For situations where performance is important, the 68040-based local routers offer full media speed (14,880 packets per second, based on 64-byte packets) between any two Ethernet ports, with aggregate throughput for the entire router in excess of 20,000 packets per second.

Concurrent Multiprotocol Routing and Bridging–
All HP routers support concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet Phase IV, and Xerox XNS. For packets that cannot be routed, the HP routers can function simultaneously as MAC-layer bridges with Spanning Tree Protocol. Where port arrangements permit, the HP routers support IEEE source routing via a token ring port; Ethernet-to-FDDI bridging (translational bridging); and Ethernet-to-Ethernet (transparent bridging) across an FDDI connection.

Ease of Use–
Despite the inherent complexities of routing, the HP routers approach the level of "plug-and-play" operation. The Quick-Config utility, available at the console port, allows the router's basic parameters to be set by answering a short series of questions; a split screen displays the current configuration and provides context-sensitive help. A detailed configuration editor is available for fine-tuning of the configuration. Extensive router management is available through the console port (RS-232) or via Telnet (in-band) access over the network. The HP Interconnect Manager applications, under both Windows® and UNIX®, allow control of the router's SNMP parameters.

Excellent Value–
HP routers provide high performance, extensive features, traditional HP reliability, and ease of use—at prices that are below the competition.

HP Router TR Features

- Provides one AUI port for Ethernet/ 802.3 IAN connection; one 15-pin port for token ring LAN connection; two synchronous WAN connections using the appropriate 5-meter interface cable (RS-232, RS-422/449, V.35,X.2 1). Router automatically senses which cable is connected. Wide area link speeds between 19.2 Kbit/s and 2.048 Mbit/s are supported.
- Provides concurrent multiprotocol routing and bridging.
- Offers five standard routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet IV, and Xerox XNS.
- Operates concurrently as a bridge between LAN and WAN ports, using the IEEE 802.1 Spanning Tree Protocol on the Ethernet port and IEEE Source Routing on the token ring port.
- Allows transfer of data through X.25 public data networks (PDN) and defense data networks (DDN) on both WAN ports.
- Supports Frame Relay WAN connections as well as SMDS access.
- Connects to popular ISDN terminal adapters using the industry-standard V.25 bis protocol.
- Automatic dial connection based on destination IP address.
- Allows load balancing between two WAN links of equal band-width for best use of leased lines.
- Allows remote software updates over the network via TFTP.
- Use dial backup circuit support to provide an alternate path when the primary circuit path fails.
- Supports synchronous pass-through to allow certain IBM SNA and other traffic to use common internet services.
- Supports Point-to-Point Protocol (PPP) for connection to multivendor WAN environments.
- Supports the BOOTP relay agent for passing initialization requests between devices on the network.
- Offers standards-based network management using the Simple Network Management Protocol (SNMP); in addition, provides router management through the router's console (RS-232) port and via Telnet (in-band) access over the network.
- Provides network security and isolation through user-configurable filtering based on service type (e.g. port, socket), protocol, subnet address, and/or network node address.
- Configures easily using the Quick-Config program. A complete configuration editor is available for detailed configuration.
- Mounts in a standard 19" rack, using 1 rack units (1.75") of vertical rack space. All necessary mounting hardware is included.

- Includes a computer-based tutorial (CBT) for a self-paced training overview of router operation.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F) noncondensing

Physical Characteristics

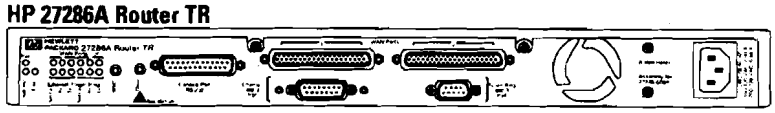
Dimensions:
42.6 cm by 23.5 cm by 4.3 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.9 A max.	0.6 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP Router TR automatically adjusts to any voltage from 90 to 240 volts.

HP 27286A Router TR



Standards

Communications:
IEEE 802.3, Type 10Base2, Type 10Base5
Ethernet version 1.0 and 2.0
IEEE 802.1 Spanning Tree Protocol, version 9
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 2
FTZ 1046/84 (VDE Level B)
Immunity:
ESD:
IEC 801-2:1991 3 kV CD, 8 kV AD
Radiated Immunity:
IEC 801-3: 1984 3 V/m

Warranty

The HP 27286A Router TR is warranted for 3 years against defects.

Ordering Information

HP 27286A Router TR

The HP 27286A product includes two WAN (synchronous) cables. Select the cable type by ordering the appropriate option.

Option	Cable	If ordered separately
001	V.35	28606-63008
002	RS-232	28606-63006
003	X.21	28606-63001
004	RS-422	28606-63005

HEWLETT® PACKARD

HP Router ER

Technical Data

Product Number
HP 27285A

The HP EtherTwist routers offer high-performance routing and bridging in a variety of port configurations. These full-featured routers are suitable for use in simple or complex network configurations, either within a single site or between geographically distant locations. The HP routers use the same form factor as the HP EtherTwist family of "rack-and-stack" hubs, and provide the performance, ease of use, reliability, and cost-effectiveness that characterize HP's network components.

Expanding Product Line— The HP router family now includes a variety of routers for different applications:

- *Access routers (Router FR and SR).* Access routers provide connections for the field office to the regional or central site. In this environment, performance depends on the speed of the WAN link. HP's access routers use Motorola 68020 processors to provide media-speed access to wide area links. These routers offer Ethernet-to-WAN (synchronous) connections.
- *Local routers (Router LR and BR).* Local routers provide segmentation of the local site. In this environment, performance depends on the media technology employed. To provide media-speed access across Ethernet segments or high aggregate throughput for FDDI, the local routers use Motorola 68040 processors. These routers offer Ethernet-to-Ethernet and Ethernet-to-FDDI connections.
- *Combination routers (Router ER and TR).* In some cases, both local routing and wide area access are required. For these applications, HP provides Ethernet-to-Ethernet and Ethernet-to-token ring local connections along with dual WAN (synchronous) connections.

High Performance— The HP routers employ Motorola 68040 and 68020 processors and a multiple-bus architecture for excellent performance, even in multiprotocol networks with high traffic loads. For situations where performance is important, the 68040-based local routers offer full media speed (14,880 packets per second, based on 64-byte packets) between any two Ethernet ports, with aggregate throughput for the entire router in excess of 20,000 packets per second.

Concurrent Multiprotocol Routing and Bridging–
All HP routers support concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet Phase IV, and Xerox XNS. For packets that cannot be routed, the HP routers can function simultaneously as MAC-layer bridges with Spanning Tree Protocol. Where port arrangements permit, the HP routers support IEEE source routing via a token ring port; Ethernet-to-FDDI bridging (translational bridging); and Ethernet-to-Ethernet (transparent bridging) across an FDDI connection.

Ease of Use–
Despite the inherent complexities of routing, the HP routers approach the level of "plug-and-play" operation. The Quick-Config utility, available at the console port, allows the router's basic parameters to be set by answering a short series of questions; a split screen displays the current configuration and provides context-sensitive help. A detailed configuration editor is available for fine-tuning of the configuration. Extensive router management is available through the console port (RS-232) or via Telnet (in-band) access over the network. The HP Interconnect Manager applications, under both Windows® and UNIX®, allow control of the router's SNMP parameters.

Excellent Value–
HP routers provide high performance, extensive features, traditional HP reliability, and ease of use—at prices that are below the competition.

HP Router ER Features

- Provides 2 AUI ports for Etherenet/802.3 LAN connection; provides 2 synchronous WAN connections using the appropriate 5-meter interface cable (RS-232, RS-422/449, V.35, X.21). The router automatically senses which cable is connected. Wide area link speeds between 19.2 Kbit/s and 2.048 Mbit/s are supported.
- Provides concurrent multiprotocol routing and bridging.
- Includes five standard routing protocols: TCP/IP (RIP/OSPF), Novell IPX, AppleTalk II, DECnet IV, and Xerox XNS.
- Operates concurrently as a bridge using the IEEE 802.1 Spanning Tree Protocol.
- Allows transfer of data through X.25 public data networks (PDN) and defense data networks (DDN) on both WAN ports.
- Supports Frame Relay WAN connections as well as SMDS access.
- Connects to popular ISDN terminal adapters using the industry-standard V.25 bis protocol.
- Automatic dial connection based on destination IP address.
- Allows load balancing between two WAN links of equal band-width for best use of leased lines.
- Use dial backup circuit support to provide an alternate path when the primary circuit path fails.
- Supports synchronous pass-through to allow certain IBM SNA and other traffic to use common internet services.
- Supports Point-to-Point Protocol (PPP) for connection to multivendor WAN environments.
- Supports the BOOTP relay agent for passing initialization requests between devices on the network.
- Allows remote software updates over the network via TFTP.
- Offers standards-based network management using the Simple Network Management Protocol (SNMP); in addition, provides router management through the router's console (RS-232) port and via Telnet (in-band) access over the network.
- Provides network security and isolation through user-configurable filtering based on service type (e.g. port, socket), protocol, subnet address, and/or network node address.
- Configures easily using the Quick-Config program. A complete configuration editor is available for detailed configuration.
- Mounts in a standard 19" rack, using 1 rack unit (1.75") of vertical rack space. All necessary mounting hardware is included.
- Includes a computer-based tutorial (CBT) for a self-paced training overview of router operation.

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Humidity:
15% to 95% @ 40°C (104°F)
noncondensing

Physical Characteristics

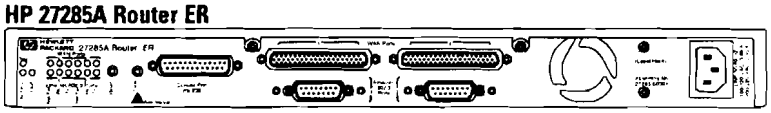
Dimensions:
42.6 cm by 23.5 cm by 4.3 cm (16.8 in. by 9.3 in. by 1.7 in.)
Weight:
2.7 kg (6.0 lbs)

Electrical Characteristics

Voltage:	
100-120 V ac	200-240 V ac
Current:	
0.60 A max.	0.45 A max
Frequency:	
50/60 Hz	50/60 Hz

The HP Router ER automatically adjusts to any voltage from 90 to 240 volts.

HP 27285A Router ER



Standards

Communications:
IEEE 802.3, Type 10Base2, Type 10Base5
Ethernet version 1.0 and 2.0 IEEE 802.1 Spanning Tree Protocol, version 9
Safety:
UL 1950
CSA 950
Verified to IEC 950/EN60950
Emissions:
FCC Part 15 Class A
CISPR-22 (1985) Class B
EN 55022 (1988) Class B
VCCI Class 2
Immunity:
ESD:
1EC 801-2: 1991 3 kV CD, 8 kV AD
Radiated Immunity
IEC 801-3: 1984 3 V/m

Warranty

The HP 27285A Router ER is warranted for 3 years against defects.

Ordering Information

HP 27285A Router ER

The HP 27285A product includes 2 WAN (synchronous) cables. Select the cable type by ordering the appropriate option.

Option	Cable	If ordered separately
001	V.35	28606-63008
002	RS-232	28606-63006
003	X.21	28606-63001
004	RS-422	28606-63005

HEWLETT® PACKARD

HP Router CR

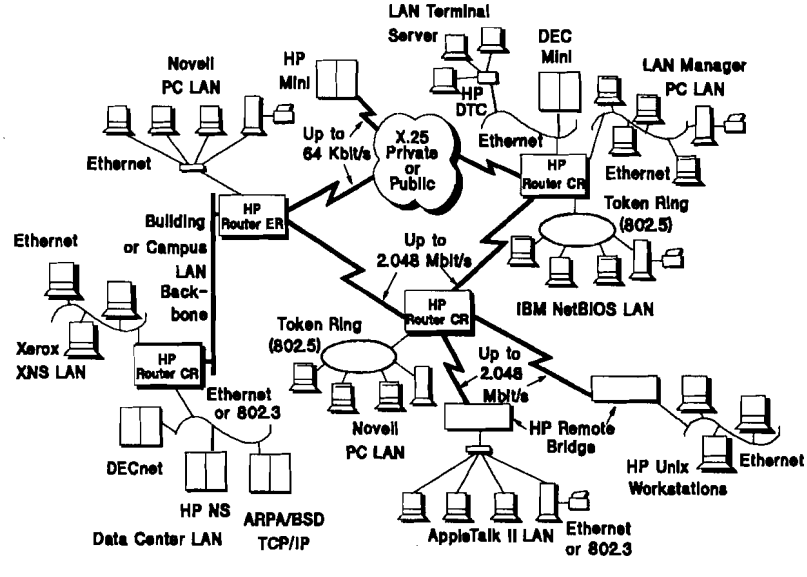
Technical Data

Product Numbers
HP 27270A, 27271A, 27272A, 27274A, 27276A, 27277A, and 27278A

The HP Router CR is a high-performance, multiprotocol router and bridge. It can be used to interconnect any number of LAN networks to create an "internetwork" which links together LANs on a single site, and/or connects LANs at multiple sites via high-speed links.

Highlights

- ***Concurrent Multiprotocol Routing and Bridging:*** The HP Router CR can be configured to support concurrent operation of five popular routing protocols: TCP/IP, DECnet IV, Novell IPX, Xerox XNS, and AppleTalk II. For packets that cannot be routed, the router can function as an Ethernet/802.3 learning bridge with the IEEE Spanning Tree protocol and/or as a Token Ring (802.5) bridge with the Source Routing Transparent protocol. It can also connect to X.25 networks in a variety of configurations.
- ***Flexibility:*** By adding the appropriate network interfaces, the router can be configured to support from 2 to 8 LAN ports or a maximum of 16 WAN ports. It can also be used in combination with the HP Router ER and HP Remote Bridge to create cost effective internetworks.
- ***High Performance:*** The HP Router CR employs a parallel, multiprocessor architecture for excellent LAN-to-LAN performance, even in multiprotocol networks with high traffic loads.



Features

- Provides concurrent multiprotocol routing and bridging for maximum flexibility in connecting different multivendor devices on the network.
- Offers five standard routing protocols: TCP/IP, DECnet IV, Xerox XNS, Novell IPX, and AppleTalk II.
- Operates concurrently as a multiport Ethernet/802.3 bridge with the IEEE 802.1 Spanning Tree Protocol and/or Token Ring (802.5) bridge with the Source Routing Transparent protocol.
- Allows connection of Ethernet/802.3 networks to Token Ring (802.5) for networks using TCP/IP, Novell IPX, and/or AppleTalk II protocols.
- Supports the standard protocols used for routing table management in multiple router networks: Open Shortest Path First (OSPF) and Routing Information Protocol (RIP).
- Supports from 2 to 8 Ethernet/802.3 connections via the standard AUI port.
- Supports from 1 to 4 Token Ring (802.5) connections at 4 or 16 Mbit/s via the mini DB-9 connector.
- Can transfer data through X.25 public data networks (PDNs).
- Supports up to 16 synchronous WAN connections. Different interface cable options provide RS-232, RS-422/449, V.35, or X.21 interfaces. Supports data rates up to 2.048 Mbit/s.
- Allows load balancing between multiple WAN links of equal bandwidth.
- Allows synchronous traffic from X.25 packet switches and/or mainframe terminal controllers to be integrated with router traffic over one set of WAN links. SDLC, HDLC, or LAP-B data streams can be connected to a synchronous port on the router and forwarded to another router port in the network.
- Provides a wide variety of filtering options for network security and isolation.
- Supports the Simple Network Management Protocol (SNMP). Works with HP OpenView Network Management Software. Also manageable via the router's console (RS-232) port or Telnet (remote terminal) access over the network.
- Supports remote installation of new versions of HP Router CR software over the network using the Trivial File Transfer Protocol (TFTP).
- Optionally mounts in a standard 19-inch rack using the built-in mounting brackets.

Specifications

Environmental Characteristics

Operating Temperature:
5°C to 40°C (40°F to 104°F)
Relative Operating Humidity:
15% to 80% at 40°C (104°F)

Physical Characteristics

Height: 22.1 cm (8.7 in)
Width: 48.3 cm (19.0 in)
Depth: 50.0 cm (19.7 in)

Electrical Characteristics

ac Voltage	100-120 V	220-240 V
Current	6 A	3 A
Frequency	50/60 Hz	50/60 Hz

The HP Router CR can be configured to support either voltage range shown above.

Regulatory Safety:
- UL 1950
- CSA 950
- TUV - IEC 950/EN60950

HP Router CR Performance

(64 byte packets per second; no packets dropped)

Protocol	Port-to-Port k packets/s	Card-to-Card k packets/s
Ethernet Learning Bridge	13.5	14.5
IP Routing over Ethernet	8.4	10.1
IP Routing over 802.3	7.4	8.7
DECnet IV Routing over Ethernet	6.0	7.1
Novell IPX Routing over Ethernet	5.8	6.8
AppleTalk Routing over Ethernet	7.8	9.4
Mix of above with SNMP & ARP	7.3	6.2

Emissions:
- FCC Part 15, Class A
- VDE 0871 Level A
- VCCI Class I
- CISPR-22 Class A
- EN 55022 Class-A

Immunity:
- ESD (8KV), IEC 801-2 Level 3 ENSS 101-2

Radiated Emissions:
- (3V/M), IEC 801-3 Level 2, ENSS 101-3

Data Communication Certification

The HP 27270A is approved under Approval Number NS/G/1234/J/100003 for indirect connection to the public telecommunications system within the United Kingdom.

X.25 Certification:
Hewlett-Packard has applied to the following agencies for certification for use on X.25 packet-switching networks. Certifications were still in progress at time of printing.

Country	Network
North America	
U.S.A.	Telenet, Tymnet
Asia/Pacific	
Japan	Venus-P
Europe	
Austria	DATEX-P
Belgium	DCS
Finland	DATAPAK-P
Germany	DATEX-P
Italy	ITAPEK
Luxembourg	LUXPAC
Netherlands	DATANET1
Norway	DATAPAK
Sweden	DATAPAK
United Kingdom	PSS

X.21 Certification:
In countries where interface protocol certification is required for connecting to leased digital lines or public data networks, the X.21 protocol must be used. Certification is in progress for the following countries:

Austria	Luxembourg
Belgium	Netherlands
Finland	Norway
Germany	Sweden
Iceland	U.K.
Italy	

Additional certification testing will continue on selected networks. Please contact your local HP Sales and Support Office for up-to-date information.

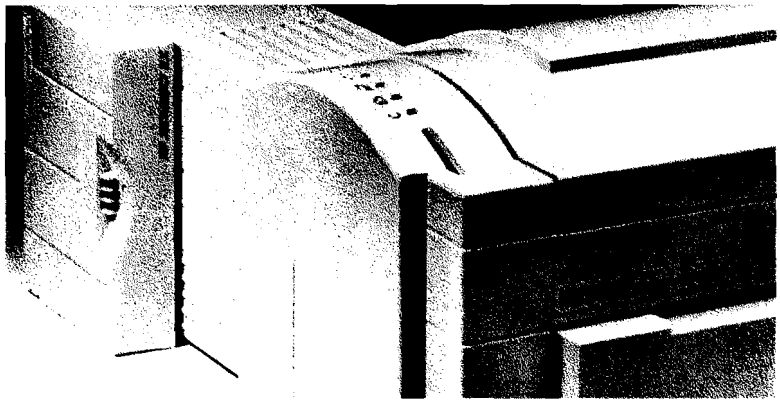
HEWLETT® PACKARD

HP JetDirect EX External Interface

Technical Data

Product Numbers
HP J2382B, J2383B

Multiprotocol network interface for parallel-based printers



HP JetDirect EX External Network interface lets you turn your HP personal printer into a full functional network printer. You can use the HP JetDirect EX interface to connect printers anywhere on an Ethernet or Token Ring LAN, getting the speed, location, sharing and simplicity benefits of a direct network connection. The interface connects to your printer via the parallel I/O port.

Peripheral Support

- LAN connectivity solutions for all HP parallel-based peripherals including the HP LaserJet 4P, 4MP, IIP, IIP plus, IIIP, 4L and 4ML printers, DraftPro Plus plotter, DesignJet, HP DeskJet printers, and 256xC and C235xA line printers
- Plus support of non-HP parallel-based printers

Highlights

- Expanded network operating system support
- Powerful utilities (HP JetAdmin and HP JetPrint) give Novell administrators and users remote printer status, configuration and driver installation capability
- Sustained data transfer of up to 230 KBytes per second through HP's Bi-Tronics high speed parallel interface
- Features automatic network/protocol switching
- Remote network management with SNMP diagnostics
- HP JetDirect network interfaces for Token Ring (4 and 16 Mbps) support transparent and source routing
- Does not require any additional power outlet

Part Names and Numbers

J2382B HP JetDirect EX External Network Interface for Ethernet LANs; BNC connector for 10Base2 thin coaxial cable, RJ-45 connector for 10-Base-T cable

J2383B HP JetDirect EX External Network Interface for Token Ring LANs; DB9 (9-pin Token Ring connector*), supports Type 1, 2 or 6 shielded cable

- Requires standard Centronics parallel printer cable p/n C2912B 3.0M or 92284A 2.0M or C3061A 1.0M (purchased separately)
- Uses printer's IEC 320 power cord

* To attach the HP JetDirect EX External Network Interface to a Token Ring 4/16 Mbps network using unshielded twisted-pair cable, you will need to purchase a Type 3 Media Filter. Consult the media filter vendor for supported 16 Mbps configurations.

For the nearest authorized Hewlett-Packard dealer in the United States, call toll-free 1-800-752-0900.

HP JetDirect EX Interface

Product Part Number	Network Type/Port	Network Operating System Support
J2382B	Ethernet/802.3 BNC (Thin Coax), RJ-45 (10BaseT)	• Novell NetWare 286 v2.15c and beyond/386 v3.11, 4.0 and 4.01 (IPX/SPX) • Microsoft LAN Manager v2.1, 2.2 (DLC, LLC) • Windows NT v3.1/Windows for Workgroups v3.1 (DLC/LLC) • IBM LAN Server OS/2 v2.0 LAN Server v3.0 (DLC/LLC) • HP-UX v8.0, 9.0;* Solaris v2.1; SunOS v4.1.1 - 4.1.3;* SCO UNIX V/386**; IBM AIX v3.2.5** (TCP/IP) • Apple EtherTalk*** • MPE/iX****
J2383B	Token Ring/802.5 4/16 Mbps DB9	• Novell NetWare 286 v2.15c and beyond/386 v3.11, 4.0 and 4.01 (IPX/SPX) • Microsoft LAN Manager v2.1, 2.2 (DLC/LLC) • Windows NT v3.1/Windows for Workgroups v3.1 (DLC/LLC) • IBM LAN Server OS/2 v2.0 LAN Server v3.0 (DLC/LLC)

* Customer must purchase an HP JetDirect software kit for HP-UX (J2374A) or SunOS/Solaris (J2375A). One software kit can be purchased for loading onto multiple host systems and will support multiple JetDirect products.
** SCO UNIX software is provided directly by the Santa Cruz Operation. IBM AIX software is provided directly by IBM. Software, documentation and support are available only from SCO and IBM, respectively.
*** Apple EtherTalk is supported only with Bi-Tronics-based printers.
**** MPE/iX support requires additional spooler software from Quest Software, Inc.

SIMM Upgrades Available:

Product Number	Upgrade to multi-protocol
J2447A	HP JetDirect EX for Ethernet PN: J2382A - to - PN: J2382B
J2448A	HP JetDirect EX for Token Ring PN: J2383A - to - PN: J2383B

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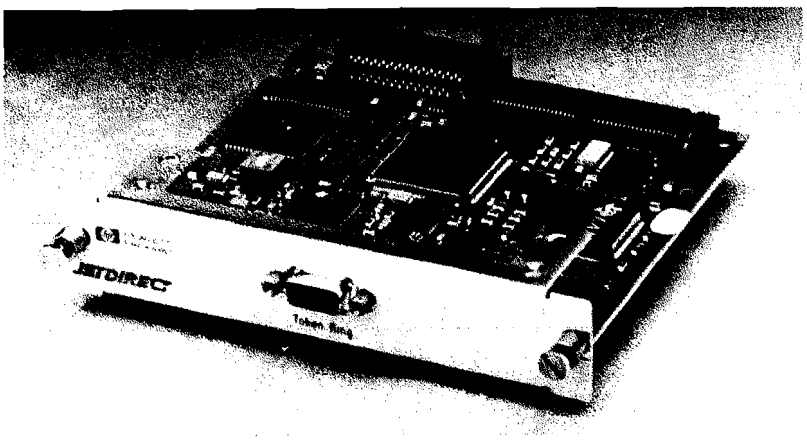
HEWLETT® PACKARD

HP JetDirect Card for Token Ring

Technical Data

Product Number
HP J2373A

For the HP LaserJet 4Si, 4Si MX, 4, 4M, and IIISi printers, HP DeskJet 1200C printer, HP PaintJet XL300 and XL300 PostScript color printers and HP DesignJet 650C, 600 and DesignJet plotters



HP's JetDirect card for Token Ring offers complete support for network printing, including printer management software. It lets you connect HP LaserJet 4Si and 4Si MX printers to a network running multiple Token Ring protocols. For the HP LaserJet 4Si and 4Si MX, automatic network switching lets your printer receive print jobs from workstations running any of the network operating systems the interface supports; the card switches on-the-fly to the proper protocol for each print job. Or connect any other network-ready HP printer or plotter for single selectable protocol capability. Because a printer with an HP JetDirect card connects directly to your network as a node, you can locate a printer anywhere on your LAN, and transmit data to it at full network speed. There's no parallel port bottleneck at the printer to slow down data input.

Highlights

- SNMP agents built in for powerful management capabilities
- Powerful utilities (JetAdmin and JetPrint) give Novell users remote printer status, configuration and driver installation capabilities
- Fully compatible with Token Ring protocols (IPX/SPX and DLC/LLC):
  - Novell NetWare*, NetWare 286 (Advanced NetWare and SFT NetWare v2.15c and beyond) and NetWare 386 (v3.11)
  - IBM LAN Server (v1.3) and Microsoft LAN Manager (v2.1), Windows NT (v3.1) and Windows for Workgroups (v3.1)
  - 4- and 16-Mbps data rates supported
- Supports transparent and source routing

Part Name and Number

J2373A DB9 9-pin Token Ring port**

* Version 1.2 or beyond of Novell's Print Server is required if the Novell Print Server is used. Contact your authorized Novell reseller for more information about Novell's Print Server. HP JetDirect cards also provide the option of using their own queue server.

** To attach the HP JetDirect card to a Token Ring 4-Mbps network using unshielded twisted-pair cable, you will need to purchase a Type 3 Media Filter. The HP JetDirect card will also work with media filters that support the 16-Mbps data rate over unshielded twisted-pair cable. Consult the media filter vendor for supported 16-Mbps configurations. The HP PaintJet XL300 is not supported running at 16 Mbps over unshielded twisted-pair cabling.

For the nearest authorized Hewlett-Packard dealer in the United States, call toll-free 1-800-752-0900.

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HEWLETT® PACKARD

HP JetDirect Card for Ethernet

Technical Data

Product Numbers
HP J2371A, J2372A

For the HP LaserJet 4Si, 4Si MX, 4, 4M, and IIISi printers, HP DeskJet 1200C and 1200C/PS printers, HP PaintJet XL300 and XL300 PostScript® color printers and HP DesignJet 650C, 600, and DesignJet plotters

HP's JetDirect cards for Ethernet offer complete support for network printing, including printer management software. They let you connect HP LaserJet 4Si and 4Si MX printers, to a cable running multiple Ethernet protocols. For the HP LaserJet 4Si and 4Si MX, automatic network switching lets your printer receive print jobs from any of the network operating systems the interfaces support; the cards switch on-the-fly to the proper protocol for each print job. Or connect any other network-ready HP printer or plotter for single selectable protocol capability. Because a printer with an HP JetDirect card connects directly to your network as a node, you can locate printers anywhere on your LAN, and transmit data to them at network speed.

Highlights

- SNMP agents built in for powerful management capabilities
- SIMM sockets for upgradeability
- Powerful utilities (JetAdmin and JetPrint) give Novell users remote status, configuration, and driver installation capabilties
- Fully compatible with Ethernet protocols for:
- Novell NetWare*, NetWare 286 (Advanced NetWare and SFT NetWare v2.15c and beyond) and NetWare 386 (v3.11) (IPX/SPX)
  - IBM LAN Server (v1.3) and Microsoft LAN Manager (v2.1), Windows NT (v3.1) and Windows for Workgroups (v3.1) (DLC/LLC)
  - Apple EtherTalk (System 6, 7)
  - HP-UX** (8.0, 9.0), SCO UNIX[1] (V/386 3.2.2., 3.2.4), SunOS[2] (v4.1.1, 4.1.2, 4.1.3 on Sun SPARCsystems) and Solaris (v2.1) on Sun SPARCsystems (TCP/IP)

Part Names and Numbers

J2371A RJ-45 jack for 10BaseT cabling

J2372A BNC port for 10Base2 Thin coaxial cabling and RJ-45 jack for 10BaseT cabling

* Version 1.2 or beyond of Novell's Print Server is required if the Novell Print Server is used. Contact your authorized Novell reseller for more information about Novell's Print Server. HP JetDirect cards also provide the option of using their own queue server.

** HP-UX requires the additional purchase of HP JetDirect Interface Software for HP-UX Systems. Includes: CD-ROM, DAT (DDS) tape, ¼-inch cartridge tape. (P/N J2374A)

1 SCO UNIX V/386 3.2.2, 3.2.4 is supported directly by The Santa Cruz Operation, Inc. Necessary software documentation and support is available only from The Santa Cruz Operation, Inc.

2 SunOS/Solaris requires the additional purchase of HP JetDirect Interface Software for Sun UNIX Systems. Includes: CD-ROM, 1/4-inch cartridge tape QIC 24 format. (P/N J2375A)

For the nearest authorized Hewlett-Packard dealer in the United States, call toll-free 1-800-752-0900.

HEWLETT® PACKARD

HP JetDirect Card for LocalTalk

Technical Data

Product Numbers
HP J2341B, C2059F, 33416B

For the HP LaserJet 4Si, 4, IIISi, III, IIID, and IID printers, HP DeskJet 1200C printer, and HP PaintJet XL300 color printer

The HP JetDirect card for LocalTalk lets you connect an HP printer anywhere on your Apple Macintosh LocalTalk network, with plug and play simplicity. The HP JetDirect card for LocalTalk plugs into your printer's optional I/O slot. Connecting an HP printer to your LocalTalk network requires adding optional PostScript® software from Adobe® and, in most cases, printer memory.

Highlights

- Uses standard Macintosh operations: users select HP peripherals via the Chooser, just as they expect.
- Works with all existing Macintosh models and system software.
- Provides the usual on-screen printing progress and printer condition feed-back Macintosh users are used to.
- Printer features can be accessed directly by any Macintosh on the network.
- HP LaserJet 4 and 4Si printers offer automatic switching between Adobe's PostScript and HP PCL 5 printer languages.
- One-year warranty.

Part Names and Numbers

J2341B HP JetDirect card for LocalTalk—for the HP LaserJet 4Si, 4 printers, HP DeskJet 1200C printer, and HP PaintJet XL300 color printer

C2059F HP JetDirect card for LocalTalk—for the HP LaserJet IIISi printer

33416B AppleTalk Interface Kit—for the HP LaserJet III, IIID, and IID printers

For the nearest authorized Hewlett-Packard dealer in the United States, call toll-free 1-800-752-0900.

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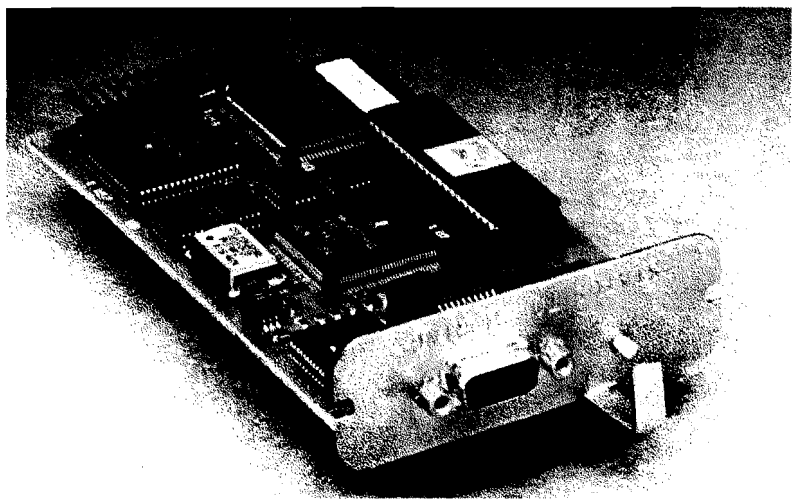
HEWLETT® PACKARD

HP JetDirect Cards for Token Ring

Technical Data

Product Numbers
HP C2071E, C2071F

For the HP LaserJet III, IIID, II, and IID printers



HP JetDirect cards simplify the management of network printing and let you connect printers directly to your network, anywhere you need to locate one.

Highlights

- A complete HP integrated solution
- Installs easily into the expanded I/O slot in the back of the printer
- Connects to Token Ring LANs using Novell NetWare, Microsoft LAN Manager, Microsoft Windows NT and Windows for Workgroups (v3.1), and IBM LAN Server
- User-installable
- Connectors and cabling:
  - 9-pin Token Ring port supports Types 1, 2, or 6 shielded cable
  - 4- and 16-Mbps data rates supported

Part Names and Numbers

C2071E HP JetDirect card for Token Ring* (802.5) (4 and 16 Mbps) with Novell NetWare**, NetWare 286 (Advanced NetWare and SFT NetWare v2.15c and beyond) and NetWare 386 (v3.11)

C2071F HP JetDirect card for Token Ring* (802.5) (4 and 16 Mbps) with Microsoft LAN Manager (v2.1) and IBM LAN Server (v1.3), Windows NT, Windows for Workgroups

* Token Ring supports transparent and source routing. To attach the HP JetDirect card to a Token Ring 4-Mbps network using unshielded twisted-pair cable, you will need to purchase a Type 3 Media Filter. The 16 Mbps data rate is not supported over unshielded twisted-pair cabling.

** Version 1.2 or beyond of Novell's Print Server is required if the Novell Print Server is used with the HP JetDirect card. Contact your authorized Novell reseller for more information about Novell's Print Server. The HP JetDirect card also provides the option of using its own queue server.

For the nearest authorized Hewlett-Packard dealer in the United States, call toll-free 1-800-752-0900.

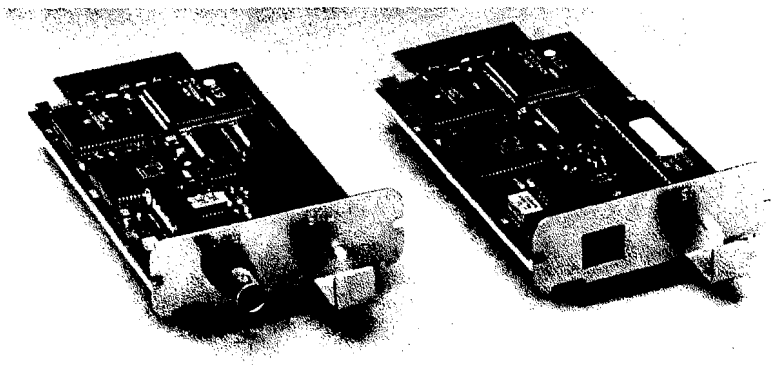
HEWLETT® PACKARD

HP JetDirect Cards for Ethernet

Technical Data

Product Numbers
HP C2071A, C2071B, C2071C, C2071D, C2071S, C2071T

For the HP LaserJet III, IIID, II and IID printers



HP JetDirect cards simplify the management of network printing and let you connect printers directly to your network, anywhere you need to locate one.

Highlights

- A complete HP integrated solution
- Connect through the expanded I/O slot at the back of the printer
- Allow printers to be plugged directly into Ethernet LANs
- HP JetDirect cards for UNIX® offer full compatibility with TCP/IP Ethernet network systems running HP-UX, SunOS and Solaris (SPARC station line only) and SCO UNIX, and compatibility with SNMP-based network management applications
- Compatible with Novell NetWare, Microsoft LAN Manager, IBM LAN Server

Part Names and Numbers

C2071A HP JetDirect card for Ethernet/802.3 (Thin Ethernet) with Novell NetWare*, NetWare 286 (Advanced NetWare and SFT, NetWare v2.15c and beyond) and NetWare 386 (v3.11); BNC port supports 10Base2 Thin coaxial cable

C2071B HP JetDirect card for Ethernet/802.3 (10BaseT) with Novell NetWare*, NetWare 286 (Advanced NetWare and SFT, NetWare v2.15c and beyond) and NetWare 386 (v3.11)

C2071C HP JetDirect card for 802.3 with Microsoft LAN Manager (v2.1); (BNC) IBM LAN Server (v1.3), Windows NT, Windows for Workgroups (v.3.1)

C2071D HP JetDirect card for 802.3 (10BaseT) with Microsoft LAN Manager (v2.1); IBM LAN Server (v1.3), Windows NT, Windows for Workgroups (v.3.1)

C2071T HP JetDirect card for UNIX Ethernet (BNC) with HP-UX 8.0, 9.0**, SunOS 4.1.1, 4.1.2, 4.1.3[1], SCO UNIX v/386 3.2.2, 3.2.4[2], Solaris 2.1; BNC port supports 10Base2 Thin coaxial cable

C2071S HP JetDirect card for UNIX (10BaseT) and HP-UX 8.0, 9.0**, SunOS 4.1.1, 4.1.2, 4.1.3, SCO UNIX v/386, 3.2.2, 3.2.4, Solaris 2.1; RJ-45 port supports 10BaseT twisted-pair cabling

* If Novell Print Server is used, version 1.2 or beyond is required. Contact your authorized Novell reseller for more information. The HP JetDirect card also provides the option of using its own queue server.

** Current version of HP-UX depends on the HP 9000 system being used. HP-UX requires the additional purchase of HP JetDirect Interface Software for HP-UX Systems. Includes: CD-ROM, DAT (DDS) tape, ¼-inch cartridge tape. (P/N J2374A)

1 SunOS and Solaris is supported only on Sun SPARCstations. SunOS/Solaris requires the additional purchase of HP JetDirect Interface Software for Sun UNIX Systems. Includes: CD-ROM, ¼-inch cartridge tape QIC 24 format. (P/N J2375A)

2 SCO UNIX v/386 3.2.2, 3.2.4 is supported directly by The Santa Cruz Operation, Inc. SunOS/Solaris requires the additional purchase of HP JetDirect Interface Software for Sun UNIX Systems. Includes: CD-ROM, ¼-inch cartridge tape QIC 24 format. (P/N J2375A).

For the nearest authorized Hewlett-Packard dealer in the United States, call toll-free 1-800-752-0900.

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HEWLETT® PACKARD

Applied Computerized Telephony (ACT)

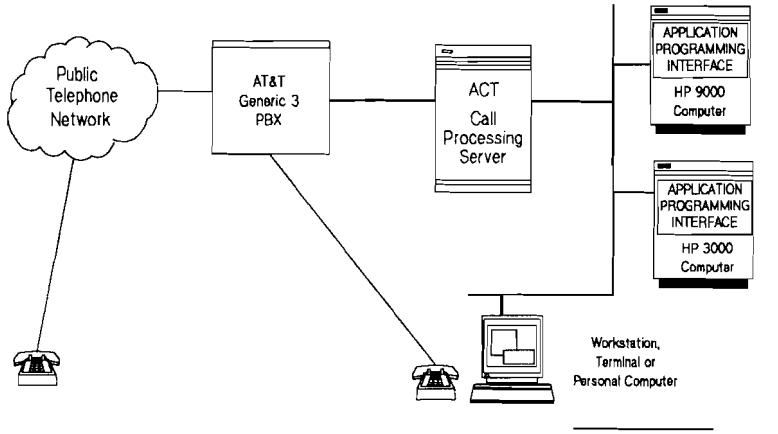
Technical Data

HP J2122A ACT Call Processing Server
HP 32046A ACT API—HP 9000
HP 32077A ACT API—HP 3000

ACT Call Processing Products for the AT&T Generic 3 (G3) PBX Telephone System

A new generation of applications have emerged that leverage the integration of voice and data technologies to increase productivity and revenues. The advanced call processing capabilities of modern telephone systems can now be combined with the open application environment of Hewlett-Packard computers via intelligent computer-to-telephone/system interfaces. The resulting benefits are especially suited to telephone intensive environments such as customer service, customer support, and telemarketing.

Hewlett-Packard integrates voice and data technologies with the Applied Computerized Telephony (ACT) Call Processing products. The ACT Call Processing Server interfaces and manages communications between the telephone system and Hewlett-Packard application processors. ACT Application Programming Interfaces (APIs) facilitate the integration of these new advanced call processing capabilities into new and existing applications.



Features

Applications that utilize ACT can be HP 3000 and/or HP 9000 based. These applications can utilize ACT to provide the following types of capabilities:

Inbound Call Information
Information passed from the telephone network to the telephone switch, such as the caller's telephone number and the number which was dialed, is passed to computer applications. Applications can then identify the caller (by their calling number) and the purpose of the call (from the telephone number that was dialed). This allows the application to automatically deliver caller information and data specific to the purpose of the call to a terminal or workstation simultaneously as the telephone rings.

Computerized Call Processing

Commands passed from computer applications instruct the telephone system to perform call processing functions such as make a call, answer a call, or other call control functions. This allows for application controlled call routing based on inbound call information and numbers in a computer database.

Outbound Calling

ACT increases productivity in outbound calling environments. With automated dialing applications, agents proceed from one active call to the next, no time is wasted by manually dialing numbers, listening to busy signals, and unanswered ringing. This results in substantial increases in agent productivity.

Industry Specific Applications

ACT provides a development environment that customers can use to enhance the capabilities of their existing applications. This environment has also been used by numerous independent software vendors that offer custom applications for specific industries. Software vendors with applications for the financial services, distribution, customer service, catalog sales, and other industries have applications that utilize ACT. For a complete list of these software vendors that have ACT compatible products contact your local HP sales office.

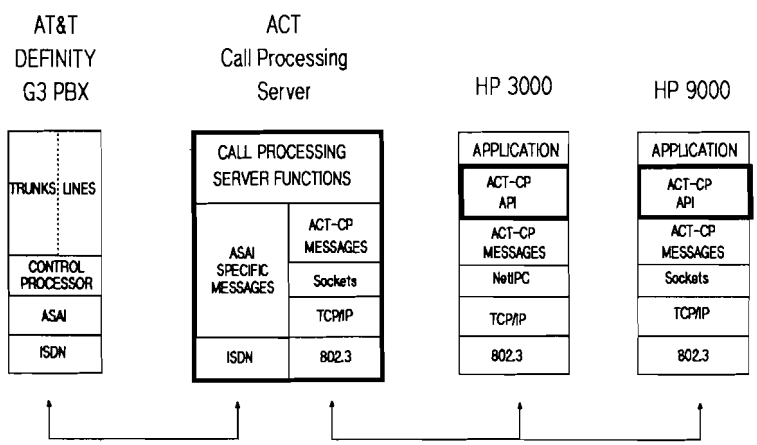
Functional Description

Command and status information is passed between HP computers and the telephone switch over an intelligent messaging interface. Computer applications use the ACT Call Processing Server and APIs to originate, answer, and manipulate telephone calls.

The Call Processing Server interfaces to the telephone switch and invokes the required function as requested by the client applications. The server keeps track of telephone call status information on the telephone switch side and ACT session status on the computer application side and makes the logical association between the two sides.

Standard IEEE 802.3/Ethernet and TCP/IP networking are used for communications between the host applications and the ACT Call Processing Server. The API software modules utilize industry-standard interprocess communications to exchange messages with the Call Processing server.

Applications Programming Interfaces (APIs) are available for the HP 9000 and HP 3000 computer families to facilitate applications development. The APIs format application requests into ACT messages and communicate with the telephone switch via the ACT Call Processing Server.



The ACT architecture is an implementation of Hewlett-Packard's Client/Server computing strategy, allowing multiple computer applications to utilize a single server to communicate with the telephone switch.

Various telephone switch manufacturers provide different messaging interfaces on their switches. Both customer premise Private Branch Exchanges (PBXs) and CENTREX-based Central Offices (COs) switches are being equipped with these switch-to-computer interfaces. The ACT architecture provides for a common application development environment regardless of telephone switch manufacturer or type of telephone service.

ACT Call Processing Server

The ACT Call Processing Server manages sessions between multiple computer applications and the call processing features of the telephone switch. Information received from the telephone switch such as the telephone number of the incoming caller or station status is passed to specific computer applications. ACT messages originating from computer applications are converted to telephone switch specific messages in order to invoke the required functions, for example to make a call or answer a call.

The HP J2122A ACT Call Processing Server has been architected to interface with the AT&T GENERIC 3 PBX. Other HP Technical Data publications describe additional telephone switches supported by ACT.

Application Programming Interfaces (APIs)

The ACT APIs are designed to provide a simple means for the application programmer to incorporate call processing functions into their applications.

The API shields the programmer from the complex telephone switch dependent communication protocols and the differences between the different types of switches.

It also shields the programmer from lower level interprocess communication protocols required to communicate with the ACT server.

A list of the ACT API calls is contained in the table that follows.

ACT Product Requirements

PBX

HP J2122A is the ACT Call Processing Server designed to interface with the AT&T GENERIC 3 line of PBXs. These PBXs must be equipped with the Adjunct/Switch Application Interface (ASAI). ASAI is a PBX-to-computer interface that enables two way communications between computer applications and the GENERIC 3 PBX. For specific GENERIC 3 PBX configuration requirements, AT&T should be consulted.

ACT API Summary

ACT Call	Function
ACT Initialize	Initiate a session with the ACT Server
ACT Terminate	Terminate a session with the ACT Server
ACT EventMonitor	Monitor events for specific numbers
ACT Receive	Retrieve an ACT event
ACT Answer	Answer an inbound call
ACT DropCall	Disconnect a party from a call
ACT Redirect	Redirect an inbound call
ACT MakeCall	Place a call on behalf of a phone or ACD queue
ACT Transfer*	Perform an unsupervised call transfer
ACT Consult*	Initiate a consultation call during an active call
ACT Conference*	Create a conference call
ACT Hold	Place a call on hold
ACT Retrieve	Retrieve a held call
ACT Get*	Get the value of a telephone switch resource
ACT Set*	Set a value of a telephone switch resource

* available in release A.02.nn of the HP J2122A product.

Application Platform

The application processor requires the appropriate ACT API software and ThinLAN interface for server communications.

On HP 3000 systems, order the HP ThinLAN 3000 Network Link, which includes the necessary TCP/IP and Net/IPC software.

On HP 9000 systems, make sure that you have a ThinLan Link and ARPA services.

Consult your local HP sales and service office for specific requirements for your system.

Supported Software Release Combinations

Product	Supported Releases
HP J2122A Server	A.01.nn, A.02.nn
HP 32046A API HPUX	A.04.nn 8.0 thru 9.n
HP 32077A API MPE/iX	A.04.nn 2.2 thru 4.7
AT&T's CallVisor	G3

Installation Services

The ACT Call Processing Server and Application Programming Interfaces (APIs) are customer installable.

If a customer would like assistance in the implementation of ACT, a full range of consulting services for ACT Call Processing products are available. These ACT Consulting services include:

ACT Assessment
HP will work with you to determine the best way to use ACT in your specific application environment. HP will work with your telecom staff, MIS staff, and your other suppliers to assess your current environment and develop a detailed report of the required computer hardware, software, and telecommunications equipment for an implementation of Applied Computerized Telephony. Upon completion of ACT Assessment, you will understand what needs to be done to implement an ACT solution, including a list of equipment you will need for an ACT implementation.

ACT Project Management
Successfully implementing the infrastructure for an ACT Application requires careful planning and coordination of resources from computer vendors, telephone switch suppliers, public telephone network service providers, and software applications providers. HP will develop and coordinate execution of a detailed schedule of tasks and activities that are required to successfully integrate your ACT installation.

ACT Application Assistance
HP will assist you in developing or modifying your application to work with ACT. HP can work with your application developer in three different ways. HP can assist developers with the high-level design assistance, detailed program design assistance, and with ongoing application support assistance.

ACT Ongoing Support
After your successful ACT installation, Hewlett-Packard will provide day-to-day technical support of your ACT installation. The ongoing technical support of an ACT application requires a close working relationship with software, computing, telephone switch, and public network services vendors. ACT ongoing support will provide you with fault isolation and problem management within your multivendor ACT installation.

All HP ACT Consulting Services are delivered by trained field personnel and are subject to local availability.

Ordering Information

ACT Products

HP J2122A ACT Call Processing Server for AT&T GENERIC 3 PBX

HP 32046A HP 9000 ACT Call Processing API

Options

AHN Series 700 Processors
AHO For Tier 1 SPUs
AE5 For Tier 2 SPUs
AEP For Tier 3 SPUs
AA0 ¼-inch cartridge tape
AA1 ½-inch mag tape 1600 bpi
AAH DAT cartridge tape
OGR Upgrade credit for AHO
OC8 Upgrade credit for AE5

HP 32077A HP 3000 ACT Call Processing API

Options

310 For Tier 1 SPUs
315 For Tier 2 SPUs
320 For Tier 3 SPUs
330 For Tier 4 SPUs
335 For Tier 5 SPUs
340 For Tier 6 SPUs
350 For Tier 7 SPUs
AA1 ½-inch mag tape 1600 bpi
AAH DAT cartridge tape
OGD Upgrade credit for 310
OCJ Upgrade credit for 315
OCE Upgrade credit for 320
OCF Upgrade credit for 330
OGL Upgrade credit for 335
OGM Upgrade credit for 340

Support Products

Initial Purchase Support Products

For the first year of support add the following options to the corresponding ACT Products.

For HP J2122A add option

0S0 License/next day system
0S1 License/same day system
0S5 License/24x7 system
0S2 Telephone/next day system
0S3 Telephone/same day system
0S6 Telephone/24x7 system
0S4 Installation system and network

For HP 32046A or HP 32077A add option

0S1 License/same day system
0S3 Telephone/same day system
0S6 Telephone/24x7 system
0S4 Installation system and network

Multivendor Network Support

Installation
HP J2122A+17A*

Network Startup
HP J2122A+16A* ACT Server
HP 50052P+16A PBX connection

NetAssure
HP J2122A+16BACT Server, same day
HP 50052P+16B PBX, same day
or
HP J2122A+16K ACT Server, 24x7
HP 50052A+16K PBX, 24x7

* These are included in the HP J2122A option 0S4.

Ongoing Support Products

These are the support products that should be ordered after the Initial Purchase Support Products have expired.

Hardware

HP J2122A+02G Priority Plus (24 hours)
HP J2122A+02A Priority (8am—9pm)
HP J2122A+02C Next Day (8am—5pm)
HP J2122A+02L Scheduled

Software Update Service

HP H2089A+S00 ACT Server options
102 for HP J2122A
AAH DAT cartridge

HP H2088A+L00 APIs option 101

Service Level

HP H2087A+H00 ResponseLine

Options

102 ACT Server
and
200 MPE/iX API low-end
201 MPE/iX API mid-range
202 MPE/iX API high-end
300 HPUX API 700 series
301 HPUX API low-end 800
302 HPUX API mid-range 800
303 HPUX API high-end 800

Technical information in this document is subject to change without notice.

Revised June 15, 1993. 5091-5227EUS

HEWLETT® PACKARD

Applied Computerized Telephony (ACT)

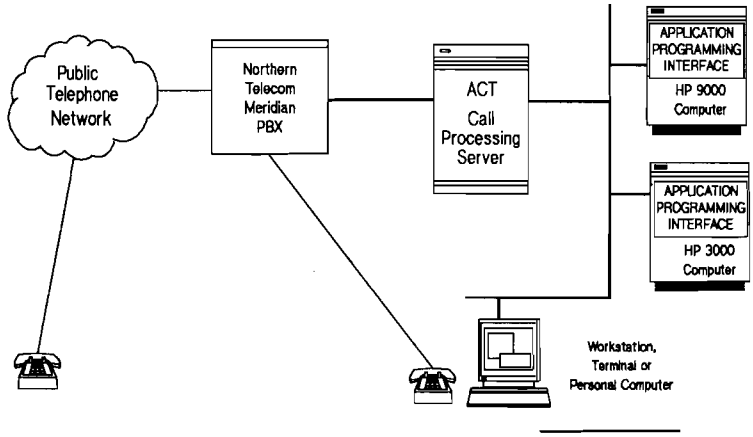
Technical Data

HP 32044B ACT Call Processing Server
HP 32046A ACT API—HP 9000
HP 32077A ACT API—HP 3000

ACT Call Processing Products for the Northern Telecom PBX Telephone System

A new generation of applications have emerged that leverage the integration of voice and data technologies to increase productivity and revenues. The advanced call processing capabilities of modern telephone systems can now be combined with the open application environment of Hewlett-Packard computers via intelligent computer-to-telephone/system interfaces. The resulting benefits are especially suited to telephone intensive environments such as customer service, customer support, and telemarketing.

Hewlett-Packard integrates voice and data technologies with the Applied Computerized Telephony (ACT) Call Processing products. The ACT Call Processing Server interfaces and manages communications between the telephone system and Hewlett-Packard application processors. ACT Application Programming Interfaces (APIs) facilitate the integration of these new advanced call processing capabilities into new and existing applications.



Features

Applications that utilize ACT can be HP 3000 and/or HP 9000 based. These applications can utilize ACT to provide the following types of capabilities:

Inbound Call Information
Information passed from the telephone network to the telephone switch, such as the caller's telephone number and the number which was dialed, is passed to computer applications. Applications can then identify the caller (by their calling number) and the purpose of the call (from the telephone number that was dialed). This allows the application to automatically deliver caller information and data specific to the purpose of the call to a terminal or workstation simultaneously as the telephone rings.

Computerized Call Processing

Commands passed from computer applications instruct the telephone system to perform call processing functions such as make a call, answer a call, or other call control functions. This allows for application controlled call routing based on inbound call information and automated dialing from numbers in a computer database.

Outbound Calling

ACT increases productivity in outbound calling environments. With automated dialing applications, agents proceed from one active call to the next. No time is wasted by manually dialing numbers, listening to busy signals, and unanswered ringing. This results in substantial increases in agent productivity.

Industry Specific Applications

ACT provides a development environment that customers can use to enhance the capabilities of their existing applications. This environment has also been used by numerous independent software vendors that offer custom applications for specific industries. Software vendors with applications for the financial services, distribution, customer service, catalog sales, and other industries have applications that utilize ACT. For a complete list of software vendors that have ACT compatible products contact your local HP sales office.

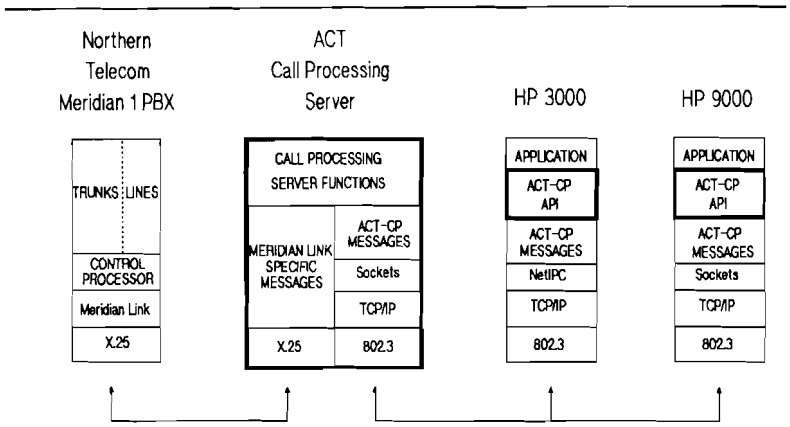
Functional Description

Command and status information is passed between HP computers and the telephone switch over an intelligent messaging interface. Computer applications use the ACT Call Processing Server and APIs to originate, answer, and manipulate telephone calls.

The Call Processing Server interfaces to the telephone switch and invokes the required function as requested by the client applications. The server keeps track of telephone call status information on the telephone switch side and ACT session status on the computer application side and makes the logical association between the two sides.

Standard IEEE 802.3/Ethernet and TCP/IP networking are used for communications between the host applications and the ACT Call Processing Server. The API software modules utilize industry-standard interprocess communications to exchange messages with the Call Processing server.

Applications Programming Interfaces (APIs) are available for the HP 9000 and HP 3000 computer families to facilitate applications development. The APIs format application requests into ACT messages and communicate with the telephone switch via the ACT Call Processing Server.



The ACT architecture is an implementation of Hewlett-Packard's Client/Server computing strategy, allowing multiple computer applications to utilize a single server to communicate with the telephone switch.

Various telephone switch manufacturers provide different messaging interfaces on their switches. Both customer premise Private Branch Exchanges (PBXs) and CENTREX-based Central Offices (COs) switches are being equipped with these switch-to-computer interfaces. The ACT architecture provides for a common application development environment regardless of telephone switch manufacturer or type of telephone service.

ACT Call Processing Server

The ACT Call Processing Server manages sessions between multiple computer applications and the call processing features of the telephone switch. Information received from the telephone switch, such as the telephone number of the incoming caller or station status, is passed to specific computer applications. ACT messages originating from computer applications are converted to telephone switch specific messages in order to invoke the required functions, for example to make a call or answer a call.

The HP 32044B ACT Call Processing Server has been architected to interface with the Northern Telecom Meridian 1 PBX. Other HP Technical Data publications describe additional telephone switches supported by ACT.

Application Programming Interfaces (APIs)

The ACT APIs are designed to provide a simple means for the application programmer to incorporate call processing functions into their applications.

The API shields the programmer from the complex telephone switch dependent communication protocols and the differences between the different types of switches.

It also shields the programmer from lower level interprocess communication protocols required to communicate with the ACT server.

A list of the ACT API calls is contained in the table below.

ACT Product Requirements

PBX

HP 32044B is the ACT Call Processing Server designed to interface with the Northern Telecom Meridian 1 line of PBXs. These PBXs must be equipped with the Meridian Link Module. The Meridian Link Module is a PBX-to-computer interface that enables two way communications between computer applications and the Northern Telecom PBX. For specific PBX configuration (X11 software and hardware) requirements, the Northern Telecom distributor should be consulted.

ACT API Summary

ACT Call	Function
ACT Initialize	Initiate a session with the ACT Server
ACT Terminate	Terminate a session with the ACT Server
ACT EventMonitor	Monitor events for specific numbers
ACT Receive	Retrieve an ACT event
ACT Answer	Answer an inbound call
ACT DropCall	Disconnect a party from a call
ACT Redirect*	Redirect an inbound call
ACT MakeCall	Place a call on behalf of a phone or ACD queue
ACT Transfer	Perform an unsupervised call transfer
ACT Consult	Initiate a consultation call during an active call
ACT Conference	Create a conference call
ACT Hold	Place a call on hold
ACT Retrieve	Retrieve a held call
ACT Get*	Get the value of a telephone switch resource
ACT Set*	Set a value of a telephone switch resource

* not available on the HP 32044B

Application Platform

The application processor requires the appropriate ACT API software and ThinLAN interface for server communications.

On HP 3000 systems, order the HP ThinLAN 3000 Network Link, which includes the necessary TCP/IP and Net/IPC software.

On HP 9000 systems, make sure that you have a ThinLan Link and ARPA services.

Consult your local HP sales and service office for specific requirements for your system.

Supported Software Release Combinations

Product	Supported Releases
HP 32044B Server	B.01.nn
HP 32046A API HP-UX	A.04.nn 8.0 thru 9.n
HP 32077A API MPE/iX	A.04.nn 2.2 thru 4.7
NT X11 software Meridian Link	17, 18, and 19 3

Installation Services

The ACT Call Processing Server and Application Programming Interfaces (APIs) are customer installable.

If a customer would like assistance in the implementation of ACT, a full range of consulting services for ACT Call Processing products are available. These ACT Consulting services include:

ACT Assessment
HP will work with you to determine the best way to use ACT in your specific application environment. HP will work with your telecom staff, MIS staff, and your other suppliers to assess your current environment and develop a detailed report of the required computer hardware, software, and telecommunications equipment for an implementation of Applied Computerized Telephony. Upon completion of ACT Assessment, you will understand what needs to be done to implement an ACT solution, including a list of equipment you will need for an ACT implementation.

ACT Project Management
Successfully implementing the infrastructure for an ACT Application requires careful planning and coordination of resources from computer vendors, telephone switch suppliers, public telephone network service providers, and software applications providers. HP will develop and coordinate execution of a detailed schedule of tasks and activities that are required to successfully integrate your ACT installation.

ACT Application Assistance
HP will assist you in developing or modifying your application to work with ACT. HP can work with your application developer in three different ways. HP can assist developers with the high-level design assistance, detailed program design assistance, and with ongoing application support assistance.

ACT Ongoing Support
After your successful ACT installation, Hewlett-Packard will provide day-to-day technical support of your ACT installation. The ongoing technical support of an ACT application requires a close working relationship with software, computing, telephone switch, and public network services vendors. ACT ongoing support will provide you with fault isolation and problem management within your multivendor ACT installation.

All HP ACT Consulting Services are delivered by trained field personnel and are subject to local availability.

Ordering Information

ACT Products

HP 32044B ACT Call Processing Server for Northern Telecom Meridian 1 PBX

HP 32046A HP 9000 ACT Call Processing API

Options

AHN Series 700 Processors
AHO For Tier 1 SPUs
AE5 For Tier 2 SPUs
AEP For Tier 3 SPUs

AA0 ¼-inch cartridge tape
AA1 ½-inch mag tape 1600 bpi
AAH DAT cartridge tape
OGR Upgrade credit for AHO
OC8 Upgrade credit for AE5

HP 32077A HP 3000 ACT Call Processing API

Options

310 For Tier 1 SPUs
315 For Tier 2 SPUs
320 For Tier 3 SPUs
330 For Tier 4 SPUs
335 For Tier 5 SPUs
340 For Tier 6 SPUs
350 For Tier 7 SPUs
AA1 ½-inch mag tape 1600 bpi
AAH DAT cartridge tape
OGD Upgrade credit for 310
OCJ Upgrade credit for 315
OCE Upgrade credit for 320
OCF Upgrade credit for 330
OGL Upgrade credit for 335
OGM Upgrade credit for 340

Support Products

Initial Purchase Support Products

For the first year of support add the following options to the corresponding ACT Products.

For HP 32044B add option

0S0 License/next day system
0S1 License/same day system
0S5 License/24x7 system
0S3 Telephone/same day system
0S6 Telephone/24x7 system
0S4 Installation system & network

For HP 32046A or HP 32077A add option

0S1 License/same day system
0S3 Telephone/same day system
0S6 Telephone/24x7 system
0S4 Installation system and network

Multivendor Network Support

Installation
HP 32044B+17A* ACT Server

Network Startup
HP 32044B+16A* ACT Server
50052P+16A PBX connection

NetAssure
HP 32044B+16B ACT Server, same day
50052P+16B PBX, same day
or
HP 32044B+16K ACT Server, 24x7
50052P+16K PBX, 24x7

* These are both included in HP 32044B option 0S4.

Ongoing Support Products

These are the support products that should be ordered after the Initial Purchase Support Products have expired.

Hardware

HP 32044B+02G Priority Plus (24 hours)
HP 32044B+02A Priority (8am–9pm)
HP 32044B+02C Next Day (8am–5pm)
HP 32044B+02L Scheduled

Software Update Service

H2089A+S00 ACT Server options
101 for HP 32044B
AAH DAT cartridge

H2088A+L00 APIs option 101

Service Level

H2087A+H00 ResponseLine

Options

101 ACT Server
and
200 MPE/iX API low-end
201 MPE/iX API mid-range
202 MPE/iX API high-end
300 HP-UX API 700 series
301 HP-UX API low-end 800
302 HP-UX API mid-range 800
303 HP-UX API high-end 800

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Revised June 15, 1993. 5952-1913

HEWLETT® PACKARD

Applied Computerized Telephony (ACT)

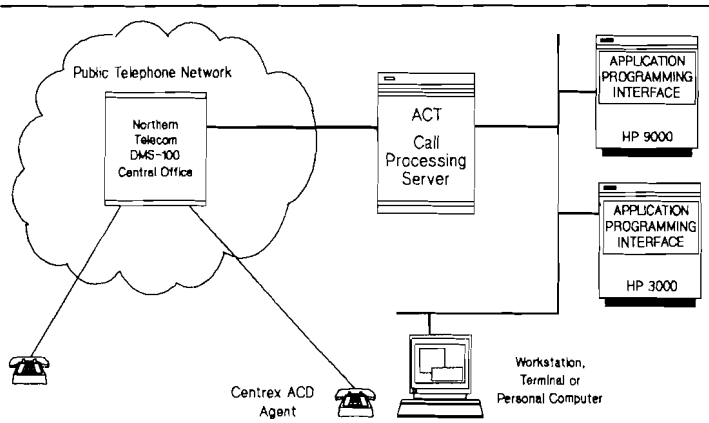
Technical Data

HP 32045B ACT Call Processing Server
HP 32046A ACT API—HP 9000
HP 32077A ACT API—HP 3000

ACT Call Processing Products for the Northern Telecom DMS100 Telephone System

A new generation of applications have emerged that leverage the integration of voice and data technologies to increase productivity and revenues. The advanced call processing capabilities of modern telephone systems can now be combined with the open application environment of Hewlett-Packard computers via intelligent computer-to-telephone/system interfaces. The resulting benefits are especially suited to telephone intensive environments such as customer service, customer support, and telemarketing.

Hewlett-Packard integrates voice and data technologies with the Applied Computerized Telephony (ACT) Call Processing products. The ACT Call Processing Server interfaces and manages communications between the telephone system and Hewlett-Packard application processors. ACT Application Programming Interfaces (APIs) facilitate the integration of these new advanced call processing capabilities into new and existing applications



Features

Applications that utilize ACT can be HP 3000 and/or HP 9000 based. These applications can utilize ACT to provide the following types of capabilities:

Inbound Call Information. Information passed from the telephone network to the telephone switch, such as the caller's telephone number and the number which was dialed, is passed to computer applications. Applications can then identify the caller (by their calling number) and the purpose of the call (from the telephone number that was dialed). This allows the application to automatically deliver caller information and data specific to the purpose of the call to a terminal or workstation simultaneously as the telephone rings.

Computerized Call Processing

Commands passed from computer applications instruct the telephone system to perform call processing functions such as make a call, answer a call, or other call control functions. This allows for application controlled call routing based on inbound call information and numbers in a computer database.

Outbound Calling

ACT increases productivity in outbound calling environments. With automated dialing applications, agents proceed from one active call to the next, no time is wasted by manually dialing numbers, listening to busy signals, and unanswered ringing. This results in substantial increases in agent productivity.

Industry Specific Applications

ACT provides a development environment that customers can use to enhance the capabilities of their existing applications. This environment has also been used by numerous independent software vendors that offer custom applications for specific industries. Software vendors with applications for the financial services, distribution, customer service, catalog sales, and other industries have applications that utilize ACT. For a complete list of these software vendors that have ACT compatible products contact your local HP sales office.

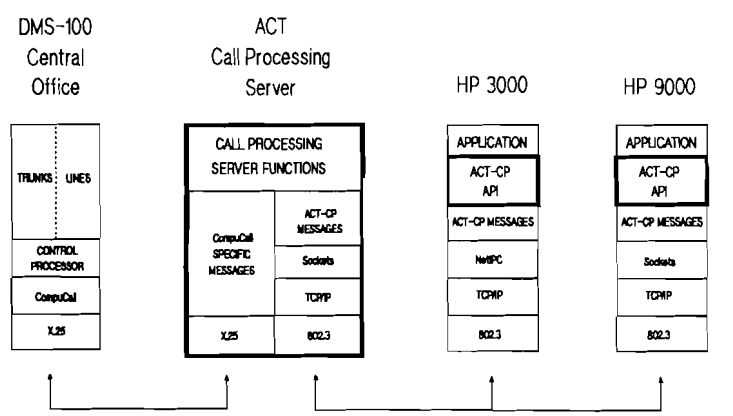
Functional Description

Command and status information is passed between HP computers and the telephone switch over an intelligent messaging interface. Computer applications use the ACT Call Processing Server and APIs to originate, answer, and manipulate telephone calls.

The Call Processing Server interfaces to the telephone switch and invokes the required function as requested by the client applications. The server keeps track of telephone call status information on the telephone switch side and ACT session status on the computer application side and makes the logical association between the two sides.

Standard IEEE 802.3/Ethernet and TCP/IP networking are used for communications between the host applications and the ACT Call Processing Server. The API software modules utilize industry-standard interprocess communications to exchange messages with the Call Processing server.

Applications Programming Interfaces (APIs) are available for the HP 9000 and/or HP 3000 computer families to facilitate applications development. The APIs format application requests into ACT messages and communicate with the telephone switch via the ACT Call Processing Server.



The ACT architecture is an implementation of Hewlett-Packard's Client/Server computing strategy, allowing multiple computer applications to utilize a single server to communicate with the telephone switch.

Various telephone switch manufacturers provide different messaging interfaces on their switches. Both customer premise Private Branch Exchanges (PBXs) and CENTREX-based Central Offices (COs) switches are being equipped with these switch-to-computer interfaces. The ACT architecture provides for a common application development environment regardless of telephone switch manufacturer or type of telephone service.

ACT Call Processing Server

The ACT Call Processing Server manages sessions between multiple computer applications and the call processing features of the telephone switch. Information received from the telephone switch such as the telephone number of the incoming caller or station status is passed to specific computer applications. ACT messages originating from computer applications are converted to telephone switch specific messages in order to invoke the required functions, for example to make a call or answer a call.

The HP 32045B ACT Call Processing Server has been architected to interface with the Northern Telecom DMS100 Central Office telephone switch. Other HP Technical Data publications describe additional telephone switches supported by ACT.

Application Programming Interfaces (APIs)

The ACT APIs are designed to provide a simple means for the application programmer to incorporate call processing functions into their applications.

The API shields the programmer from the complex telephone switch dependent communication protocols and the differences between the different types of switches.

It also shields the programmer from lower level interprocess communication protocols required to communicate with the ACT server.

A list of the ACT API calls is contained in the table that follows.

ACT API Summary

ACT Call	Function
ACT Initialize	Initiate a session with the ACT Server
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ACT DropCall*	Disconnect a party from a call
ACT Redirect	Redirect an inbound call
ACT MakeCall	Place a call on behalf of a phone or ACD queue
ACT Transfer	Perform an unsupervised call transfer
ACT Consult	Initiate a consultation call during an active call
ACT Conference*	Create a conference call
ACT Hold*	Place a call on hold
ACT Retrieve	Retrieve a held call
ACT Get*	Get the value of a telephone switch resource
ACT Set*	Set a value of a telephone switch resource

* not available on the HP 32045B

ACT Product Requirements

Telephone System

HP 32045B is the ACT Call Processing Server designed to interface with the Northern Telecom DMS100 line of Central Office switches. The DMS100 must be equipped with CompuCall. CompuCall is the switch-to-computer interface that enables two way communications between computer applications and the Northern Telecom telephone switch. For specific information about availability, the local telephone company should be consulted.

Application Platform

The application processor requires the appropriate ACT API software and ThinLAN interface for server communications.

On HP 3000 systems, order the HP ThinLAN 3000 Network Link, which includes the necessary TCP/IP and Net/IPC software.

On HP 9000 systems, make sure that you have a ThinLan Link and ARPA services.

Consult your local HP sales and service office for specific requirements for your system.

Supported Software Release Combinations

Product	Supported Releases
HP 32045B Server	B.01.nn
HP 32046A API HP-UX	A.04.nn 8.0 thru 9.n
HP 32077A API MPE/iX	A.04.nn 2.2 thru 4.7
NT BCS	33, 34

Installation Services

The ACT Call Processing Server and Application Programming Interfaces (APIs) are customer installable.

If a customer would like assistance in the implementation of ACT, a full range of consulting services for ACT Call Processing products are available. These ACT Consulting services include:

ACT Assessment
HP will work with you to determine the best way to use ACT in your specific application environment. HP will work with your telecom staff, MIS staff, and your other suppliers to assess your current environment and develop a detailed report of the required computer hardware, software, and telecommunications equipment for an implementation of Applied Computerized Telephony. Upon completion of ACT Assessment, you will understand what needs to be done to implement an ACT solution, including a list of equipment you will need for an ACT implementation.

ACT Project Management
Successfully implementing the infrastructure for an ACT Application requires careful planning and coordination of resources from computer vendors, telephone switch suppliers, public telephone network service providers, and software applications providers. HP will develop and coordinate execution of a detailed schedule of tasks and activities that are required to successfully integrate your ACT installation.

ACT Application Assistance
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ACT Ongoing Support
After your successful ACT installation, Hewlett-Packard will provide day-to-day technical support of your ACT installation. The ongoing technical support of an ACT application requires a close working relationship with software, computing, telephone switch, and public network services vendors. ACT ongoing support will provide you with fault isolation and problem management within your multivendor ACT installation.

All HP ACT Consulting Services are delivered by trained field personnel and are subject to local availability.

Ordering Information

ACT Products

HP 32045B ACT Call Processing Server for Northern Telecom DMS100 central office switch

HP 32046A HP 9000 ACT Call Processing API

Options

AHN Series 700 Processors
AHO For Tier 1 SPUs
AE5 For Tier 2 SPUs
AEP For Tier 3 SPUs
AA0 ¼-inch cartridge tape
AA1 ½-inch mag tape 1600 bpi
AAH DAT cartridge tape
OGR Upgrade credit for AHO
OC8 Upgrade credit for AE5

HP 32077A HP 3000 ACT Call Processing API

Options

310 For Tier 1 SPU's
315 For Tier 2 SPU's
320 For Tier 3 SPU's
330 For Tier 4 SPU's
335 For Tier 5 SPU's
340 For Tier 6 SPU's
350 For Tier 7 SPU's
AA1 ½-inch mag tape 1600 bpi
AAH DAT cartridge tape
OGD Upgrade credit for 310
OCJ Upgrade credit for 315
OCE Upgrade credit for 320
OCF Upgrade credit for 330
OGL Upgrade credit for 335
OGM Upgrade credit for 340

Support Products

Initial Purchase Support Products

For the first year of support add the following options to the corresponding ACT Products.

For HP 32045B add option

0S0 License/next day system
0S1 License/same day system
0S5 License/24x7 system
0S2 Telephone/next day system
0S3 Telephone/same day system
0S6 Telephone/24x7 system
0S4 Installation system & network

For HP 32046A or HP 32077A add option

0S1 License/same day system
0S3 Telephone/same day system
0S6 Telephone/24x7 system
0S4 Installation system & network

Multivendor Network Support

Installation
HP 32045B*

Network Startup
32045B+16A*

NetAssure
32045B+16B same day
or
32045B+16K 24x7

* These are included in the HP 32045B option 0S4.

Ongoing Support Products

These are the support products that should be ordered after the Initial Purchase Support Products have expired.

Hardware

32045B+02G Priority Plus (24 hours)
32045B+02A Priority (8am—9pm)
32045B+02C Next Day (8am—5pm)
32045B+02L Scheduled

Software Update Service

H2089A+S00 ACT Server options
103 for 32045B
AAH DAT cartridge
H2088A+L00 APIs option 101

Service Level

H2087A+H00 ResponseLine

Options

103 ACT Server
and
200 MPE/iX API low-end
201 MPE/iX API mid-range
202 MPE/iX API high-end

300 HP-UX API 700 series
301 HP-UX API low-end 800
302 HP-UX API mid-range 800
303 HP-UX API high-end 800

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Applied Computerized Telephony (ACT)

Technical Data

Support Products
ACT Support

After your successful ACT installation, Hewlett-Packard will provide technical support for your ACT installation. The ongoing technical support of an ACT application requires a close working relationship with the computing, application, telephone switch, and public network services vendors. HP can provide you with fault isolation and problem management within your multivendor ACT installation.

ACT support is comprised of three complementary modules that will assist you in maintaining an effective ACT installation. You can customize your level of support based upon your participation in the different modules. The highest level of support is obtained by purchasing the support products from each module.

ACT Support Modules

- Product support
  - Initial purchase support
  - Ongoing support
- Multivendor network support
- Consulting

Initial Purchase Support

This support product is available only at the time of initial purchase. These options are added to the ACT products.

Ongoing Support

These support products provide support after the initial year or if support was not ordered with the product.

Installation
The ACT Server is considered customer installable; you may choose however, to have HP install and configure the ACT server.

Hardware Support
This covers the ACT Server hardware and the associated application processors. HP will customize a hardware support plan based upon the needs and importance of the application. HP hardware support can range from 24 hour a day support to scheduled maintenance.

Software Support
This support product covers the software involved with the ACT Server software and ACT Application Programming Interfaces (APIs).

ResponseLine: HP will provide phone assistance to help resolve ACT related problems. This service also provides read/write access to a product update database.

Software Update Service
This is a service by which updates to the ACT products are automatically forwarded to you on a regular basis.

Multivendor Network Support

If a problem does occur, HP will be available to test and isolate a problem that has occurred with the telephone switch, ACT Server, ACT API, or application processor. HP will also manage the problem with the associated vendor to expedite problem resolution.

Consulting

ACT Assessment
HP will work with your telecom operations, MIS staff, and other suppliers to assess your current environment and outline the equipment and services necessary for an ACT installation.

ACT Project Management
HP will work with you to assist in the multivendor installation process. HP will work with your public network service provider and telephone switch vendor to ensure a smooth ACT installation.

ACT Application Assistance
HP will aid in the continuing assistance to support the application developer. In a multiphased application development, HP will assist in each stage of the application to achieve the desired result.

Ordering Information

Initial Purchase Support

HP 32044B, J2122A ACT Servers

0S0 License/Next Day System Support—1 Yr
0S1 License/Same Day System Support—1 Yr
0S5 License/24x7 System Support—1 Yr
0S2 Telephone/Next Day System Support—1 Yr
0S3 Telephone/Same Day System Support—1 Yr
0S6 Telephone/24x7 System Support—1 Yr
0S4 Installation—System and Network

HP 32046A, 32077A ACT APIs

0S0 License to Use System Support
0S3 Telephone Assist System Support—1 Yr
0S6 Telephone/24x7 System Support—1 Yr
0S4 Installation—System and Network

Ongoing Support

Installation

32044A+17A, J2122A+17A
ACT Servers

32046A+17A, 32077A+17A
ACT APIs

Hardware Support

32044B, J2122A ACT Servers
02G Priority Plus (24 Hours)
02A Priority (8am—9pm)
02C Next Day (8am—5pm)
02L Scheduled

Software Support ResponseLine

ACT Server
H2087A+H00
101 Northern Telecom PBX
102 AT&T PBX

HP 9000 ACT API
H2087A+H00
300 Series 300/400
301 Low-End S800
302 Mid-Range S800
303 High-End S800

HP 3000 ACT API
H2087A+H00
200 Low-End MPE/iX
201 Mid-Range MPE/iX
202 High-End MPE/iX
203 MPE V

Software Update Service

ACT Server
H2089A+S00
101 Northern Telecom PBX
102 AT&T PBX
AA0 ¼-inch Tape Cartridge
AAH DAT Cartridge

ACT APIs
H2088A+L00
101 Northern Telecom PBX

Multivendor Network Support

NetStartup
32044A+16A, J2122A+16A
ACT Servers

PBX Network Startup
50052P+16A

NetAssure*
32044A+16B, J2122A+16B
ACT Servers
50052P+16B PBX Network Connection
50052P+16K PBX Network Connection (24x7)

* NetAssure is needed for each application system LAN link.

Consulting

ACT Assessment
HP ConsultLine HP H2355A Module N
ACT Project Management
HP ConsultLine HP H2355A Module 9
Application Assistance
HP ConsultLine HP H2405A Module N

HEWLETT® PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products
ACT Assessment

HP will work with you to determine the best way to use ACT in your business. Working with your telecom staff, MIS staff, and your other suppliers, HP will evaluate your current environment and identify equipment needed to construct the foundation for an ACT application.

Upon completion of the ACT Assessment, HP will deliver a detailed report that describes what equipment needs to be added or upgraded to support an ACT application. This report will provide a detailed equipment list for the computers, networking, telephone switch, and public network service provider. HP will also identify the phases of application assistance necessary to integrate ACT into the application.

The following are the deliverables received from ACT Assessment:

Computer System and Networking
An inventory of your computer and networking equipment will be taken to analyze the current configurations for integration with ACT. This ensures that you have the appropriate computer equipment to ensure a seamless integration with ACT.

Public Network Service Provider
HP will work with your public network service provider to determine the type of telecommunication services available in your area. The type and availability of telephone trunks into your facilities and the required timing of their installation will be identified.

Telecommunications Equipment
Your current telephone switch and telephony hardware will be inventoried and the configuration reviewed. HP will determine the hardware and software needed to function with the public network service.

Application Assessment
HP will help determine if the source of the application will be from a value added business (VAB) or an in-house application. HP will help determine what ACT functionality will be utilized and identify the application phases that need to be accomplished. HP will also identify the contacts and their role in instituting the necessary phases.

Ordering Information

Provided on a custom quote basis, under the HP ConsultLine Program, product category HP H2355A Module N Custom Network Consulting. Contact your HP sales representative for local availability.

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HEWLETT® PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products
ACT Project Management

Successfully implementing an ACT Application requires careful planning and coordination of people, equipment, and time from computer vendors, telephone switch suppliers, public network service providers, and software applications developers. HP will develop and coordinate execution of a detailed schedule of tasks and activities that are required to integrate your ACT installation.

With ACT Project Management, HP will work with you during your ACT installation, and will coordinate or subcontract, where appropriate, the other vendors involved. HP will regularly meet with you and the other vendors to monitor the installation progress.

The following are the deliverables received from ACT Project Management:

Computer Systems and Networking
A detailed migration plan for your computing equipment will be developed. It will outline when new equipment should be installed or upgraded so it will be available at the optimum time to integrate with the other ACT components.

Telephone Switch
A step-by-step schedule of telephone switch installation or upgrade activities will be provided. HP will coordinate with the telephone switch distributor, the delivery, and installation of the telephone switch equipment.

Public Network Service Provider
A detailed installation plan of new public network services will be created. HP will also ensure the service delivered is consistent with the telephone switch configuration.

Training
A schedule of training for the groups within your organization involved with the ACT application will be developed.

Demonstration
With the completion of ACT Project Management, HP will demonstrate the functionality of all components necessary to support an ACT application.

Ordering Information

ACT Project Management is provided on a custom quote basis, under the HP ConsultLine Program, product category HP H2355A Module 9 Project Management Network Consulting. To obtain additional information and availability, contact your HP sales representative.

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HEWLETT® PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products
ACT Application Assistance

HP will assist you in modifying your application to work with the ACT Application Programming Interfaces (APIs). HP will work with your application developer to modify an existing application, or to assist in developing a new application and determine how it will work with the ACT product.

While ACT Assessment and ACT Project Management consulting services handle the installation of the infrastructure necessary to support an ACT application, ACT Application Assistance concentrates on designing and modifying applications to work with the ACT APIs.

Three general categories of ACT Application Assistance:

- High-level design
- Detail design
- Application continuing assistance

High-Level Design
Working with your application developer, HP will evaluate the application to determine how the desired functionality can be phased into the application. HP will describe the phases necessary to implement the required ACT functionality into the application and estimate the time to complete each phase.

Detail Design
Working with the phased implementation schedule from the high-level design evaluation, HP will work with the application developer to incorporate the ACT APIs into the existing application. HP will assist in the design, integration, and testing of the ACT APIs in the application. Upon completion of a detailed design, a functional prototype application will be using the ACT APIs.

Application Continuing Assistance
After successfully integrating the ACT APIs into the application, HP can be contracted to provide ongoing application assistance.

Ordering Information

ACT Application Assistance is provided on a custom quote basis, under the HP ConsultLine Program, product category HP H2405A Module N Custom Information Management Network Consulting. To obtain additional information and availability, contact your HP sales representative.

Technical information in this document is subject to change without notice.

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HEWLETT® PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products
ACT Technical Training

HP offers an ACT Technical Training class to assist in understanding the basic technology, installation, application design, and programming techniques.

The class is designed for the technical individual responsible for the implementation of ACT. These people include HP SEs, customers, Value-Added Businesses (VABs), and systems integrators implementing ACT Application Programming Interfaces (APIs) into applications.

The student will have an opportunity to work with the ACT APIs in a hands-on environment, with labs to reinforce the course material. HP will also review telephone environment terms to familiarize the students with the equipment and terminology used in ACT installations.

Prerequisites

Due to the technical and application focus of this course, it is highly recommended that students possess programming skills in either COBOL, Pascal, or C, with a good working knowledge of either HP-UX or MPE operating system.
The agenda for the three day ACT Technical Training:

Day 1
- ACT product overview
- ACT demo (Inbound)
- Telephony environment and terminology lecture
- Telephone switch overview
- Telephony labs
- Installation and configuration

Day 2
- ACT Administration utility
- Fault isolation
  - ACT APITEST Lab
- ACT API introduction
- ACT API programming labs

Day 3
- Design considerations
- ACT demo (Outbound)
- Telephone switch differences
- ACT API programming labs

Upon completion of the course, we would expect the student to be able to implement an ACT solution and create an application that will utilize the functionality available with the ACT APIs:

Ordering Information

Ordered under training number HP SE3044. Contact your local sales office for more information on the dates of the next ACT Technical training class, or to determine class availability.

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HEWLETT® PACKARD

HP OpenView SNMP Developer's Kit and Platform Products

Technical Data

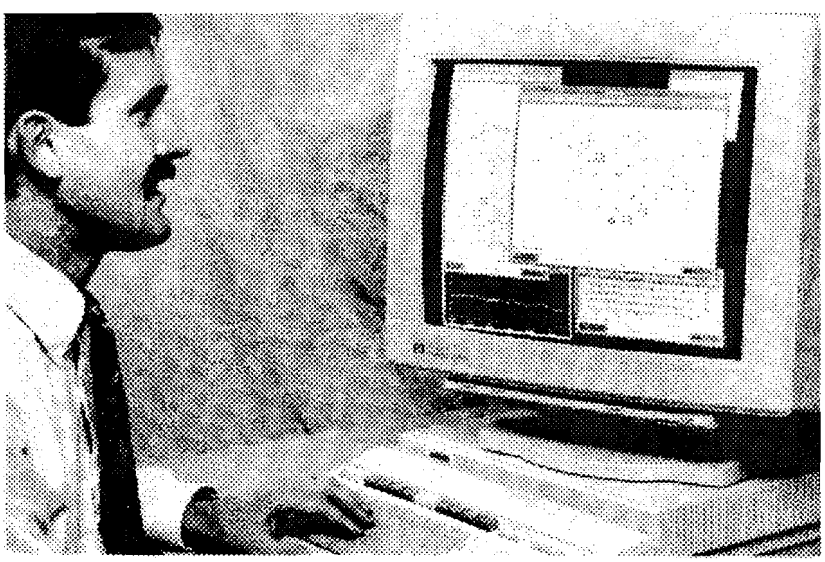
Welcome to HP OpenView

HP OpenView is a complete family of products providing integrated network and system management (NSM) solutions for multivendor distributed computing environments. HP OpenView addresses the pressing need of organizations to ensure the uninterrupted flow of critical business information through their systems and networks. The HP OpenView solution consists of a family of management platforms, a complete set of NSM application development tools, an impressive portfolio of management applications, and a unifying architecture.

The HP OpenView SNMP Developer's Kit and Platform products (the HP OpenView SNMP Management products) provide:

- An application development environment (the HP OpenView SNMP Developer's Kit) for developers who are creating NSM solutions to manage TCP/IP environments using the Simple Network Management Protocol (SNMP).
- A run-time environment (the HP OpenView SNMP Platform) for applications written with the HP OpenView SNMP Developer's Kit.

A broad range of important SNMP management applications is already available from HP and selected third parties. A case in point – HP's Network Node Manager is the top ranked TCP/IP network manager in user surveys conducted by both Data Communications Magazine and Computer World.



Features and Benefits

Standards-Based Development Environment

HP OpenView SNMP Management products are standards-based.

The products include the OSF/DME selected HP OpenView Windows (OVW) Graphical User Interface (GUI). OVW is based on X.11 and OSF/Motif. The HP OpenView SNMP Platform dynamically discovers and monitors standard IP-addressable, SNMP MIB II, and user defined SNMP devices.

HP OpenView SNMP Management products provide a stable programming environment, easily portable code, and interoperability with other standards-based systems and devices. Standards-based design opens HP's SNMP products to integration of a wide range of multi-vendor management applications and services.

Multiple Hardware Support

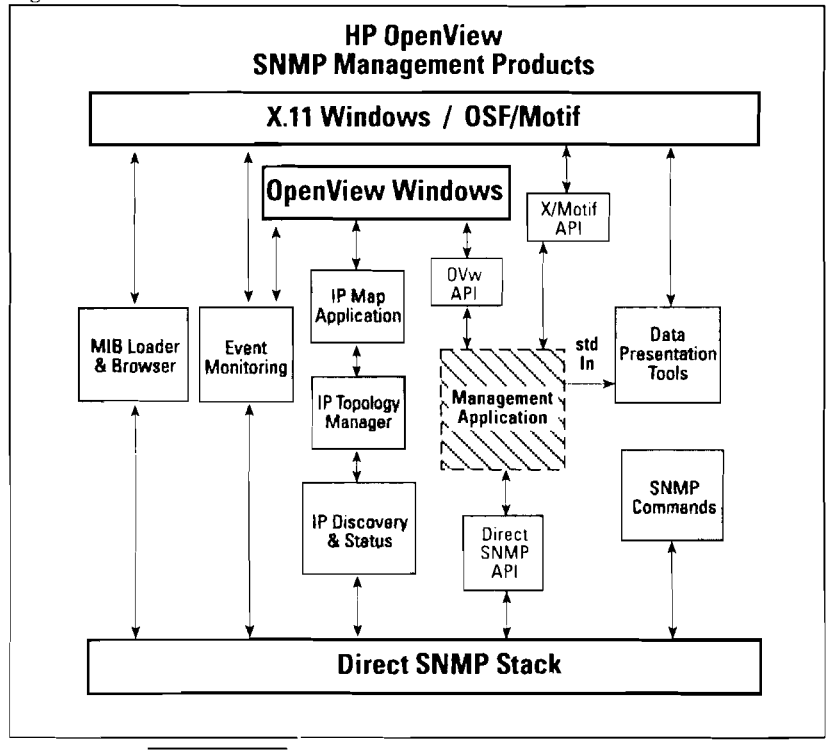
HP's SNMP Management products are currently available on HP 9000 and Sun SPARC systems. IBM is using HP OpenView source code as a base for its SNMP management products on RS/6000 systems. Additionally, HP is licensing HP OpenView source code to other key computer manufacturers who will further extend the operational breadth of HP OpenView software. The benefit is that an HP OpenView application written on one system can be quickly transferred to multiple computers.

Developer Support

HP OpenView developers can count on HP as an enthusiastic and able partner in the development process. HP delivers thorough, developer focused documentation and comprehensive five day HP OpenView developer training classes. From multiple locations around the world, HP OpenView Design Consulting service is available to customize HP OpenView SNMP Management products to meet specific business needs of customers. HP OpenView Developer Assist program provides answers to technical questions directly from HP online support engineers.

Independent Software Vendors (ISVs) can rely on HP for assistance in developing and marketing their HP OpenView-based products. HP backs its business partners with the top-rated HP OpenView Solution Partners Program, the widely distributed HP OpenView Solutions Catalog (listing both HP and partner products), and joint marketing programs.

Figure 1.



Product Descriptions

HP OpenView SNMP Management products are of two types: a developer's kit and a run-time platform.

- The developer's kit includes the header files and libraries necessary to develop applications using the HP OpenView SNMP application program interfaces (APIs).
- The run-time platform contains those executables necessary to run HP OpenView applications.

See figures 1 and 2 for the component and product structure views of the SNMP Management Products.

HP OpenView SNMP Developer's Kit

The HP OpenView SNMP Developer's Kit is designed for developers writing NSM applications that manage SNMP/TCP/IP devices and networks and require a standard, integrating graphical user interface. The SNMP Developer's Kit supports two major APIs: the Direct SNMP API and the HP OpenView Windows (OVw) API.

The Direct SNMP API provides access to the SNMP stack to perform management operations on SNMP devices. Additionally, the SNMP API includes programmatic access to the HP OpenView trap dispatcher so that applications can receive and process traps (events) sent to the management station.

The OVw API provides programmatic access to HP OpenView Windows for the purposes of interacting with the network map (the map is created by SNMP Platform functionality), drawing and modifying application specific submaps, and registering applications in a menu-bar. HP OpenView Windows was selected by OSF for the DME, so developers can begin training and applications development confident that their investment will be protected into the future.

The HP OpenView SNMP Developer's Kit contains the HP OpenView SNMP Platform.

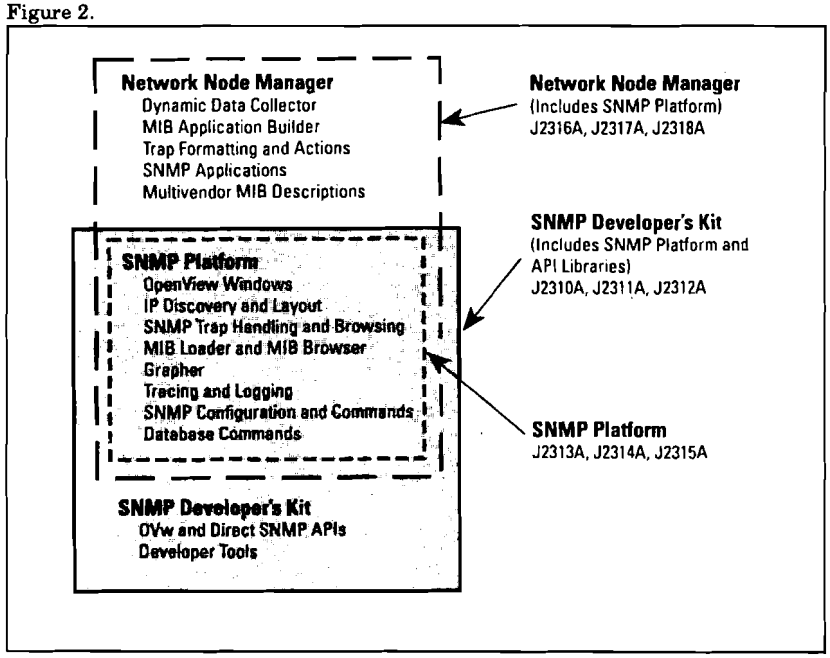
HP OpenView SNMP Platform

The HP OpenView SNMP Platform contains the executables which support the API calls of the SNMP Developer's Kit. It includes HP OpenView Windows, automatic IP discovery and layout (that is, automatic node discovery and map creation), the SNMP run-time library, trap handling, and an end user accessible MIB loader and MIB browser.

SQL Database Option

Both the HP OpenView SNMP Developer's Kit and Platform contain, as an option, the run-time version of Ingres' SQL relational database. The Ingres database option consists of the Ingres Intelligent Database, Version 6.4, from the Ask/Ingres Corporation. The

Figure 2.



Ingres database is currently used for storing IP topology information gathered by the HP OpenView SNMP Platform. Users can access the stored data through interactive SQL queries and report generation tools provided with the Ingres SQL database option.

Database application development tools (that is, programmatic access to the database) are sold and supported by Ingres.

Developer Support Products

HP has a wide range of support products designed to minimize the time-to-market of HP OpenView-based solutions.

HP OpenView Developer Assist

Developer Assist provides expeditious developer assistance through direct phone access to HP online support engineers located in the facility where HP OpenView product design and development takes place. Customers can also submit questions and service requests through electronic mail.

Customers receive acknowledge-ment of their electronic mail or phone messages within 24 hours.

Software Materials Update Service

For a monthly fee the Software Materials Update Service provides automatic distribution of minor revisions to the SNMP Management Products.

HP OpenView Developer Training

Customers can purchase a five day class describing the HP OpenView architecture, the various APIs contained in the HP OpenView SNMP Developer's Kit, and the basic strategies for building network and system management applications.

HP OpenView Design Consulting

Design Consulting provides personalized consulting to aid in the implementation of customer applications. Example services are

- requirements analysis
- application design
- design review
- object modeling assistance
- third party product integration

Design Consulting services are specified in a contract tailored to meet individual requirements.

HP OpenView Contractual Support

For developers requiring customized combinations of support products, individualized support contracts are available. Pricing and services are based on specific needs.

Related Products

HP OpenView Network Node Manager (see Applications in the "Ordering Instructions" section) is an end user application which provides fault, configuration, and performance management of multivendor TCP/IP networks. The Network Node Manager includes the HP OpenView SNMP Platform.

Recommended Systems

HP Hardware and Software:

- HP 9000 S300, S400, S600, S700, or S800
- HP-UX 8.0x
- RAM: S300/S400 require 24MB minimum, S600/S700/S800 require 32MB minimum
- Free disk space: all HP systems require 80MB of disk space for installation and 100MB of swap space (a total of 180MB of free space)

Sun Microsystems Hardware and Software:

- Sun SPARCstations 1+, 2, IPC (or greater class systems)
- SunOS 4.1.1 and 4.1.2
- RAM: 24MB minimum
- Free disk space: 80MB of disk space for installation and 100MB of swap space (a total of 180MB of free space)

To install and operate as a server, the optional Ingres SQL database requires at least an additional 120MB of disk space and 8MB of RAM. To operate as an Ingres client, 65MB of additional disk space is required.

For More Information

For more information, contact your HP Representative. The HP OpenView Technical Evaluation Guide, Release 3.1 (HP P/N 5091-5134E), includes a detailed technical description of the HP OpenView SNMP Management products and individual components.

Ordering Instructions

To order the following products contact your local sales office. Note that DAT and CD ROM media options are available for all products and options. Other media options, such as 1/2 inch tape or QIC, are not available on all hardware systems.

Developer's Kits

- **J2310A** HP OpenView SNMP Developer's Kit for the HP 9000 S300 and S400
- **J2311A** HP OpenView SNMP Developer's Kit for the HP 9000 S600, S700, and S800
- **J2312A** HP OpenView SNMP Developer's Kit for Sun SPARC

Platforms

- **J2313A** HP OpenView SNMP Platform for the HP 9000 S300 and S400
- **J2314A** HP OpenView SNMP Platform for the HP 9000 S600, S700, and S800
- **J2315A** HP OpenView SNMP Platform for Sun SPARC

Key Options (note: this is not a complete list)

001	1/4-inch tape media and manuals
004	DAT media and manuals
005	CD ROM media and manuals
008	License-to-use (for one developer or single SNMP platform system)
015	Additional manual set
024	Ingres DAT media and manuals
025	Ingres CD ROM media and manuals
028	Ingres License-to-use (for one user or single SNMP platform system)

Phone-In Support

- **32013A**, Option #010 HP OpenView Developer Assist Plus

Applications

- **J2316A** HP OpenView Network Node Manager for the HP 9000 S300 and S400
- **J2317A** HP OpenView Network Node Manager for the HP 9000 S600, S700, and S800
- **J2318A** HP OpenView Network Node Manager for Sun SPARC

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5091-6887E

HEWLETT® PACKARD

HP OpenView TCP/IP Agent

Technical Data

Product Number
Bundled with HP-UX 8.0
LAN/Link Product on
Series 300, 400, 600, 700,
and 800 Systems,
B1035A for SunSPARC

Welcome to HP OpenView

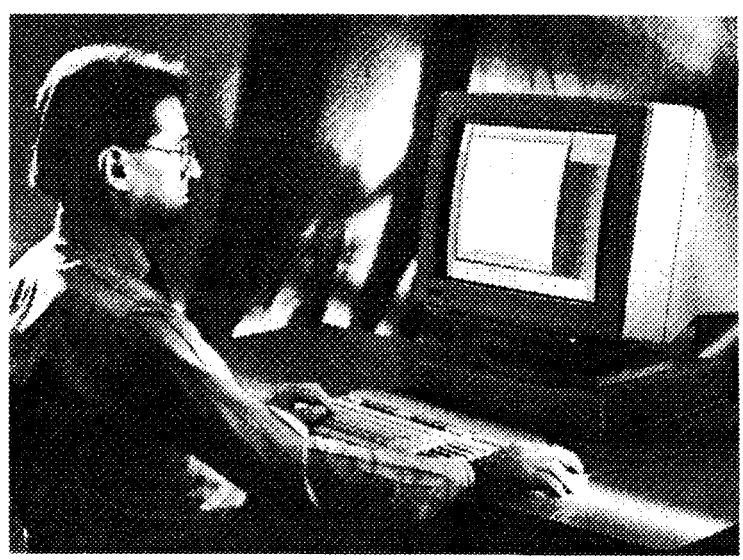
HP OpenView TCP/IP Agent provides the capabilities necessary to manage an HP 9000 Series 300, 400, 600, 700, 800, and SunSPARC computer via SNMP, (Simple Network Management Protocol). SNMP is the de facto standard protocol for managing TCP/IP (Transmission Control Protocol/Internet Protocol) networks.

With the explosion of LANs solutions are needed today to minimize network downtime, while maximizing user productivity. Part of an overall network management solution, the TCP/IP Agent allows HP 9000 and SunSPARC computers to actively participate in the management of the network to which they are attached.

HP OpenView TCP/IP Agent is the agent process for the HP 9000 and SunSPARC computers. Agents cooperate with managers to provide a complete network management solution. The more agents there are on a network, the more effective a network management solution will be. For more information on HP's management solutions for TCP/IP networks, see the HP OpenView Network Node Manager data sheet (P/N 5091-2288E).

Features and Benefits

Based on standards: The TCP/IP Agent uses standards such as TCP/IP, UDP/IP (User Datagram Protocol), and SNMP. This enables the TCP/IP Agent to be part of other vendors' network management solutions in addition to the solution provided by HP OpenView.



Agent Generated Alarms: Besides responding to requests for information from a network manager, the TCP/IP Agent will automatically send alarms (also called traps) when event conditions occur on the agent system. This provides the manager information more quickly than may be available through the regular cycle of polling agents individually.

Supports Multiple Managers: The TCP/IP Agent is capable of sending alarms to more than one manager at the same time. This means that an agent system can simultaneously be part of more than one network management solution if the administrator so desires.

Management Security: The TCP/IP Agent implements security with a type of password, called a community name, which prevents unauthorized network managers from accessing agent information.

HP Extensions: The TCP/IP Agent uses the industry standard network definitions of local resources to report information to a manager. In order to provide additional management functionality for HP-UX and SunSPARC systems, the TCP/IP Agent includes definitions specific to HP-UX and SunOS for such items as disk space and CPU utilization. This provides more robust management solutions for HP-UX and SunOS while still conforming to industry standards.

Functionality

SNMP Conformant: The TCP/IP Agent conforms to the SNMP specification to facilitate interoperability with other vendors' management solutions. The SNMP specification is outlined in RFC 1098.

Internet-Standard MIB Version 2 Conformant: The industry has developed standard definitions of such network objects as interfaces and protocols for TCP/IP networks. These definitions comprise the Management Information Base, MIB, outlined in RFC 1158.

Community Names: Community names act as passwords that allow access to a TCP/IP Agent's information. When a manager sends a request to the TCP/IP Agent, the request must contain the community name which corresponds to that known by the agent. If the community name is not the same, an alarm is generated by the agent.

Generates Alarms (Traps): The TCP/IP Agent will automatically generate the following alarms and send them to known manager systems:

- Indicate the agent process has been invoked (coldStart)
- Indicate a request had an improper community name (authenticationFailure)

Multiple Destinations for Alarms (Traps): The TCP/IP Agent is capable of sending alarms to more than one manager simultaneously. This is accomplished by simply creating additional entries for trap destination in the SNMP configuration file /etc/snmpd.conf.

Location and Contact Information: To facilitate configuration management of the TCP/IP Agent system, it is possible to specify the contact person responsible for the agent system and the location of the system within a building or network. This may be done with entries in /etc/snmpd.conf or from the command line when invoking the TCP/IP Agent.

Product Requirements

Required Hardware

- HP 9000 Series 300, 400, 600, 700, or 800 computer, or SunSPARC station or SPARC server

Required Software

- HP-UX 8.0 or later for Series 300/400
- HP-UX 8.0 or later for Series 600 and Series 800
- LAN Link for HP 9000
  - HP 36967A for the Series 800
  - HP J2146A for the Series 8X7
- ARPA Services/9000
  - HP B1014A for the Series 300/400
  - HP B1030A for the Series 800/700/600
- SunOS 4.1 or later for the SunSPARC

Related Software

- HP OpenView Network Node Manager
  - HP B1009A for the Series 300/400
  - HP B1024A for the Series 600/700/800
  - HP B1034A for the SunSPARC

The HP OpenView TCP/IP Agent is one part of your network management solution. The HP OpenView Network Node Manager product completes your TCP/IP management solution. The HP OpenView TCP/IP Agent may also be used with management solutions from other vendors that use the SNMP protocol.

Ordering Information

The HP OpenView TCP/IP Agent is bundled with the HP-UX LAN/Link product on all HP-UX 8.0 systems.

HP B1035A HP OpenView TCP/IP Agent for SunSPARC

Options

AA0	¼-inch Sun format tape and manual
0B1	Additional copy of manual
UA0	Single system license
0A9	License for up to 10 systems
UAE	License for up to 100 systems
UAG	License for up to 1000 systems
001	Upgrade from single system license
002	Upgrade from 10 systems license
003	Upgrade from 100 systems license

HEWLETT® PACKARD

HP OpenView Extensible SNMP Agent

Technical Data

HP OpenView Network Management Product Numbers
B1036B for Series 300/400
B1037B for Series 600/700/800
B1038B for Sun SPARC

Welcome to HP OpenView

HP OpenView is a complete family of cohesive products and services for the integrated management of multivendor networks and systems. With the advent of open systems and distributed client-server computing, the job of managing networks and the computers on those networks has become increasingly complex. Network and system managers and administrators are constantly looking for tools to ease the job of monitoring and controlling all aspects of their networks and systems from links all the way up to applications.

The job of managing today's networks is no longer just a matter of managing the devices or computers on those networks. It now involves managing the other resources critical to your business, such as servers and end-user applications. The HP OpenView Extensible SNMP Agent is the only technology available today that lets you manage all these resources. It gives you the centralized control of all the network assets that are crucial to your success.

Features and Benefits

A Breakthrough in How to Manage Systems and Applications

The Extensible SNMP Agent greatly extends the capabilities of SNMP-based management applications like OpenView Network Node Manager from basic network devices to critical systems and applications. Now, in addition to managing devices like routers, bridges, and hubs, you can manage objects such as computers, applications, printers, users, and databases that are central to the success of your business.

The Power of Extensibility without C Programming

Non-programmers can completely customize their network and system management to include all of the objects that are important to them. The user simply specifies what command is executed when a particular SNMP request arrives at the node running the OpenView Extensible SNMP Agent. Commands can include any executable or shell script.

Get Started Immediately

Templates and examples are included with the OpenView Extensible SNMP Agent so you can get started immediately. The templates clearly show how to easily define new SNMP objects on your managed systems, and the examples provide management of such objects as lists of users on a system, the message count of a system's mail queue, and the status of the printer scheduler.

Based on Standards

The use of standards such as Internet Protocol (IP), User Datagram Protocol (UDP) and the Simple Network Management Protocol (SNMP) allow the HP OpenView Extensible SNMP Agent to integrate in any network management environment, whether it is managed by the OpenView Network Node Manager or another SNMP management package.

Available for Multiple Platforms

The Extensible SNMP Agent is available in versions for HP 9000 Series 300/400, 700/800, and Sun SPARC systems, providing true multivendor network and system management.

Functionality

Basic SNMP Conformance

The OpenView Extensible SNMP Agent conforms to SNMP specifications to facilitate inter-operability with both HP's and other vendors' management solutions. It follows RFCs 1212 and 1213, which cover the format and set of objects in MIB II. These include such items as networking interfaces, protocols and system descriptions. The basic SNMP functionality of the Extensible SNMP Agent is covered in the HP OpenView TCP/IP Agent data sheet, HP part number 5091-2427E.

Extensibility

The OpenView Extensible SNMP Agent allows the user to configure new SNMP objects by defining a UNIX command or commands that the agent should execute when an SNMP query arrives.

Referring to Figure 1, when the Extensible SNMP agent receives a request, it first checks if the request is for a basic or custom SNMP object. If the request is for one of the basic SNMP objects, the agent uses its internal mechanisms to return a value for the requested object.

If the request is for a custom SNMP object, the HP OpenView Extensible SNMP Agent checks the set of custom objects the user has defined. If the requested object is defined, then the agent returns the value.

SNMP Get/Set

Custom SNMP objects specified in the Extensible OpenView Extensible SNMP Agent can be configured for either or both SNMP Get (retrieve an object's value) or SNMP Set (put a new value into an object). The network manager can both monitor and control system resources using this capability.

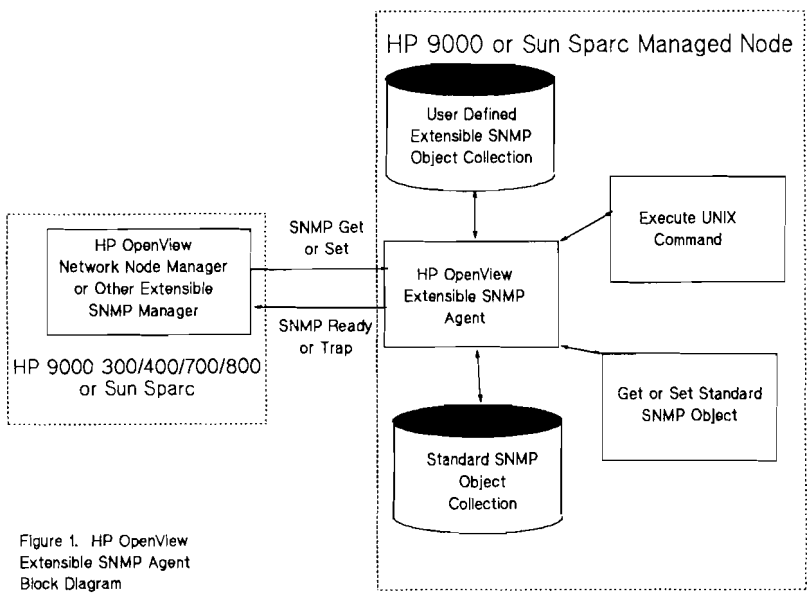


Figure 1. HP OpenView Extensible SNMP Agent Block Diagram

Extensible SNMP Agent Example

In the example shown in Figure 1, a network manager has determined that he needs to monitor the number of users on a particular system. If that number gets too large, it could cause significant performance problems.

To configure this, the network manager sets up a "users" object by editing a file called snmpd.extend. The object is specified in concise MIB format. He assigns an SNMP object ID number to the number of users, and specifies that the UNIX command

```
users | wc -w
```

should be executed when that SNMP object is queried. This command returns the number of users currently logged into the system.

The network manager then takes the same file used to configure this new "users" MIB object and adds it to HP OpenView Network Node Manager, just as with any vendor-specific MIB object.

The network manager can use the MIB Application Builder feature of OpenView Network Node Manager to add a menu choice to manually check the number of users on a system selected on Network Node Manager's map. Or he can use the Dynamic Data Collector feature to set a threshold on the number of users. The manager system would then generate an alarm condition when the number of users gets above a certain value.

Other Application Examples

The OpenView Extensible SNMP Agent can be applied to many different system management tasks. Some examples are:

- Check status of printer daemons.
- Check status of application processes, such as databases.
- Check status of critical processes, such as NFS daemons.
- Check for specific person or persons logging into a system.
- Monitor parameters related to FDDI or X.25 interfaces.
- Get or modify peripheral configurations for a system.

SNMP Traps

HP OpenView Extensible SNMP Agent generates the same set of generic alarms (traps) as the basic OpenView TCP/IP agent. These are:

- Agent process has been started (coldstart).
- Request has an improper community name.

In addition, the OpenView Extensible SNMP Agent comes with the *snmptrap* command, which can be used to generate a user-defined SNMP trap. The network manager simply decides what conditions constitute an alarm, and sets up a script to monitor for the condition and execute the *snmptrap* command if the condition occurs.

The *snmptrap* command can be sent with user-specified enterprise, agent address, generic and specific trap identifications, and time-stamps. The *snmptrap* command can be combined with OpenView Network Node Manager's Event Configuration feature to set up special commands to be executed upon the arrival of particular traps.

Product Requirements

Required Hardware

- HP 9000 Series 300/400 with 8 MB or more RAM
- HP 9000 Series 700 with 12 MB or more RAM
- HP 9000 Series 600/800 with 12 MB or more RAM
- Sun SPARCstation or SPARCserver with 12 MB or more RAM

For HP 9000 Series 800's without bundled networking, the appropriate HP 9000 LAN/Link product is also required.

Required Software

- HP-UX 8.x or 9.x for all HP 9000 platforms
- SunOS 4.1, 4.1.1, 4.1.2, or 4.1.3

Related Software

HP OpenView Network Node Manager

- HP J2316A for Series 300/400
- HP J2317A for Series 600/700/800
- HP J2318A for Sun SPARC

Ordering Information

HP B1036A HP OpenView Extensible SNMP Agent for HP 9000 Series 300/400

Options

AA0 ¼-inch tape and manuals
AAH DDS (DAT) tape and manual
UA0 License for use on a single system
UAE License for use on 100 systems
UAG License for use on 1000 systems
UEJ Upgrade from previous version

HP B1037A HP OpenView Extensible SNMP Agent for HP 9000 Series 600/700/800

Options

AA0 ¼-inch tape and manuals
AAH DDS (DAT) tape and manual
UA0 License for use on a single system
UAE License for use on 100 systems
UAG License for use on 1000 systems
UEJ Upgrade from previous version

HP B1038A HP OpenView Extensible SNMP Agent for Sun SPARC

Options

AA0 ¼-inch tape and manuals
UA0 License for use on a single system
UAE License for use on 100 systems
UAG License for use on 1000 systems
UEJ Upgrade from previous version

Options UA0, UEJ, UAE, and UAG, the license to use options, are valid for use on any combination of HP 9000 Series 300, 400, 600, 700, and 800, and Sun SPARC systems.

If B1038A, Extensible SNMP Agent for Sun SPARC, is purchased, then the OpenView TCP/IP Agent for Sun SPARC, B1035A, is not required.

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HP OpenView Distributed Management Products

Technical Data

Welcome to HP OpenView

HP OpenView is a complete family of products providing integrated network and system management (NSM) solutions for multivendor distributed computing environments. HP OpenView addresses the pressing need of organizations to ensure the uninterrupted flow of critical business information through their systems and networks. The HP OpenView solution consists of a family of management platforms, a complete set of NSM application development tools, an impressive portfolio of management applications, and a unifying architecture.

The HP OpenView Distributed Management (DM) Developer's Kit and Platform products provide an application development and run-time environment for creating NSM solutions using industry standard management protocols (SNMP, CMIP, and CMOT). Other HP OpenView applications, including Network Node Manager, can operate on the HP OpenView DM Platform.

The new Common Management Information Protocol (CMIP) option provided in the HP OpenView DM Release 3.2 extends the range of the DM products into the Open Systems Interconnect (OSI) environment. HP OpenView DM products are designed to manage multivendor and multiprotocol enterprise network environments. Backed by HP's commitment to open systems and expansion of platform capabilities for full-scale enterprise management, these products are particularly well suited for developing new and integrating existing applications for management of existing and emerging telecommunications operational networks.

Features and Benefits

Standards-based Development Environment

The HP OpenView Distributed Management Developer's Kit provides a standards based environment for object definition, management protocol access, and application programmatic interfaces. The corresponding HP OpenView DM Platform can then be used as a run-time environment to manage a diverse set of objects and protocols.

The HP OpenView Windows (OVw) Graphical User Interface (GUI) is based on the X.11 and OSF/Motif standards. In addition to support for OSI standard protocols (CMIP and CMOT), the HP OpenView DM Platform also discovers and manages IP-addressable, SNMP MIB II, and user defined Simple Network Management Protocol (SNMP) devices. These features are provided by the HP OpenView SNMP Platform which is fully contained within the HP OpenView DM Platform.

The HP OpenView DM Developer's Kit provides the X/Open Management Protocol (XMP) Application Programming Interface (API) for developing network and system management applications using SNMP and CMIP protocols. In addition to being supported by X/Open, the XMP API has been included in the OSF/DME management framework. The OSI Common Management Information Service (CMIS) package provided by XMP can be used to develop applications for managing OSI standard GDMO (Guidelines for the Definition of Managed Objects) defined objects.

The Communications Infrastructure related components of the DM Platform (both API's and processes) are based on the OSI network management architecture and guided by the CCITT X.700 network management specifications. With this focus, the DM Platform provides an excellent fit with the network management needs of the government agencies and Telecommunications industry.

Thus, HP OpenView provides a stable programming environment, portable code, and interoperability with other standards based systems and devices. Standards-based design opens the DM Platform to integration of a wide range of multivendor management applications and services.

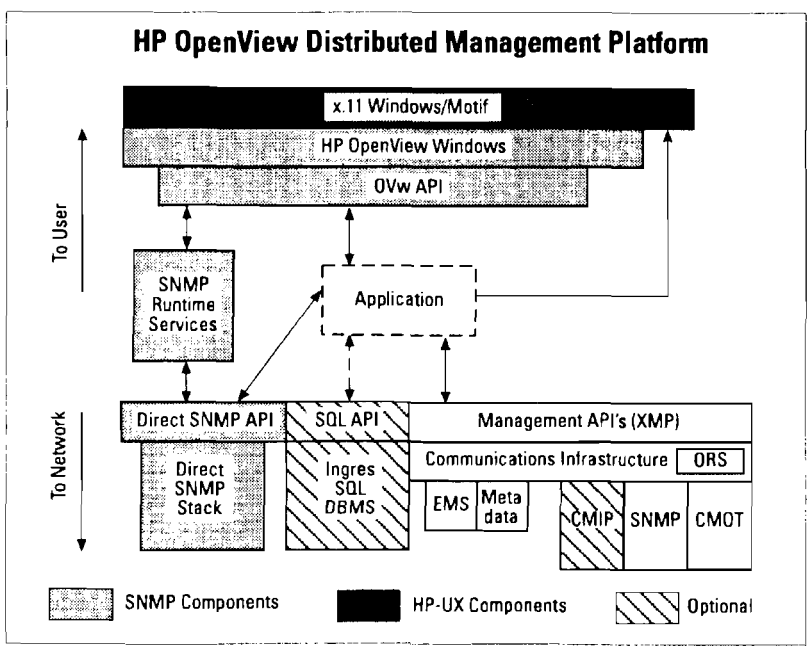

Figure 1.

A Fast Path to DME

HP and industry experts around the world believe OSF's Distributed Management Environment (DME) will become the standard software platform for NSM applications that manage open, distributed computing environments.

HP OpenView Distributed Management (DM) product technologies were selected by OSF for the DME. The Communications Infrastructure (CI) and related Metadata services are core components of the DME network management option. Network map components of the DME

Management User Interface were drawn from HP OpenView Windows. The XMP API, co-developed by HP and Groupe Bull, is the standard network management API in the DME development environment.

HP will evolve the DM Platform to incorporate DME framework components as they are made available from OSF. As a technology provider and one of DME's integrators, HP is well positioned to provide early DME compliant products. The DM Platform, with its DME selected components, provides a foundation for developing todays management solutions and taking advantage of new DME technologies and services (object-oriented system management, security, naming/directory, event management service, etc.) when they are released by OSF.

As an industry standard framework, the DME will attract a rich set of network and system management applications. The HP OpenView DM development environment, with its DME component, will allow developers to focus on solving problems relative to their unique skills and business situation.

While support of the DME core framework is important for multivendor interoperability and distributed systems management, the HP OpenView DM Platform will offer more than just DME. The DM Platform will provide expanded support of OSI and Internet/SNMP management standards including evolving CCITT X.700 systems management functions, selected OMNIPoint and NM Forum standards, and SNMP Version 2. This added functionality, not supported by DME, is essential for a complete enterprise management solution which meets the needs of telecommunications and large corporate customers.

Hardware Independence

HP's Developer's Kits are available on HP 9000 and SUN Sparc systems. IBM has adapted HP OpenView to certain IBM computer systems. Additionally, HP is licensing the HP OpenView source code to other computer manufacturers which will further extend the operational breadth of HP OpenView systems. The benefit is that an HP OpenView application written on one system can be quickly transferred to multiple computers.

Developer Support

HP OpenView developers can count on HP as an enthusiastic and able partner in the development process. HP delivers thorough, developer focused documentation and comprehensive five day DM developer training classes. From multiple locations around the world, HP's Design and Consulting service is available to customize HP OpenView Distributed Management (DM) products to meet specific business needs of customers. HP's Developer Assist program provides answers to technical questions directly from HP's factory support engineers.

Independent Software Vendors (ISVs) and Value-Added Resellers (VARs) can count on HP for assistance in developing and marketing their HP OpenView based products. HP backs these business partners with the top-rated HP OpenView Partners Program, widely distributed HP OpenView Solutions Catalog (listing both HP and partner products), and joint marketing programs.

Product Descriptions

HP OpenView Distributed Management (DM) products are the next generation of the HP OpenView Network Management Server (NMS) products which were first released in June 1990. The new DM products include the same enhanced HP OpenView Windows (OVw) user interface supplied with HP OpenView SNMP Platform and Network Node Manager products. The DM products offer updated versions of NMS components including the Communications Infrastructure (CI) and its related components (Metadata, Object Registration, and Event Management Services).

1DM Developer's Kit

The HP OpenView DM Developer's Kit is designed for developers writing NSM applications using multiple management protocols and/or communication stacks. The DM Developer's Kit includes a copy of the DM Platform run time; therefore, developers do not need to purchase a separate copy of the DM Platform to test applications.

The DM Developer's Kit contains all API's provided in the HP OpenView SNMP Developer's Kit (OVw and direct SNMP API's), plus XMP and related XOM API's. The XMP API provides programmatic access to both SNMP and CMIS services. The XMP API also provides access to Event Management Services that filter, route, and log events. The DM Developer's Kit can be used to write both manager and agent applications (including proxy agents).

The DM Developer's Kit includes full documentation and all of the library and header files needed to create an HP OpenView based application.

A contribution file set is also provided with the HP OpenView DM Developer's Kit. This contribution software includes a public domain ASN.1 compiler, utility routines, and sample applications.

DM Platform

The HP OpenView Distributed Management (DM) Platform provides all of the run-time processes needed to run applications written with the DM Developer's Kit. In addition, the DM Platform can run applications written using the HP OpenView SNMP Developer's Kit, such as Network Node Manager. Figure 1 illustrates the relationship of components in the DM Platform.

Like the DM Developer's Kit, the DM Platform contains all of the run-time processes found in the HP OpenView SNMP Platform including HP OpenView Windows and the IP discovery, layout, and monitoring routines. The DM Platform provides further run-time support for XMP based applications, allowing consolidated access to SNMP, CMOT, and CMIP protocols.

As the individual components of the DM platform can be operated separately, the platform can be run in variety of modes. One common configuration is to start only the Communications Infrastructure and its related processes (such as the Event Management Services), thereby, providing an agent platform.

SQL Database Option

Both the DM Developer's Kit and Platform contain, as an option, the run-time version of the Ingres SQL relational database. When installed, the Ingres database will become the repository of selected HP OpenView information (primarily IP network topology data). Users can access this information via interactive SQL queries and report generation tools. Database application development tools (i.e. programmatic access to the database) are sold and supported by Ingres.

CMIP Option

In conjunction with the HP OpenView Distributed Management (DM) Release 3.2, a CMIP stack option is being offered for the DM Platform and Developer's Kit. The CMIP option requires the presence of a full OSI stack; consequently, HP-UX customers need to purchase the HP OSI Transport Services (OTS) product. Due to this requirement, the CMIP option is initially only available on HP-UX systems.

CMIP is the OSI protocol for interchange of CMIS service requests such as get, set, create, and event. CMIP specifies the protocol and CMIS defines the services. CMIS service requests and responses can also be transported in an IP environment, by the DM Platform, using the CMOT protocol. In addition to CMIP, other key DM services have been enhanced to further support ISO specifications for addressing and events.

The HP OpenView DM Platform with the CMIP option conforms, in varying degrees, to both the OMNIPoint 1 specification and the US Government Network Management Profile (GNMP). Conformance with the OMNIPoint 1 required Management Communications category is the key to interoperability with other conformant management systems.

To use the CMIP option, it is required that the 3.2 version of the DM Platform or Developer's Kit be present. The CMIP option will not operate with the earlier 3.1 version of the DM products. A CMIP license-to-use is required on a per-computer basis. Multiple users or applications do not require additional license-to-use options.

CMIP-Related Upgrades

HP OpenView Distributed Management (DM) customers who have purchased software material update subscription services will automatically receive new 3.X versions of the DM products. As CMIP is an option, it is not provided as part of an update service, and must be ordered separately.

Original DM customers (who purchased 3.1 DM products) who desire to upgrade to the 3.2 release and the CMIP option, simply need to purchase a CMIP media option and a corresponding CMIP License-to-use (one per system). The CMIP option media also contains the 3.2 version of the DM platform which is required to use the option. The original DM license and corresponding software key can continue to be used with the new 3.2 DM software.

Related Products

The HP OpenView SNMP Developer's Kit and Platform products are closely related to the HP OpenView Distributed Management (DM) products. All components of the SNMP products (manuals, files, and processes) are contained in the corresponding DM products. The DM products are a complete super-set of the related HP OpenView SNMP products. This provides the benefit of being able to run SNMP Developer's Kit based applications on the HP OpenView Distributed Management Platform, including Network Node Manager. Figure 2 shows the DM product structure and relationship to SNMP Platform and Network Node Manager products.

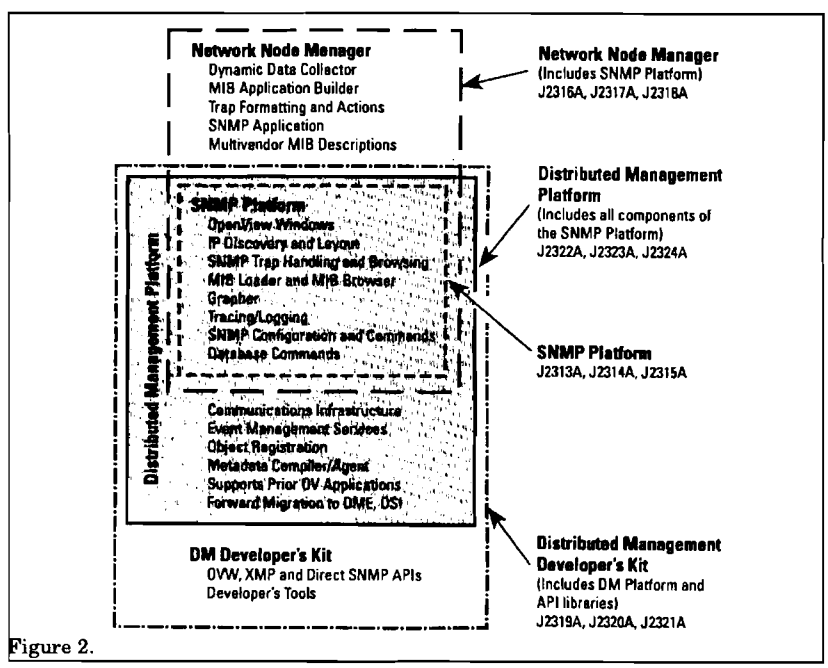

Figure 2.

As previously noted, operation of the CMIP option on HP-UX systems also requires the presence of the HP OSI Transport Services/9000 (OTS) product. The HP part number for OTS on the HP 9000 Series 700 is J2160A. The HP part number for OTS on the HP 9000 Series 800 is 32070A.

Recommended Systems

HP Hardware: HP 9000 S600, S700, and S800 computers running HP-UX 8.0x are recommended. HP 9000 S300 and S400 systems are also supported, but not recommended for new purchases.

SUN Microsystems Hardware: SUN SPARCstations 1+, 2, IPC (or greater class machines) running SunOS 4.1.1 or SunOS 4.1.2.

Multiprocessor versions of the both HP and SUN systems are not supported in HP OpenView DM Release 3.2. Support for both HP-UX 9.0 and SUN Solaris 2.0 operating systems and key corresponding hardware platforms, however, will be provided in early 1993.

To successfully install and operate the DM products, it is recommended that 100MB of free disc space be available and 32MB of RAM be present on the computer. To install and operate with the optional Ingres SQL database, as an Ingres server, an additional 120MB of disc space and 8MB of RAM is required. To operate as an Ingres client, 60MB of additional disc space is required.

For More Information

For more information, please contact your HP representative. The HP OpenView Technical Evaluation Guide, Release 3.1 (HP P/N 5091-5134E), includes a detailed technical description of the HP OpenView DM products and individual components including the CMIP option.

Ordering Instructions

To order the following products please contact your local sales office. Please note, DAT and CD ROM media options are available for all products and options. Other media options, such as 1/2 inch tape or QIC, are not available on all hardware systems. Also note, CMIP options are currently only available for the HP-UX products.

Developer's Kits

- **HP J2319A** HP OpenView Distributed Management Developer's Kit for the HP 9000 S300 and S400
- **HP J2320A** HP OpenView Distributed Management Developer's Kit for the HP 9000 S600, S700, and S800
- **J2321A** HP OpenView Distributed Management Developer's Kit for SUN Sparc

Platforms

- **HP J2322A** HP OpenView Distributed Management Platform for the HP 9000 S300 and S400
- **HP J2323A** HP OpenView Distributed Management Platform for the HP 9000 S600, S700, and S800
- **HP J2324A** HP OpenView Distributed Management Platform for SUN Sparc

Phone-In Support

- **HP 32013A**, Option #010 HP OpenView Developer Assist Plus

Key Options

(note: this is not a complete list)

004	DAT media and manuals (for the base DM products)
005	CD ROM media and manuals (for the base DM products)
008	License-to-use (for one developer or single DM platform system)
019	Additional manual set
024	Ingres DAT media and manuals
025	Ingres CD ROM media and manuals
028	Ingres License-to-use (for one user or single DM platform system)
044	CMIP DAT media and manuals (HP-UX only)
045	CMIP CD ROM media and manuals (HP-UX only)
048	CMIP License-to-use (one per system)

HEWLETT® PACKARD

HP OpenView Factory Based Design Consulting

Technical Data

Welcome to HP OpenView

HP OpenView is a complete family of network, systems, and application solutions and services for the integrated management of multi-vendor networks and systems. In the open systems and distributed client-server computing environment, the management of networks and computers has become increasingly complex. HP's Factory Based Design Consulting services for your HP OpenView Network and System management products can enhance your success.

Who needs HP OpenView Consulting?

Understanding and implementing network and system management solutions can be challenging. In many cases implementing an appropriate solution requires a significant amount of investigation, design, and expertise.

End users of management applications need to fully understand the capabilities and limitations of these tools and understand how to deploy appropriate solutions.

Developers of management applications may need assistance in designing applications that take best advantage of the underlying management platform.

Integrators using solutions to provide management for end users need expertise and experience regarding platform and application integration issues.

HP provides specialized R&D based consulting for the industry leading HP OpenView family of network and system management products.

HP OpenView Design Consulting Services

Factory Based Design Consulting is available to enhance the productivity of HP OpenView developers, allowing developers to shorten time to market for new applications.

End users benefit from these services by implementing a management plan that will provide functionality to meet their needs.

Developer consulting services range from high level information exchange to low level prototyping and component development. These services fall into the following categories:

- Understanding customer requirements to explore, propose, and discuss HP OpenView Solutions
- HP OpenView education through training, example code, and tools
- Detailed HP OpenView design assistance
- Review of functional specifications, design specifications, test plans, and user documentation
- Participation in "proof of concept" prototyping
- Development of custom components that can be used in future HP products

End user consulting services fall into the following categories:

- Complex HP OpenView Network Node Manager and Extensible Agent design and implementation
- Identification of potential HP OpenView software and hardware available for use by end users to satisfy a particular need
- Participation in "proof of concept" prototyping
- Development of custom applications for end users that can be leveraged in future HP products

HP OpenView Factory Based Design Consulting and the HP Professional Services Organization

The Factory Based HP OpenView Consulting team partners with the HP PSO. It works with the HP PSO when requested to assist with either end user customers or management application developers.

Ordering Information

To request HP OpenView Factory Based Design Consulting assistance, call the Design Consulting customer voicemail hotline at 303-229-2490. Delivery of consulting is subject to availability.

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HEWLETT® PACKARD

HP OpenView Solution Partners Program

Technical Data

Market Leading Integrated Network and System Management Products
More Powerful Developer Integration
Joint Marketing Programs

HP OpenView Solution Partners Program

You and HP OpenView Provide the Whole Solution

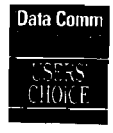
Since no single vendor can supply the entire solution to the complexities of integrated, multivendor network and system management, HP created the OpenView Solution Partners Program. This program delivers customer management solutions from the broadest variety of vendors in the industry. The HP OpenView family uniquely offers the tools and support you need to provide and integrate all the management functionality for your customers' environments, simplifying the task of planning, operating, and expanding today's integrated network and system environments.

The Need for Application Integration with Industry Standard Management Platforms

HP OpenView provides the industry standard network and system management platform for application developers, and delivers the market leverage you need to be successful. More companies use and develop applications on HP OpenView than on any other network and system management platform.

Faced with budget constraints, lack of staff resources, and skill limitations, network and system managers today are working to rapidly assimilate increasingly complex technology. The almost unbounded choice of connectivity options has led to complexity and fragmentation of network and system management responsibilities. Integrated network and system management solutions provide an economical alternative to the continued confusion caused by the proliferation of stand-alone, proprietary network, and system management solutions.

Because of HP OpenView's focus on Open Systems standards, HP OpenView is your best solution to these problems. Together, we bring the value to the network and system managers. HP broadens your market reach by providing market leading industry standard management platforms for your applications. Your partnership and



Rated best overall today, HP OpenView is the best choice for the future.

development with HP OpenView provides a rich application base and the necessary tools and services to provide what customers are looking for. Network and system managers benefit as they quickly get increased functionality, increased productivity and reduced operating costs.

Using Standards to Innovate

HP has led the industry in its commitment to networking and interoperability standards. HP has taken this leadership role by contributing to and implementing standards in both the TCP/IP and OSI domains. HP OpenView addresses the management needs in both domains by supporting coexistence of both TCP/IP and OSI standard network management solutions.

HP's OpenView has been confirmed as the industry leading platform for Integrated Network and System Management (INSM) solutions. This confirmation has come from customers, industry analysts who have endorsed the HP OpenView products, and from a number of HP OpenView Solution Partners who have committed to build management solutions on HP OpenView. These partners include IBM, over 50 LAN & WAN equipment vendors, and many system management suppliers. In addition, the Open Systems Foundation (OSF) has selected HP OpenView technologies as key technologies for the Distributed Management Environment (DME), making HP OpenView an industry standard and the right strategic choice for multivendor network and system management.

What You Need in an Integrated Network and System Management Platform Partner

I. You Need to Partner with the Right Partner!

You need the right partner with the right strategy to meet the market requirements. You need a powerful partner who has a unique approach based on open standards. You need HP OpenView.

HP OpenView Product Strategy

The HP OpenView product strategy meets the market need for integrated, multivendor network and system management on three interrelated principles:

1. Build a pervasive family of standards-based, interoperable software platforms that provide the basic enabling technology for integrated network and system management solutions. These platforms are made available on a wide variety of industry leading hardware platforms. HP OpenView products are available from HP and authorized resellers for HP UNIX workstations and business servers, SUNOS based workstations from Sun Microsystems, and Microsoft Windows personal computers. Also, through a license agreement with IBM, HP OpenView based platforms and applications are available on the IBM RS/6000. The freedom of platform choice enables you to easily adapt an HP OpenView management solution to another vendor's platform, which leverages your software development investment, and maximizes your business return.

   A standard platform allows you to combine applications from many vendors on a single, integrated management system. It provides common management services that simplify applications development and facilitate integration. This reduces the cost of developing management solutions for hardware and software vendors, increasing application availability. While others talk, HP OpenView delivers.

2. Provide application building blocks on these platforms, that can be combined with additional management applications from a variety of vendors to meet individual customer needs. Many applications are integrated with the HP OpenView Network Node Manager application, since it provides critical platform functionality such as continuous network discovery and mapping and the one-minute SNMP application builder.

The HP OpenView OperationsCenter is an excellent example of central management of remote systems. HP OpenView OperationsCenter provides sophisticated means to integrate other management applications to achieve a common and consistent working environment for all management activities. HP OpenView's DME-based API's and management services offer a clear route to DME, prompting vendors to provide new innovative applications today, with a clear growth to the future.

3. Since no single vendor can supply the entire solution to the complexities of integrated, multivendor network and system management, HP created the OpenView Solution Partners program. This program delivers customer management solutions from the broadest variety of vendors in the industry. The HP OpenView family uniquely offers the tools and support you need to provide and integrate all the management functionality for your customer's environments.

II. You Need the Resources and Tools to Make It Happen

You need a partner who has the right resources and tools to help you deliver your solution on time.

HP OpenView Solution Partner Resources With You!

HP OpenView Integration Quick Start—We can provide you with the right combination of hardware, software development environment, documentation, training and support to facilitate your application development quickly and easily to HP OpenView. Included are style guidelines that allow for a common look and feel between the HP OpenView Windows map display and each developer's application. These guidelines cover menus, icons, dialog boxes, buttons, and error messages.

Developer Support—Direct developer support is available from the HP OpenView engineering group for timely response to questions. Phone-in, Fax, and electronic mail support can be utilized.

Product Training—HP OpenView developer classes are held on a monthly basis, and as an option can be taught at your facilities. Both operations and network administration training classes are available for your customer to gain the skills they need to effectively manage and configure their network using HP OpenView. These classes allow your customer to apply HP OpenView solutions quickly and smoothly in their network and systems environment.

III. You Need the Right Marketing Programs to Communicate and Deliver to Your Customers

You need a partner who has the right marketing programs to help you take your product to market, ensuring your bottomline success!

HP OpenView Solution Partner Marketing Programs for You!

The HP OpenView Solutions Partner Program is designed to help you achieve rapid return on your investment in developing and marketing applications on HP OpenView. The HP OpenView Solutions Partner Program is focused on meeting customer needs. The Solution Partner categories are stratified on vendor contribution and benefits, as indicated by your integrated solution with HP OpenView, and demonstrated by your business focus.

HP OpenView Premier Partner—Have achieved a high level of integration with the HP OpenView platform, providing the most value to customers in key application areas, and broad support services. Premier Partners provide the best integrated solutions customers can get with HP OpenView.

HP OpenView Certified Partner—Certified applications have passed qualification testing by HP for one or more levels of integration with HP OpenView. Your customers have an added measure of confidence that certified applications meet their integrated network and system management needs.

HP OpenView Solution Partner—Acknowledgement to the industry of your solution with HP OpenView. Your solution provides HP OpenView complementary functionality. This can include an SNMP MIB that you have tested with HP OpenView, or an application that is automatically launched from the HP OpenView console.

HP OpenView Systems Integrator—Qualified to use HP OpenView to deliver network and system management integration, consulting, and custom software services. HP OpenView systems integrators provide a valuable link in designing, implementing, and maintaining networks which are managed by HP OpenView.

What the HP OpenView Solution Partner Program Does for You

The HP OpenView Solution Partner program gives you instant market exposure as part of the well recognized portfolio of solutions for your application. As part of the HP OpenView partner program, you have access to a wide variety of marketing activities to help you present your solution in the best light to your customers. These marketing activities include the following market awareness and selling tools:

Lead Generation/Referral

- **Tradeshow Assistance**—This includes HP OpenView branding collateral, cooperative educational seminars, demonstration software, joint product demonstrations, and HP booth demonstrations, and we're always open to new innovative ideas on how to work with you!
- **Sales Force Exposure**—Your products are referenced in HP's sales channel collateral, including product presentation slides, solutions catalogs, OpenView newsletters, customer references, etc. HP's sales channels are trained on the basics of your product.
- **HP OpenView Systems Integrator Exposure**—Your products are referenced to OpenView Systems Integrators, including HP's Professional Services Organization.
- **HP OpenView Symposiums**—These symposiums provide partnership with other HP OpenView solution partners at HP sponsored and industry sponsored symposiums.
- **HP OpenView Solutions Catalog**—This catalog is the industry's major source for solutions available on HP OpenView. Your application and company are featured in this publication, which provides market exposure to customers who are evaluating Integrated Network and System Management solutions.

Joint Marketing

HP OpenView Product Branding—As an HP OpenView Solution Partner, you are able to license, at no-cost, the usage of HP OpenView branding in your product and sales literature based on your Solution Partner level. This helps you leverage the successful HP OpenView brand awareness and image in the marketplace.

HP OpenView Product Packaging—HP provides access to HP's design and marketing partners for product packaging, literature development, advertiser's design and media duplication and product distribution.

HP OpenView Sales Literature—Your product capabilities can be referenced in HP OpenView sales literature. And, you can easily purchase quantities of HP OpenView sales and marketing literature for your own channel use.

HP OpenView Public Relations—HP continually promotes the availability of OpenView based solutions to our customers, sales channels, industry analysts and publications. As a branded HP OpenView Solutions Partner, you have access to these public relations efforts.

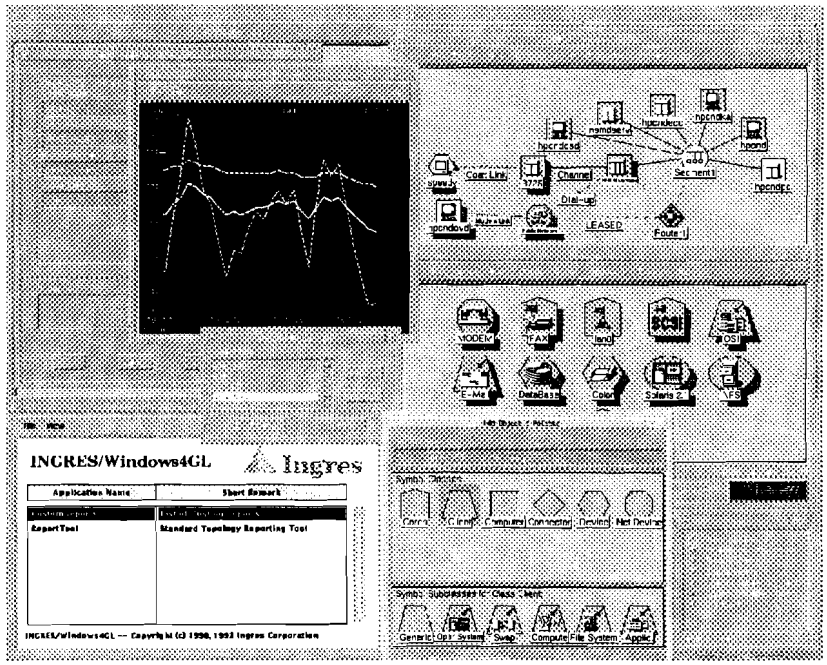
Market Pull

As an HP OpenView Solution Partner, you can leverage the HP OpenView market pull to get the attention of your customers. The same reasons that customers are buying HP OpenView are the same benefits you can leverage in your marketing and sales efforts. These reasons include

- industry leading platform provider based on Open standards
- wide breadth of application availability from the HP OpenView Solution Partner Program
- easy market leverage into HP, Sun, and IBM UNIX hardware platforms and customer base
- technologies adopted by OSF for the DME

OEM Capability

Insure your business success through HP OpenView OEM capabilities. You can have the ability to provide the complete solution set for your customers, which would include selling HP OpenView products with your integrated management application. This enables you to sell, support, and service your customers with a single source answer to their needs.



What You Need is What You Get with HP OpenView Application Integration Capabilities

- **SQL Database Manipulation**—Write reports on OpenView topology data using standard Ingress reporting tools shipped with HP OpenView. Additional applications or reports can be developed using the Ingres Developers Kit available from Ingres. Additional SQL database support is planned.
- **Manage HP 9000 or SUN Sparcstations using SNMP**—Extended management capabilities to networks, systems, applications on distributed systems. HP OpenView Extensible Agent allows executing processes, retrieving data, scripts, or to be notified of events.
- **Easily Load SNMP MIBS**—Any standard or enterprise specific MIB can be loaded with clicks of the mouse. Fully SNMP extensible to include any vendors SNMP objects without proxies or programming required. HP can also ship your MIB with HP OpenView Network Node Manager.
- **Data Attributes**—Store and display your own data fields or attributes on any object through API's or registration files.
- **Context Sensitive Menu Selection**—Menu-bar items are selectable based on objects specifies. Enables your application to only act on the proper objects.
- **Data Presentation**—Obtain a visual assessment of real-time or historical information trends using UNIX standard-in. Customize graph headings, labels, colors, or present in tabular column format.

- **HP OpenView Windows Map Integration**—Adds the visual front-end to your application that customers are demanding. Customize the display with over 200 symbols, or define your own. Explode symbols into multiple icons to represent complex objects. Develop your own icons and map displays of the network, systems, or applications. Easily control status of these objects, invoke automatic help, or edit these objects using API's.
- **Background Graphics**—Tailor the visual console to represent the layout of your building, physical appearance of your LAN, WAN hardware backplane, or front panel status indicators using standard gif graphics files.
- **Easily Integrate and Launch Applications**—Personalize your application to HP OpenView through menubar access in less than a day! Integration can also be done through executing objects and installation startup.
- **Connections**—Easily portray where your networking equipment fits in through your application. Connections can easily be added between objects maintain status and control, execute applications from, or further define by your application.
- **Manage both SNMP and CMIS objects**—This is done through the X/Open Management Protocol (XMP) API adopted as part of the OSF DME framework. Your applications have a long term migration for the future.
- **Event Monitoring**—Enable your application to send and receive SNMP traps. Display SNMP events on the management station using the HP OpenView SNMP Event Monitor.
- **Event Management Services**—Register your application to receive only the network events that are necessary. Your application can programmatically collect, forward, and filter data related to any network event using the XMP API. Via the Event Management Service user interface, both SNMP and CMIS events can be retrieved from the event log, and you can apply filtering for what is stored and graphically viewed from the event log.
- **SNMP Access**—Register to receive SNMP traps/Events through SNMP libraries.
- **Automatic Actions**—Through event configuration, applications can be automatically launched or a pop-up window displayed to manage the object. Your application can instantly solve network and system management problems!
- **Automatically Populate Your Symbol**—Representing your object upon IP discovery or application startup through the SNMP system ID. Select or change the symbols within your application.
- **Create Own Symbol Classes**—Tailor the symbol to your specific hardware, software, application, or any logical object.

Note: For more information, consult the HP OpenView Technical Evaluation Guide, HP Part Number 5091-5134E, and the HP OpenView OperationsCenter data sheet, HP Part Number 5091-7056E.

Get the Industry Leading Integrated Network and System Management Partner on Your Team!

Get Started in the HP OpenView Solutions Partner Program Now!

Call the HP OpenView Solutions Hotlines. In North America, call 303-229-4975. In Europe, call +49.7031.142958. In Japan, call 423-30-7826. In Asia/Pacific, call +61.3.272.2675 (Australia).

An HP OpenView Solutions partner representative will discuss your business needs and objectives, and get you started towards accessing the market leverage you need for your business success! We look forward to working with you as an equal partner in providing the industry's best Integrated Network and System Management solutions!

Printed in the U.S.A. 4/93
5091-7432E

HEWLETT® PACKARD

HP OpenView Network Node Manager

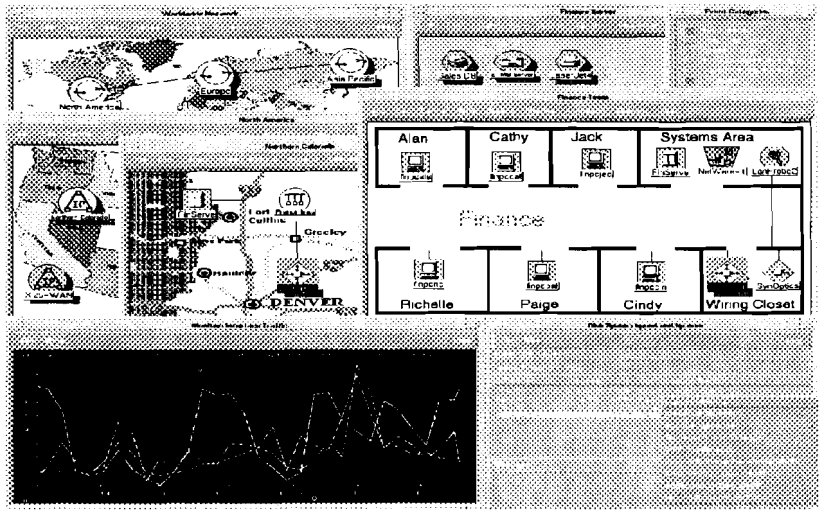
Technical Data

The industry's best network and system management solution for multivendor TCP/IP environments

HP OpenView Network Node Manager maximizes the productivity of your network and system management staff and increases the availability of your entire environment whether you have a single Local Area Network (LAN) or interconnected LANs. Gives you an unconstrained view of your network and systems to easily monitor and control your entire environment.

Network Node Manager provides easy-to-use fault, configuration and performance management for multivendor TCP/IP (Transmission Control Protocol/Internet Protocol) networks.

Part of the HP OpenView family of network and system management products, Network Node Manager includes a robust set of features which reduce management tasks from hours to minutes. For example:



- Discovery of your environment is performed automatically by Network Node Manager; maps are created and updated with current status of any device on the network with an IP address.
- Single View Management is accomplished by integrating your new and existing third-party or custom applications in a matter of minutes without programming.
- Application Builder provides a quick, nonprogrammatic way to customize your solution by including management information specific to other vendors' devices.
- HP OpenView Windows graphical user interface provides sophisticated capabilities for quick, simple task execution within an accurate representation of your environment.
- Data Collector provides automatic collection of historical information on user-selected data objects.

Based on industry standards, Network Node Manager manages network devices that are IP-addressable and run the Simple Network Management

Protocol (SNMP). These devices include HP 9000s, HP 3000s, PCs, and numerous devices from HP and other vendors. HP OpenView Network Node Manager runs on the HP 9000 family of computers and is also available for Sun SPARCstations.

Features

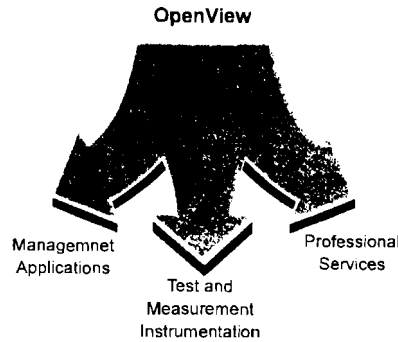
Enhanced HP OpenView Windows Graphical User Interface
Based on OSF/Motif and on technology selected for the OSF Distributed Management Environment user interface, this interface allows network management staff to easily monitor and control their entire environment. For example, users can perform the following tasks easily, without programming:

- Define map icons which when selected automatically initiate a program or shell script
- Define maps to represent your unique environment including the addition of background graphics
- Define symbols appropriate to represent objects in your environment from over 200 templates
- Select and perform operations on transmission lines
- Define symbols which explode into multiple icons to represent complex objects like a system and all of its components from the chassis to the backplane
- Integrate applications with the menu bar quickly, giving a single point of monitoring and control for management applications and tools

Discovery
Network Node Manager's Discovery capability automatically generates and maintains a map of your TCP/IP network. Saving hours of work entering and modifying the network configuration, Discovery also continuously monitors the status of the network nodes.

Application Builder
Users can quickly build applications to manage network devices and resources that use SNMP but aren't preconfigured in Network Node Manager. Network Node Manager provides tools to load vendor-specific Management Information Base (MIB) extensions and control specific MIB variables through a browser menu and using the SNMP set command.

Dynamic Data Collector and User-Defined Thresholds
Users can get real-time and historical network information they need to understand the dynamics of their distributed environment for efficient troubleshooting and planning. This information allows users to manage more effectively by establishing thresholds on critical resources which Network Node Manager then monitors. Network Node Manager allows the user to select the notification method to be used when a threshold is exceeded. Historical information can be printed in ASCII format or exported to a spreadsheet for off-line planning and reporting.



Putting Network Node Manager to Work

HP OpenView Network Node Manager was designed to meet the needs of a variety of users. Help Desk staff will use the up-to-date maps to understand the current status and health of the network. Troubleshooters can utilize Network Node Manager's tools to isolate and correct problems more quickly than ever before. Administrators can take advantage of the wide range of network and system configuration capabilities available with Network Node Manager to minimize the time spent in routine management activities and Planners will have more flexibility and control in collecting and analyzing performance information for their entire network.

Fault Management Tasks
Network Node Manager performs the following fault management tasks:

- Determine network status and connectivity–device status is displayed via color changes to the map automatically and continually.
- Monitor critical resources–set thresholds on critical resources which Network Node Manager monitors and automatically reports a threshold has been exceeded.
- Customize user event notification and specify automatic actions–decide what text and MIB variable are represented in the network event message as well as identify a program or shell script to be executed when the event is received.
- Find network routes–Network Node Manager provides a graphical and textual display to indicate the route packets take between tnetwork nodes.
- Diagnose network problems–perform the following protocol tests on problem nodes selected from the map or entered manually:
  - IP test–uses the ping command to verify physical connectivity
  - TCP test–performs a TCP connection
  - SNMP test–checks a node to determine if an SNMP agent is running
- Document network topology–Network Node Manager can save the current network map for comparison against future topologies.
- Perform real-time comparisons to "normal"–with enhanced data graphing capabilities, Network Node Manager provides tools to develop profiles for your environment under normal conditions. Real-time graphs compare current performance against these profiles to speed problem isolation and resolution.
- Customize the fault management solution–with easy menu integration, add any programs or shell scripts you're used to using in your environment.
- Retrieve network information–to expedite problem resolution, quickly access essential information by selecting nodes from the map and choosing menu items.

Configuration Management Tasks
Network Node Manager performs the following configuration tasks:

- Update network topology–Network Node Manager automatically keeps track of your network topology by finding new devices and reporting other configuration changes.
- Locate network objects–locate objects by a variety of attributes to increase inventory control.
- List remote network services–provides information about TCP/IP services available on remote nodes.
- Edit network maps–Network Node Manager allows users to represent any nodes on the map which cannot be discovered automatically by adding custom or standard icons to map views.
- Configure nodes–via integration with HP-UX System Administration Manager (SAM) and TCP/IP network services, Network Node Manager provides facilities to perform configuration tasks on nodes selected on the map.
- Get node-specific information–use the mouse to obtain and edit descriptions of node-specific information like location, owner, type and configuration as well as free-form comments such as serial number or asset number.
- Retrieve MIB information–you can easily point-and-click through menus which present information on any SNMP device. A single variable's value can be retrieved and multiple objects can be retrieved in table form or in a real-time graph. You can also set the value of the variable.
- Retrieve configuration events–Network Node Manager automatically detects and reports a wide variety of events which are generated due to configuration changes.
- Keep electronic records–because Network Node Manager automatically detects changes and records them, manual configuration records are no longer necessary.

Performance Management Tasks

Network Node Manager performs the following performance management tasks:

- Monitor network statistics–monitor real-time networks statistics and display them in a variety of formats and combinations.
- Gather historical data–gather historical information about MIB variables for SNMP devices. This information can be saved to a file, and printed in user-defined ASCII formats or in user-defined graphs.
- Define thresholds–Network Node Manager provides capabilities to set thresholds on any MIB variables so deviations in important statistics like throughput and error rates can be detected before problems arise.
- Monitor system resources–monitor the relative load of HP 9000 systems and Sun SPARC systems running the HP OpenView TCP/IP Agent for SunSPARC.
- Determine usage profiles–using the combined capabilities of the data collector and the flexible graphing capabilities in Network Node Manager, you can easily gather information, run analyses and create graphs for identification of normal utilization of resources in your environment.

Product Requirements

Required HP Hardware

- HP 9000 workstation Series 300 with 68040 processors
  Series 400, 600, 700, 800 (models without bitmapped displays require an X-terminal), multi- processors not currently supported
- RAM: 24 Mbytes minimum for S300/400; 32 Mbytes minimum for S600/700/800
- Color Graphics: 1024x768 minimum resolution;1280x1024 recommended
- 6 color planes minimum; 8 color planes recommended
- Hard disk (supported only on root server in diskless clusters)
- mouse

Required Sun Hardware

- Sun SPARCstation 1+, IPC, IPX, or 2
- RAM: 24 Mbytes minimum
- CG3 color graphics required
  207 Mbyte hard disk minimum (second 207 Mbyte hard disk recommended)
- mouse

Required HP Software

- HP-UX 8.07 or later (including X-Windows and OSF/Motif)
- LAN/Link for HP 9000
- ARPA Services/9000

Required Sun Software

- SunOS 4.1.1 or SunOS 4.1.2
- OpenWindows Version 2 with Patch Release 4 for X11/NEWS Server or third party OSF/Motif window manager (HP VUE from SAIC or Quest Motif-Window Manager are recommended)
- System V Software Installation Option
- HP OpenView SNMP Agent (B1035A) is recommended for management of SPARCstations running SunOS

Support Services

HP offers a comprehensive set of support services for your hardware and software as well as network planning, design, implementation and problem management. Contact your HP sales representative for more information.

Ordering Information

J2316A OpenView Network Node Manager for Series 300/400

001	¼-inch tape and documentation
003	DAT tape media and documentation
008	License-to-use for one system
013	Credit for SNMP Platform already purchased
014	Upgrade credit for NNM 2.X customers not on SMU
015	Extra copy of documentation

J2317A OpenView Network Node Manager for Series 600/700/800

001 ¼-inch tape and documentation
003 DAT tape media and documentation
008 License-to-use for one system
013 Credit for SNMP Platform already purchased
014 Upgrade credit for NNM 2.X customers not on SMU
015 Extra copy of documentation

J2318A OpenView Network Node Manager for Sun SPARC

001 ¼-inch tape and documentation
008 License-to-use for one system
013 Credit for SNMP Platform already purchased
014 Upgrade credit for NNM 2.X customers not on SMU
015 Extra copy of documentation

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5091-5433E

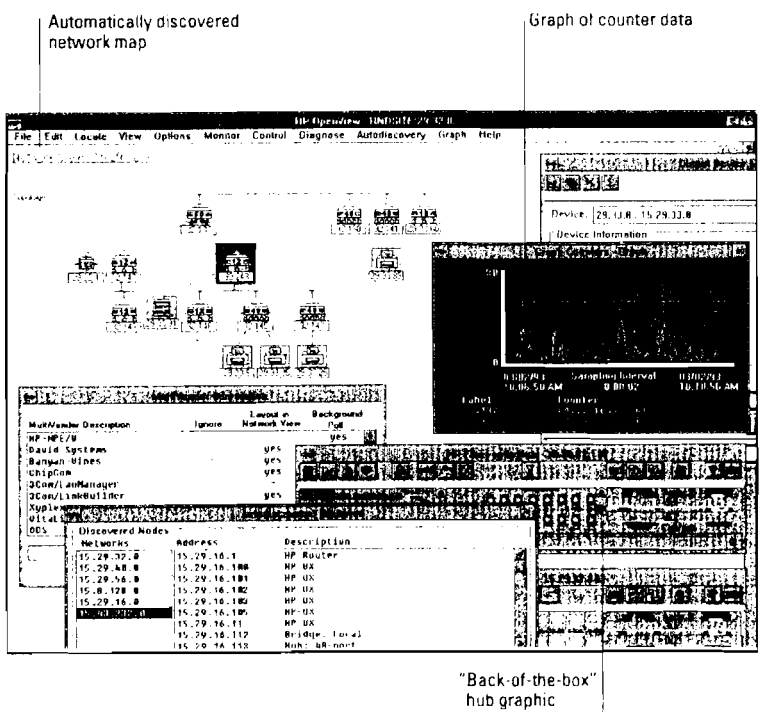
HEWLETT® PACKARD

HP OpenView Workgroup Manager/Windows
HP OpenView Interconnect Manager/Windows

Technical Data

Product Numbers
HP 28686E, 27256E

HP 28686E OpenView Workgroup Manager/Windows is an SNMP-based workgroup-level manager for managing network devices such as hubs, printers, PCs, and workstations. HP 27256E OpenView Interconnect Manager/Windows is a superset of Workgroup Manager, expanding its functions to include bridges and routers as well as offering some traffic management functions. Workgroup Manager provides services for managing networks consisting of hubs and attached devices; Interconnect Manager is designed for managing connected workgroups, up to hundreds of nodes.



Both Workgroup Manager and Interconnect Manager are based on the industry-standard HP OpenView network management platform, and both operate on PC-compatible computers under Microsoft Windows®.

Integrated Multivendor Management—
Both management products offer leading-edge autodiscovery, which automatically discovers IP devices or NetWare/IPX clients and servers and lays them out in a hierarchical map that accurately represents your network topology. This map is the basis for graphical monitoring and control of HP network devices, as well as monitoring of multivendor devices down to PCs or printers on your network. For HP EtherTwist hubs, back-of-the-box graphics give you straightforward control over all hub ports. For HP printers and plotters with SNMP agents—as provided by HP's JetDirect networking cards—you can be notified of specific printer events, such as paper out, paper

jammed, and toner low. There is a browser that lets you browse MIBs from HP and other vendors and a facility for graphing standard MIB-II and HP-private MIB. And sophisticated security features allow you to set network-level policies and device level security for HP's Hub Plus/24 S hubs.

Ease of Use—
Despite the complexity of your network, these managers give you seamless integration of multivendor IP or IPX management. Their icon-based color graphic interface, "back-of-the-box" hub graphics, context-sensitive online help, and task-oriented documentation allow you to perform management functions quickly and easily. This ease of use lets you keep your network running smoothly and avoid costly downtime. And if your network management starts small with Workgroup Manager, you can easily upgrade to Interconnect Manager and upgrade your network management functions while maintaining a familiar management environment.

Real-Time Traffic Analysis—
HP Interconnect Manager has advanced, real-time traffic analysis features to help you monitor network usage and identify potential trouble spots. These features are based on the HP Embedded Advanced Sampling Environment (EASE) functions built into all HP EtherTwist hubs and bridges to sample network traffic. This allows you to monitor trends on your network (based on IP, IPX, or MAC addresses) and identify top talkers, heavy users, communication pairs, and errors and their sources.

Features

HP 28686E OpenView Workgroup Manager/Windows and HP 27256E Interconnect Manager/Windows

Both managers do the following:

- Discover the devices in your network (workgroup LAN or extended LAN, as appropriate), down to the level of individual computer and printers.
- Automatically draw the network map.
- Allow you to monitor and control HP EtherTwist hubs and to monitor multivendor SNMP/IP or SNMP/IPX devices.
- Provide back-of-the-box graphics of HP EtherTwist hubs for quick and easy monitoring and control down to the port level.
- Allow you to set thresholds for HP EtherTwist hubs to trigger alarms when needed.
- Allow you to set "action on events", such as paging you or sending an audio speaker alert, when specified events occur.
- Allow graphing of standard MIB-II counters and HP private MIB extensions through the graphing facility.
- Provide easy point-and-click browsing of MIB-II or proprietary MIB extensions with the MIB browser facility.
- Provide security screens for setting network security at a network or device level.

- Provide integrated printer management for HP printers or plotters using HP's JetDirect cards; this allows you to get printer information and status, inventory, and notification of events like paper out and toner low.
- Allow uploading and downloading of HP EtherTwist hub configuration files, for modifying existing configurations or copying of configurations between hubs.
- Protect your investment through standards support. Both managers support SNMP/IP, SNMP/IPX, MIB-II, and RFC 1368.

HP 27256E Interconnect Manager/Windows only

In addition to the functions listed above, Interconnect Manager/Windows also does the following:

- Provides monitoring and control for HP bridges (in addition to hubs). This includes setting of bridge operating modes, spanning tree parameters, and wildcard filters.
- Allows remote configuration of routers via Telnet.
- Uses HP EASE for real-time traffic analysis functions, which allow you to monitor network traffic and identify potential network trouble spots using easy-to-read pie charts, bar charts, or time-series charts (previously a separate product: HP OpenView Resource Manager/DOS).

Specifications

System Requirements

- IBM PC-compatible computer (minimum 386/20 MHz for Workgroup Manager; minimum 386/33 MHz for Interconnect Manager)
- 640 Kbytes base memory
- 6 Mbytes minimum extended memory for Workgroup Manager (8 Mbytes recommended); 8 Mbytes minimum extended memory for Interconnect Manager
- 10 Mbytes available hard disk space for Workgroup Manager; 12 Mbytes available hard disk space for Interconnect Manager
- VGA monitor
- Microsoft Windows-compatible mouse
- 10BaseT (twisted-pair) or 10Base2 (thin coaxial) LAN adapter card
- MS-DOS®, version 3.3, 4.01, or 5.0
- Microsoft Windows, version 3.1

Warranty

HP 28686E OpenView Workgroup Manager/Windows and HP 27256E OpenView Interconnect Manager/Windows are warranted for 90 days against defects.

Ordering Information

HP 28686E OpenView Workgroup Manager/Windows

HP 27256E OpenView Interconnect Manager/Windows

See your dealer or HP representative for information on upgrading Workgroup Manager/Windows to Interconnect Manager/Windows.

HEWLETT® PACKARD

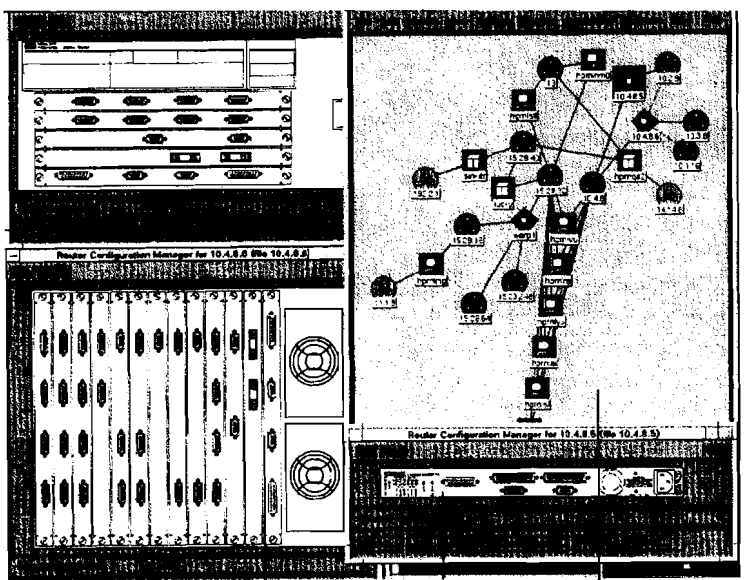
HP OpenView Interconnect Lite/UX and Sun HP OpenView Interconnect Manager/UX and Sun

Technical Data

Product Numbers
HP J2343A, J2342A, 27361B, J2344A

HP OpenView Interconnect Lite is an entry-level, UNIX®-based network management tool that provides monitoring functions for large, multivendor, IP-based networks. It monitors any SNMP/IP-addressable network devices, including hubs, bridges, routers, and attached devices. Interconnect Lite is available in versions for HP and Sun workstations (see ordering information).

HP OpenView Interconnect Manager is a full-featured superset of the Interconnect Lite product. It adds control and customization features: easy, graphical configuration for HP and Wellfleet routers; an Application Builder utility for quick and easy creation of custom management applications; and a tool for managing disk space and CPU utilization on HP and Sun workstations. Interconnect Manager is available in versions for HP and Sun workstations (see ordering information).



Complete Network View— HP Interconnect Lite and HP Interconnect Manager give you an accurate view of your network configuration and status, whether your network is located all on one site or is spread out across multiple continents. The discovery function automatically discovers all IP-addressable devices on your network, lays out the network map, and continually updates the map with changes as they occur. Background graphics allow you to integrate the discovered devices with floor plans and maps, for an accurate physical and logical representation of your network.

Multivendor Monitoring—
Both managers continuously monitor the IP-addressable devices across the network and display their status using colored icons—green indicates a healthy network, red indicates a problem, and yellow warns of a potential problem. A graphing facility allows you to graph counters from hubs, bridges, and routers made by both HP and third parties (using the third-party MIB extensions). You can also define network events that trigger alarms or take other actions when certain thresholds in important network statistics (such as throughput or error rates) are exceeded.

Device Control—
In addition to monitoring your network devices, these managers allow you to control them. You can enable and disable hub ports and change link beat and other settings. You can set the operating states of bridges and configure spanning tree parameters to build in redundant bridging to your network. And you can change your router configurations via Telnet from Interconnect Lite, or—for HP and Wellfleet routers—with easy-to-use graphical tools from Interconnect Manager.

Features

HP OpenView Interconnect Lite/UX (J2343A) and Sun (J2342A) *and* HP OpenView Interconnect Manager/UX (27361B) and Sun (J2344A)

Both HP Interconnect Lite and Interconnect Manager share the following features:

- Are available in versions for either HP or Sun workstations
- Support OSF/DME user interface technology.
- Support TCP/IP, IPX, DECnet IV, AppleTalk II, XNS, and Learning Bridge (LB) protocols.
- Discover any IP-addressable device on your network.
- Automatically generate a network map and update it to reflect the current network status.
- Monitor LAN and WAN links.
- Gather and graph network statistics.
- Provide a MIB (Management Information Base) loader and compiler for adding other vendors' specific MIBs.
- Allow you to configure ports, adjust spanning tree parameters, and set thresholds and alarms for hubs, bridges, and routers.
- Use TFTP to upload and download configuration data across the network.
- Provide an encrypted password for access control on HP EtherTwist devices.
- Allow remote router configuration via Telnet.

HP OpenView Interconnect Manager/UX (27361B) and Sun (J2344A) only

In addition to the features listed above, Interconnect Manager adds the following:

- Provides the Router Configuration Management System for configuring HP and Wellfleet routers (software versions 5.70 and 5.74) through a graphical interface.
- Provides Application Builder for quick creation of custom management applications without any programming.
- Provides System Management tool for managing disk space and CPU utilization on HP and Sun workstations.

Ordering Information

HP J2343A OpenView Interconnect Lite/UX

HP J2342A OpenView Interconnect Lite/Sun

HP 273618 OpenView Interconnect Manager/UX

HP J2344A OpenView Interconnect Manager/Sun

Media Options

AAO ¼-inch cartridge tape media and documentation
AAH DDS media and documentation (UX version only)

Specifications

Required Hardware for HP Systems

- HP 9000 Series 700 or HP 9000 Series 800 Model 825, 834, or 835
- 32 Mbytes RAM
- Color monitor with at least 1024 by 768 resolution
- 8 color planes
- Mouse
- 75 Mbytes available hard disk space for Interconnect Lite, or 98 Mbytes available hard disk space for Interconnect Manager

Required Software for HP Systems

- HP-UX 8.07 (including X-Windows and OSF/Motif®)
- ARPA Services/9000
- Network Node Manager (included with Interconnect Manager) for Interconnect Manager

Required Hardware for Sun Systems

- Sun SPARC 1, 1+, IPC, 2, or 10
- 24 Mbytes RAM
- CG3 color graphics monitor
- Mouse
- 65 Mbytes available hard disk space for Interconnect Lite, or 80 Mbytes available hard disk space for Interconnect Manager

Required Software for Sun Systems

- SunOS 4.1.1, 4.1.2, or 4.1.3
- OpenWindows version 2 with patch release 10 for X11/NEWS server, OpenWindows version 3, or third-party OSF/Motif window manager
- SunOS System V software with installation option
- HP OpenView SNMP Agent (B1035A) is recommended for management of SPARC stations

Warranty

HP J2343A OpenView Interconnect Lite/UX, HP J2342A OpenView Interconnect Lite/Sun, HP 27361B OpenView Interconnect Manager/UX, and HP J2344A OpenView Interconnect Manager/Sun are warranted for 90 days against defects.

HEWLETT® PACKARD

HP OpenView Resource Manager/UNIX
HP OpenView Resource Manager/Sun

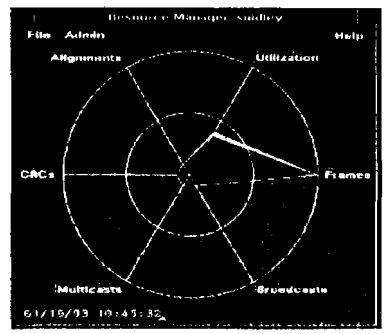
Technical Data

Product Numbers
HP J2345A, J2346A

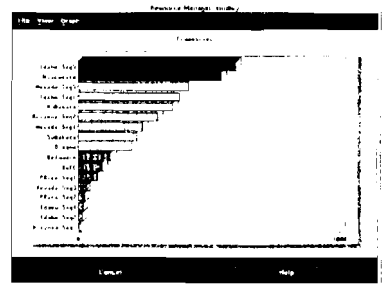
HP OpenView Resource Manager is a UNIX®-based traffic management application that guides you to hot spots on your network, so you can fix current problems and plan for the future. Resource Manager is available in versions for HP and Sun workstations (see ordering information).

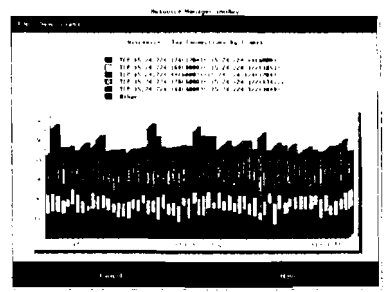
Resource Manager takes advantage of the HP EASE traffic sampling functions built into managed HP EtherTwist hubs and bridges, and analyzes network traffic patterns to give you a continuous view of your network's activity—on all segments concurrently—whether at a single site or around the globe. When Resource Manager has pinpointed the source of a problem on the network, you can frequently use a device management application, such as HP OpenView Interconnect Manager, to prevent the problem from affecting the network, as when you disable the hub port of a computer that is causing a broadcast storm on the network.

Predictive Management— Resource Manager takes advantage of your knowledge of your network, and helps you find trouble spots before they erupt. You can customize warning (yellow) and alert (red) thresholds for network conditions—utilization levels and error levels that can cause trouble throughout your network—based on your experience with the network. You will be advised of potential troubles before your users feel any effects, so you can make sure that they never do see those problems. (You can act, not react.)



Radar diagram: What is the problem?


Segment view: Where is the problem?


Node view: Who is causing the problem?

Automatic Guidance to Hot Spots—
Finding the trouble spots on your network is as easy as 1, 2, 3—whether you are running TCP/IP, IPX, DECnet Phase IV, or AppleTalk.

1. See *what* the problem is by checking the radar diagram. It points to the major statistics that indicate the health of your network, and shows which ones are out of their normal ranges. Click on the out-of-range statistic and ...

2. See *where* the problem is by looking at the distribution of that error type across all network segments. Click on the offending segment and ...

3. See *who* is causing the problem—the source node, the destination node, or the communicating pair.

Ease of Use—
Resource Manager gives you a whole new kind of user interface for network management. Instead of looking at a screen full of scattered icons, you look at a single diagram that reports the status of your whole network. When you need to find an error source, Resource Manager takes you there in three clicks. (This user interface technology is so easy that you will actually use it.) You will even find it easy to customize the interface to fit your network's characteristics. For instance, to alter threshold value for any of the six network measures, just click on the threshold marker in that measure's threshold bar and drag it to the value you want.

Features

HP OpenView Resource Manager/UNIX (J2345A) and Sun (J2346A) do the following:

- Provide centralized real-time traffic analysis of your network statistics.
- Provide multiple views of your network: global view, segment view, and node view.
- Enable management of your entire network through a single "radar chart" screen.
- Monitor your entire network's trends and traffic continuously.
- Monitor MAC utilization and frames, broadcasts, multicasts, CRC errors, and alignment errors.
- Guide you to error sources automatically, saving you time and money.
- Provide end-to-end limited protocol decoding. Support multiple protocols: Ethernet, IP, TCP, UDP, DECnet Phase IV, AppleTalk, and IPX.
- Track network connections, identifying top users and services used on your network.
- Provide click-and-drag function to set up and change thresholds.
- Are available in versions for either HP or Sun workstations.

Specifications

Required Hardware for HP Systems

- HP 9000 Series 700 or HP 9000 Series 800 models that are equipped with the X-Windows system
- 32 Mbytes RAM
- Color monitor with at least 1024 by 768 resolution
- 8 color planes
- Mouse
- 10 Mbytes hard disk space for application and data collection

Required Software for HP Systems

- HP-UX 8.07 (including X-Windows and OSF/Motif®)
- ARPA/Berkeley 4.0 Sockets

Required Hardware for Sun Systems

- Sun SPARC 1, 1+, IPC, 2, or 10
- 32 Mbytes RAM
- Color graphics monitor
- Mouse
- 15 Mbytes hard disk space for application and data collection

Required Software for Sun Systems

- SunOS 4.1.1, 4.1.2, or 4.1.3 with 80 Mbytes total swap space
- SunOS System V software with installation option
- SunOS network services (Ethernet and TCP/IP)
- OpenWindows version 2 with patch release 10 for X11/NEWS server, OpenWindows version 3, or third-party OSF/Motif window manager

Warranty

HP J2345A OpenView Resource Manager/UNIX and HP J2346A OpenView Resource Manager/Sun are warranted for 90 days against defects.

Ordering Information

HP J2345A Open View Resource Manager/UNIX

Media: DDS cartridge

HP J2346A OpenView Resource Manager/Sun

Media: ¼-inch cartridge tape and documentation

HEWLETT® PACKARD

HP OpenView Switch/PAD Manager

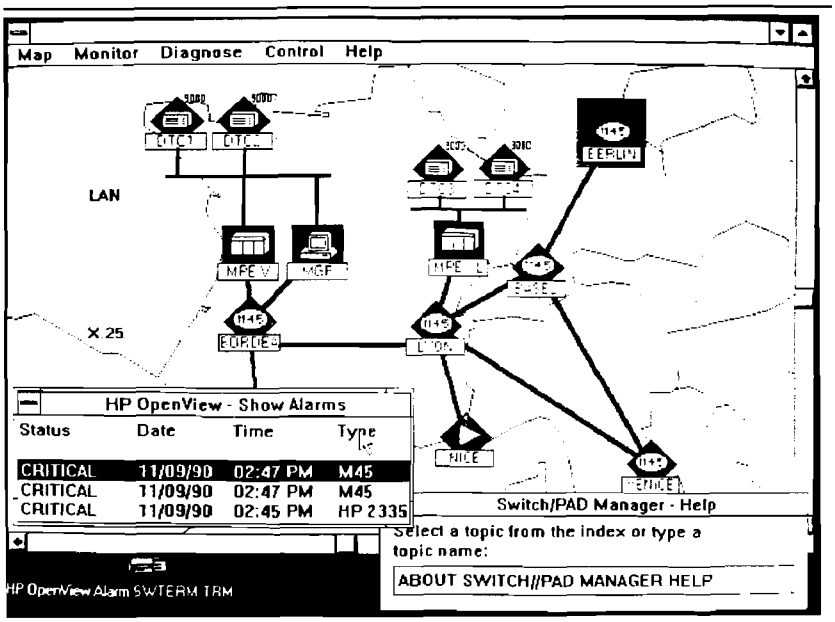
Technical Data

Product Numbers
HP J2017A, 32054E #204

The HP OpenView Switch/PAD Manager, based on the HP OpenView Windows DOS Workstation, is a centralized network management tool for local and remote management of Model 45 switching nodes and/or HP 2334A/2335A PADs.

Features and Benefits

- Central control and monitoring of Model 45 switching nodes and HP 2334A/2335A PADs to ensure low-cost and centralized operations.
- User-friendly HP OpenView graphical interface with color-coded alarms to easily configure and monitor the network.
- Complete coexistence with other HP OpenView applications to manage multiple devices from a single PC platform.
- Real-time status monitoring and logging of events allowing problem recognition and prevention.
- Remote diagnostic capabilities for quick and efficient problem solving.



Functional Description

The HP OpenView Switch/PAD Manager is connected to the network via a local asynchronous connection to a Model 45 switching node or an HP 2334A/2335A PAD. It can then be used to manage a network of Model 45 switching nodes and/or HP 2334A/2335A PADs.

Up to 100 Model 45 Plus switching nodes and 300 HP 2334A/2225A PAD can be simultaneously managed.

With the HP OpenView Switch/PAD Manager, based on the HP OpenView workstation, system managers or network

DETAILED FUNCTIONS	MODEL 45 SWITCH	2334A/2335A PAD
ALARMS	AUTOMATIC ALARMS GENERATION * LINK X.25 FAIL * NODE RESTART * ALARM CONGESTION * ...	NO ALARM GENERATION
MONITORING	HEARTBEAT FROM MODEL 45	POLLING FROM SWITCH/PAD MANAGER PC
STATUS DISPLAY	NODES DISPLAYED ON THE MAP NODE COLOR CHANGES COLOR-CODED EVENT NOTIFICATION	
EVENTS	EVENT LOGFILE DISPLAYED EVENT SEARCH CAPABILITIES ON-LINE PRINTING	
DEVICE ACCESS	AUTOMATIC LOGON TO MODEL 45 AND 2335A PAD MANUAL LOGON TO ANY X.25 DEVICE	

administrators can centrally monitor the status of the entire network. In addition, the Switch/PAD Manager provides quick centralized access for the configuration and control of Model 45 switching nodes and HP 2334A/2335A PADs.

These features help the network administrator increase network uptime. In addition, HP OpenView Switch/PAD Manager reduces learning time for users by providing an easy-to-use graphical interface based on HP OpenView Windows.

Network Management Functions

The HP OpenView Switch/PAD Manager allows the network administrator to perform the following tasks:

Network fault management: Real-time alarm detection on an HP OpenView map and event reporting according to preset severity levels. Status of the Model 45 switching nodes and HP 2334A/2335A PADs network is provided through a set of pre-defined standard HP OpenView icons. Four different colors are used to reflect the status of each component according to the level of alarm severity.

Network diagnostic capabilities: Once a problem has been detected on the map, the HP OpenView Switch/PAD Manager allows the network administrator to display the contents of event logfiles. The search capabilities can then be used to view all the events relating to a particular device or within a particular timeframe.

Network control functions: The HP OpenView Switch/PAD Manager, using an automatic connection to any device on the network, provides access to the full management functionality of these devices. This includes configuring any device on the network and a first level of diagnostics.

Network Operator Interface

The HP OpenView Switch/PAD Manager uses the standard HP OpenView user interface environment with a graphical network map, pull-down menu-based commands, standard dialog boxes, and context-sensitive Online Help.

Coexistence with HP OpenView DTC and other HP OpenView applications

The integration of both HP OpenView DTC Manager and Switch/PAD Manager applications brings the following advantages to customers:

#1 Cut operation costs: coexistence of management applications on the same platform under the HP OpenView umbrella drastically cuts the cost of required equipment and decreases operation overhead.

#2 One family of products integrated under HP OpenView: whenever HP 3000/9000 users are managing their DTCs and need switch or PAD equipment, they

can buy it from HP instead of from another vendor, as HP provides you with a seamless integration of these devices under the same manager.

Functional Specifications

General Specifications
HP OpenView Workstation consists of:

- HP Vectra 486s/33XM with:
  - 4 Mbytes memory
  - 85 Mbytes hard disk drive
  - 3½-inch flexible disk
  - SVGA monitor
  - Portable DeskJet printer and cable
- MS-DOS® Version 6.0
- MS Windows® version 3.1
- HP OpenView Windows B.01.01

The HP OpenView Switch/PAD Manager product consists of:

- HP OpenView Switch/PAD Manager software B.02.02
- HP 24541B dual serial card
- HP 24542M – 2 serial cables
- HP 24542G serial card

Environmental Conditions

Operating temperature: 41°F to 104°F (5°C to 40°C)
Non-operating temperature: -40°F to 158°F (-20°C to 70°C)
Humidity: 15% to 80% (noncondensing).
Operating altitude: 15,000 ft (4.6 km)
Non-operating altitude: 50,000 ft (15.2 km)

Regulatory Compliance

- FCC Class B
- FTZ 1046/84 Level B
- SABS approval
- VCCI approval

Safety Approvals

- UL listed
- CSA, TUV certified
- Nemko, FEI pending
- IEC 380/435 compliance

Ordering Information

Ordering the HP OpenView Workstation Hardware and Software.

HP 32054E HP OpenView Windows Workstation. The HP OpenView Windows Workstation is a specially configured HP Vectra, with PC software already installed. Includes 4 Mbytes memory, portable DeskJet printer cable, HP mouse, Security Lock, MS-DOS version 6.0, MS-Windows version 3.1, HP OpenView version B.01.01.

ABA->ABZ (*must order*) – Localization options for HP Vectra PC.

204 (must order) Switch/PAD Manager connection (dual serial card, 3 serial cables) and Switch/PAD Manager software (media product).

Note: If the Model 45 collecting node connected to the HP OpenView Switch/PAD Manager PC doesn't have a monitor HP J2007A (i.e., a terminal or a loopback connector), an additional dual serial link card HP 24541B needs to be ordered for the Model 45 switch.

Ordering the HP OpenView Switch/PAD Manager only

The HP OpenView Switch/PAD Manager software (B.02.02) is supported over MS Windows Version 3.1 and HP OpenView Windows B.01.01.

HP J2017A Switch/PAD Manager software and Switch/PAD connection (dual serial card, 3 serial cables).

Support Services

HP also offers a number of software support services. With the purchase of these support services, customers are entitled to free updates of the HP OpenView Switch/PAD Manager.

The support services available for the HP OpenView Switch/PAD Manager are as follows:

H2024A + T00 #0L7
TeamLine support for HP OpenView workstation
H2025A + H00 #0L7
ResponseLine support for HP OpenView workstation
H2026A + S00 #AA6
HP Software updates (5¼-inch floppy) #AA8 HP Software updates (3½-inch floppy).

HEWLETT® PACKARD

HP OpenView System Manager

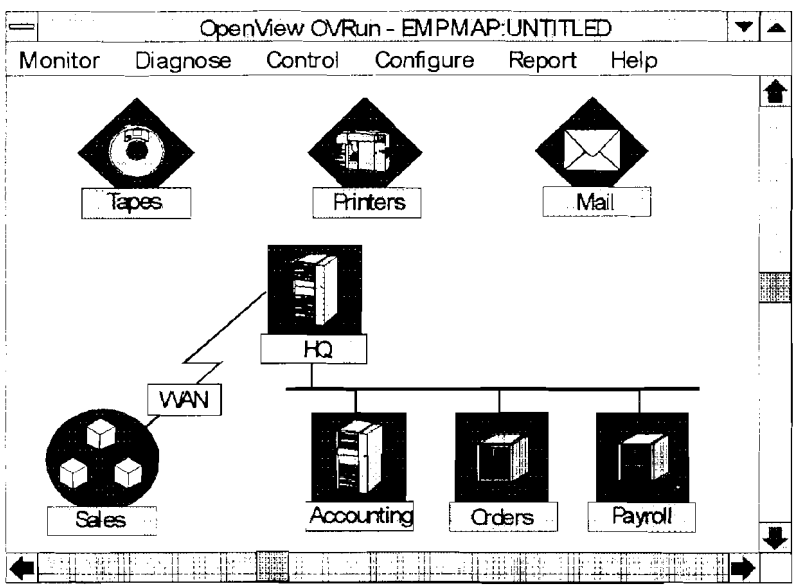
Technical Data

Product Numbers
HP 36936A, 36937A, 36938A

Product description

HP OpenView System Manager allows operators to monitor and control multiple networked HP 3000s from a central console. As networks of systems grow increasingly large and complex, the number of technical people needed to manage those systems also grows. In order to control costs and simplify operations, businesses are making efforts to centralize management of their networked systems. By consolidating operations control and expertise, HP OpenView System Manager allows businesses to increase operator efficiency while reducing operations cost.

Managing systems in both local and wide area networks, HP OpenView System Manager consists of two main components: HP OpenView console, the central controlling node, and Managed (or Remote) Nodes, which are controlled by HP OpenView console.



HP OpenView System Manager is part of the HP OpenView family of network and systems management products.

Features and benefits

Graphical User Interface
Allows operators to monitor all of their networked HP 3000s at a glance through an intuitive graphical network map on the HP OpenView console. Systems on the network map change color to reflect their current status. Easy to learn and use, the HP OpenView Windows user interface significantly reduces operator training time.

Immediate system status notification
Provides faster fault detection by notifying operators of the status of all networked HP 3000s via a central HP OpenView Windows graphical network map.

Management by exception
Increases operators' efficiency by freeing them from monitoring every system console message. Instead, operators are notified only of the problems they are truly interested in via the HP OpenView Windows network map. Operations departments define which problems to track, eliminating unnecessary notification.

Automated responses
MPE commands or command files (scripts) can automatically respond to events, which reduces the amount of events that require operator attention. This further increases the productivity of the operations staff, making the systems more "self-healing and self-managing". This feature is very flexible.

Operators can decide whether or not they want the events that took care of themselves with automated responses to show up in the event log. They can choose to see everything that went on, even if they did not have to intervene, or they can choose to simply see the events that required operator help.

Centralized system console control
Provides system control including shutdown and restart of all managed HP 3000s from a central console. Increases system uptime by providing faster problem resolution. Improves level of operations service by making centralized systems management expertise available to all systems. Reduces operator cost by minimizing technical expertise required at distributed sites.

Centralized application monitoring and control
Expands fault detection/resolution capabilities by allowing operators to centrally monitor and control HP-supplied, user-written, or third-party applications.

Task-based filtering of events
Enables customers to categorize messages based on groups represented by predefined icons on the screen. Customers can view all the disk-related events under the disk icon, all the printer-related events under the printer icon, etc. The icons can be put on one central console, or they can be distributed across a maximum of five different consoles. Icons and events can be viewed as they relate to each system, or viewed at a higher overall network level.

Partnership with existing applications
Allows operators to capitalize on the expertise of other systems management applications such as job scheduling and disk space utilization applications. HP OpenView System Manager can consolidate the status and centralize control of these applications on HP OpenView console.

Application monitoring and control
HP OpenView System Manager also allows operators to monitor and control HP-supplied, user-written, and third-party applications. Applications generate a status and send that status to HP OpenView console's graphical network map.

Link to other applications
MPE/iX contains a message catalog that many applications use to generate their messages. It contains in the neighborhood of 10,000 different messages. A subset of 500-1,000 of these messages that are especially relevant to system managers has been identified and adjusted so that as they occur, they will automatically show up as an event to OpenView console. This feature minimizes the amount of time needed to install and use the product.

Functional description

HP OpenView System Manager gives operators the choice of monitoring their networked HP 3000s at several different levels of detail. When monitoring their systems, operators have the ability to go from a high level overview of system status to a detailed description of each system incident. If necessary, operators can then take corrective action on one or more managed nodes all from a central HP OpenView console. HP OpenView System Manager consolidates operations of networked HP 3000s by providing the following functionality:

Continuous system status notification

The HP OpenView Workstation displays a graphical network map which allows operators to check the status of all of their HP 3000s at a glance. Each system on the map changes color to reflect its current status. Operators can monitor the status of operating systems, all subsystems, job streams, and applications.

Console message review

For more detailed information, HP OpenView System Manager allows operators to see a summary of outstanding system events as well as their associated console messages. At the first level of detail, HP OpenView System manager summarizes how many events of a particular severity occurred on each system. For further details, operators may selectively review actual console messages either by system or by event severity.

Trouble tracking

For trouble tracking purposes, HP OpenView System Manager provides a message annotation feature. After reviewing an event message, the message annotation feature allows operators to append the message with a note describing any additional information about that message. This feature is particularly useful for multi-shift operations where it is often difficult to track problems during shift changes.

Console control

Once a problem has been detected that requires action, HP OpenView System Manager provides operators with full console access to one or more of their distributed HP 3000s from a central console. Operators can execute any console command and receive console messages just as if they were sitting in front of the local system console.

Console message logging and reporting

For long-term problem detection, HP OpenView System Manager logs all console messages in a database residing on the controlling HP OpenView console node. Operations staff may generate customized reports from this log for selective trend analysis.

Configuration description

HP OpenView System Manager is a distributed application which runs on up to five HP OpenView Workstations, an HP OpenView console (HP 3000, MPE/iX system), and one or more Managed Nodes (HP 3000, MPE V, and /iX systems). A single HP OpenView console supports up to 64 managed nodes and the product manages systems over any NS network. The main application resides on the HP OpenView console. The HP OpenView Workstation provides a user interface to the management node functionality and uses HP OpenView Windows, Microsoft Windowsc, AdvLink for Windows, and NS (Network Services) 2.1.

HP OpenView System Manager employs two connections between the HP OpenView console and each managed node. The primary connection is used for all status monitoring and control capabilities. The primary connection consists of an NS- X.25, NS-LAN, or NS-Point- to-Point network. The secondary connection is used as a safety feature for the rare occasions when the network or systems go down. When this happens, the secondary connection allows HP OpenView System Manager to continue providing full console access. The secondary connection consists of either one of the following:

- an X.25 connection to the managed node's ldev 20 hardware console port via an X.25 PAD, or
- a back-to-back modem or DTC connection to the managed node's ldev 20 hardware console port over a LAN or Point-to-Point topology.

Product requirements

The following hardware and software are required for HP OpenView System Manager (version numbers are current as of 2/1/93):

HP OpenView Workstation

- HP Vectra PC running Microsoft Windows 3.1 (must be bought outside HP)
- HP OpenView Windows 5.0
- AdvLink for Windows A.03.12
- NS (Network Services) 2.1, or

HP OpenView Windows Workstation (32054x)

- HP Vectra PC and all required pre-installed PC software
- option 202
- option 101, 102, or 103
- localization option

HP 3000 OpenView console (Management Node)

- HP 3000 Series 9xx
- MPE/iX operating system release 4.5 or later
- ThinLAN 3000/iX Link (36923A)
- NS3000/iX Network Services (36920A)

If using an X.25 secondary connection, the following is required:

- HP OpenView Windows Workstation dedicated for DTC Manager (32054B, option 201)
- DTC (2345A or 2340A) with DTC/X.25 Network Access card
- X.25 iX System Access (36939A)

PAD hardware:

- X.25 PAD (HP 2334A or HP 2335A recommended), or Model 45 switch (J2000A/J2001A)
- HP 40261A PAD modem connect ports for HP 2334A (each card provides 4 PAD ports)
- HP 40262A PAD modem connect ports for HP 2335A (each card provides 4 PAD ports)
- HP 40230A cables (1 per managed HP 3000 with 3 pin direct connect port)
- HP 13242G cables (1 per managed HP 3000 w/25 pin modem connect port)

Note: One PAD connection is required for each managed node console port which will be connected through the network to the management node. The HP 2334A and HP 2335A PADs can support up to 16 managed nodes provided they are in close enough proximity to one another that they can all be cabled to the same PAD.

If using a LAN or Point-to-Point secondary connection, the following is required:

- Hayes or Hayes compatible modem (assumes presence of anexisting support modem on ldev 21), or
- DTCs, depending on configuration, and HP OpenView Windows Workstation dedicated for DTC Manager (32054C, option 201)

When the MANAGED NODE is an MPE V system:

- HP 3000 Micro family or Series 37-70
- MPE V Operating System (U-MIT or later)
- NS X.25 3000/V Network Link (24405A) or ThinLAN 3000/V Link (30240A) or NS Point-to-Point Network Link (30284A, 30285A)
- NS3000/V Network Services (32344A)
- See "note" below

When the MANAGED NODE is an MPE/iX system:

- HP 3000 Series 9xx
- MPE/iX Operating System (Release 2.1 or later)
- DTC X.25 iX Network Link (2345A, 2346D/E/F/G, 2355A, 36939A) or ThinLAN 3000/iX Link (36923A) or NS Point-to-Point Network Link (36922A)
- NS3000/iX Network Services (36920A)

Note: The NMEvent API feature is supported on MPE V Operating System platform 1P or later, and on MPE/iX Operating System release 2.2 or later.

Ordering information

New functionality requires MPE/iX Release 4.5.

HP 36936A* HP OpenView console (HP Management Node and PC software. Must order one copy for EACH management node.)

Select one processor option for each management node.

HP 36937A Managed Node/iX software. Must order one copy for **each** MPE/iX managed node. Managed node software is not required for the 36936A HP OpenView console.

HP 36938A Managed Node/V software. Must order one copy for each MPE V managed node.

* PC software—One copy of the HP OpenView System Manager PC software is required for each HP OpenView workstation. One to five HP OpenView workstations may be run per management node. There are two ways to order the HP OpenView System Manager PC software: 1) order 36936A which includes HP OpenView System Manager Management Node and PC software. All other required PC software must be purchased separately, 2) order the HP OpenView Windows Workstation (32054B option 202 plus connect and localization options). This includes all required PC software pre-installed on an HP Vectra PC.

Documentation

36936-61001 HP OpenView System Manager User's Guide
36936-61002 HP OpenView System Manager Manager's Guide

Support products

HP offers a spectrum of support services to help plan, implement, operate, and manage a network throughout the network lifecycle.

For more information, contact your HP representative.

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5091-6354E

HEWLETT® PACKARD

HP OpenView History Analyzer/UNIX
HP OpenView History Analyzer/Sun

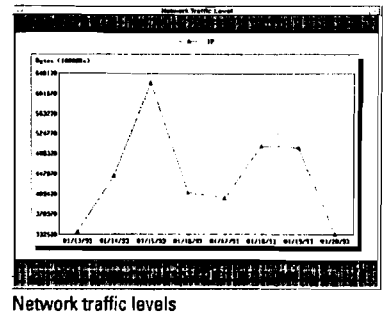
Technical Data

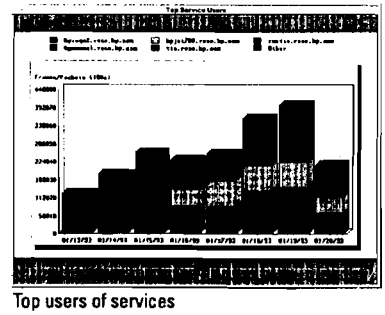
Product Numbers
HP J2347A, J2419A

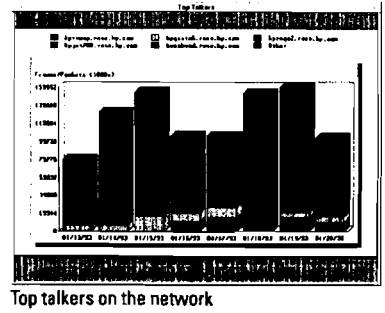
HP OpenView History Analyzer is a UNIX®-based traffic analysis tool that provides the real network data you need for efficient use of your existing network capacity and effective planning for future growth. History Analyzer is available in versions for HP and Sun workstations (see ordering information).

History Analyzer takes advantage of the HP EASE traffic sampling functions built into managed HP EtherTwist hubs and bridges, and analyzes network traffic patterns to give you a historic view of your network's activity—on all segments concurrently—whether at a single site or around the globe.

Effects of Changing Routines—
History Analyzer can help you evaluate the effects that a change in your network routines may have on your users. For instance, if you want to change the time for backing up the network, History Analyzer will advise you of any high levels of traffic at the new time that would be adversely affected by the change, before you make it. History Analyzer will tell you the traffic levels on your network at any time, over the entire period that History Analyzer has been operating on your network. You can retrieve data in any one of 14 predefined categories, with extensive options for customizing the analysis to your requirements. Similarly, you can use History Analyzer to find the quietest times for network maintenance operations, like adding new servers or upgrading network operating systems.


Network traffic levels


Top users of services


Top talkers on the network

Resource Distribution–
In many networks, a few users—CAD engineers, publications departments—take up a large part of the capacity on your network. History Analyzer gives you real usage data, so you can tailor your network's resources to your users' actual needs. For instance, the service traffic level query tells you who has been using the various services on the network and which nodes are providing those services. With this type of reporting, you have concrete data to support decisions on the level and location of the resources you provide for your users.

Capacity Planning–
Your network is not a static entity—it is constantly changing and growing, and you can't afford to keep it at its current size and configuration until it simply clogs up. At the same time, it's too chancy to choose where to add capacity based simply on hunches or guesswork. History Analyzer shows you where the traffic, on your network approaches capacity; and when you know how much growth is needed, you can budget accordingly and spend your money in the right places. By replacing guesswork with hard facts, you can keep your network capacity one step ahead of your user's demands.

Features

HP OpenView History Analyzer/UNIX (J2347A) and Sun (J2419A) do the following:

- Allow you to evaluate network capacity from various geographic locations concurrently.
- Provide you with a record of the top users on the entire network that you can use for billing purposes.
- Identify top service users across your network: for example, who uses FTP and who uses X-Windows.
- Identify top service providers across your network, enabling you to expand them accordingly.
- Show the top users of network capacity; this may suggest topology changes.
- Show traffic level for a specified period of time; this may suggest the best time for network backup or other maintenance activity.
- Track broadcast and multicast storms, enabling you to evaluate their effect on network capacity.
- Track network errors, identifying which node has the greatest effect on your network capacity.
- Identify multiple protocols: Ethernet, IP, TCP, UDP, DECnet Phase IV, and IPX.
- Provide selections to view historical data for specific time, protocol, service, addresses, traffic type, and others.
  Are available in versions for either HP or Sun workstations.

Specifications

Required Hardware for HP Systems

- HP 9000 Series 700 or HP 9000 Series 800 models that are equipped with the X-Windows system
- 32 Mbytes RAM
- Color monitor with at least 1024 by 768 resolution
- 8 color planes
- Mouse
- 15 Mbytes hard disk space for application
- Up to 310 Mbytes hard disk space for data collection (typical usage for 30 days of data for 1000 nodes); History Analyzer and Traffic Expert share the same data space

Required Software for HP Systems

- HP-UX 8.07 (including X-Windows and OSF/Motif®)
- ARPA/Berkeley 4.0 Sockets

Required Hardware for Sun Systems

- Sun SPARC 1, 1+, IPC, 2, or 10
- 32 Mbytes RAM
- Color graphics monitor
- Mouse
- 20 Mbytes hard disk space for application
- Up to 310 Mbytes hard disk space for data collection (typical usage for 30 days of data for 1000 nodes); History Analyzer and Traffic Expert share the same data space

Required Software for Sun Systems

- SunOS 4.1.1, 4.1.2, or 4.1.3 with 80 Mbytes total swap space
- SunOS System V software with installation option
- SunOS network services (Ethernet and TCP/IP)
- OpenWindows version 2 with patch release 10 for X11/NEWS server, OpenWindows version 3, or third-party OSF/Motif window manager

Warranty

HP J2347A OpenView History Analyzer/UNIX and HP J2419A OpenView History Analyzer/Sun are warranted for 90 days against defects.

Ordering Information

HP J2347A OpenView History Analyzer/UNIX

Media: DDS cartridge

HP J2419A OpenView History Analyzer/Sun

Media: ¼-inch cartridge tape and documentation

HEWLETT® PACKARD

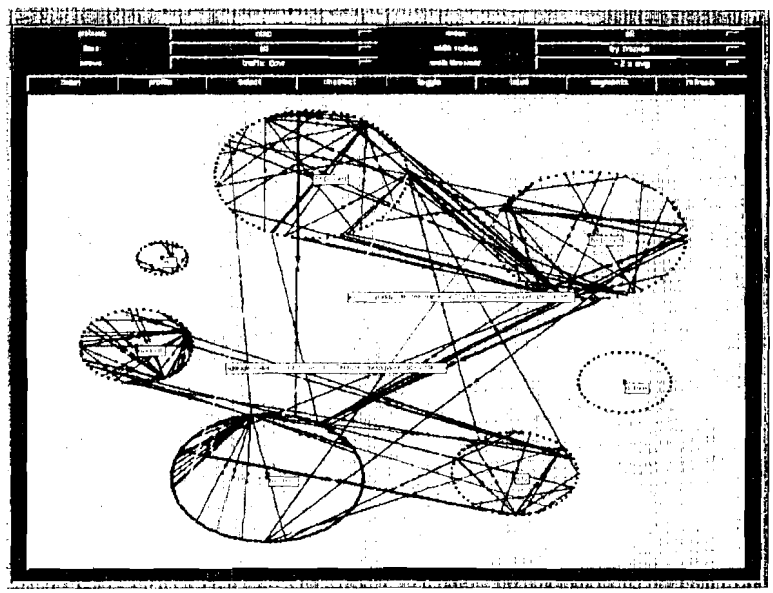
HP OpenView Traffic Expert/UNIX
HP OpenView Traffic Expert/Sun

Technical Data

Product Numbers
HP J2348A, J2349A

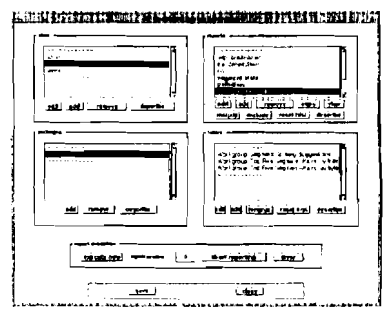
HP OpenView Traffic Expert is a UNIX®-based traffic management tool that visualizes network traffic flows graphically and recommends actions to maximize network availability. Traffic Expert is available in versions for HP and Sun workstations.

Traffic Expert provides an adaptive management system that continuously learns and adapts to your network's behavior. This lets you view both the dynamics of your network topology and the traffic characteristics: volume, type, usage, and flow directions. Traffic Expert's adaptive learning of your network traffic patterns enables it to build a knowledge-based system for managing your workgroups and recommending actions to enhance your network performance. Acting as your onsite network consultant, Traffic Expert provides you with daily reports recommending various actions to optimize your traffic flow.



View of network traffic flows

Adaptive Learning—
Traffic Expert takes advantage of the HP EASE traffic sampling technology build into managed HP EtherTwist hubs and bridges to focus on the traffic between network devices. Continuous sampling of network traffic enables Traffic Expert to learn what is normal and to highlight abnormal behavior, allowing you to focus on key areas of



Report generator

your network. It displays traffic information—volume, type, source, and destination—drawing lines between communicating nodes to show traffic flow directions, varying the line thicknesses to indicate traffic volume, and using color to differentiate traffic flows within the workgroup from those between different workgroups or to unsampled regions of the network.

Knowledge-Based Management System— Traffic Expert continuously monitors your workgroups' clients and servers to build a knowledge-based management system. This system can be used to make recommendations for optimizing the flow of traffic on your network. The power of continuous sampling lets Traffic Expert continue to learn and automatically build a set of rules for a well behaved workgroup. This is not a generic set of rules based on simulation; it is based on your own network traffic, and lets Traffic Expert analyze your network's health and make recommendations—such as moving clients or servers or adding filtering devices (bridges and routers) to the network—to optimize your network traffic.

Clearly Documented Recommendations— Traffic Expert's intuitive reports take the mystery out of traffic management, and translate its knowledge-based recommendations for decision making. The reports facility provides a broad set of user-customizable formats that cover services, traffic, protocols, workgroup partitioning, and troubleshooting. After you decide which report you want, a click of the mouse will automatically generate daily reports, and route them to your printer or to your electronic mail system for distribution across your organization.

Features

HP OpenView Traffic Expert/UNIX (J2348A) and Sun (J2349A) do the following:

- Learn and adapt to changes in your network traffic.
- Learn what is normal and highlights unusual behavior.
- Display traffic: volume, type, and flow direction.
- Use color to differentiate workgroup traffic from site traffic and internet traffic.
- Build a knowledge-based system by continuously monitoring and analyzing normal traffic.
- Recommend actions to optimize network traffic across remote sites.
- Generate reports with recommendations to optimize network performance.
- Monitor and isolate IP, IPX, TCP, UDP, MAC, ICMP, DECnet Phase IV, NFS, SNMP, and diskless traffic.
- Are available in versions for either HP or Sun workstations.

Specifications

Required Hardware for HP Systems

- HP 9000 Series 700
- 64 Mbytes RAM
- Color monitor with at least 1024 by 768 resolution
- 8 color planes minimum
- Mouse
- 20 Mbytes hard disk space for application
- up to 310 Mbytes hard disk space for data collection (typical usage for 30 days of data for 1000 nodes); History Analyzer and Traffic Expert share the same data space

Required Software for HP Systems

- HP-UX 8.07 (including X-Windows and OSF/Motif®)
- ARPA/Berkeley 4.0 Sockets
- HP OpenView Interconnect Lite, Interconnect Manager, or Network Node Manager

Required Hardware for Sun Systems

- Sun SPARC 1, 1+, IPC, 2, or 10
- 32 M bytes RAM
- Color graphics monitor
- Mouse
- 20 Mbytes hard disk space for application
- up to 310 Mbytes hard disk space for data collection (typical usage for 30 days of data for 1000 nodes); History Analyzer and Traffic Expert share the same data space

Required Software for Sun Systems

- SunOS 4.1.1, 4.1.2, or 4.1.3 with 80 Mbytes total swap space
- SunOS System V software with installation option
- SunOS network services (Ethernet and TCP/IP)
- OpenWindows version 2 with patch release 10 for X11/NEWS server, OpenWindows version 3, or third-party OSF/Motif window manager

Warranty

HP J2348A OpenView Traffic Expert/UNIX and HP J2349A OpenView Traffic Expert/Sun are warranted for 90 days against defects.

Ordering Information

HP J2348A OpenView Traffic Expert/UNIX

Media: DDS cartridge

HP J2349A OpenView Traffic Expert/Sun

Media: ¼-inch cartridge tape and documentation

HEWLETT® PACKARD

HP PerfView Software

Technical Data

Performance Management for Distributed Computing Environments

HP PerfView software provides an advanced framework and powerful tools that enable centralized performance management for systems throughout the enterprise. Through state-of-the-art management-by-exception techniques, HP PerfView automatically identifies and helps resolve existing and potential performance problems in real time, before they affect your system and network users.

The HP PerfView distributed software application has two components. The performance analysis software, which is based on OSF/Motif®, runs on HP 9000 computer systems. The performance collection software runs on HP 9000, HP 3000, and Sun SPARCstation systems. As an integral member of the family of HP OpenView system and network products, HP PerfView delivers the performance management functionality required for group, site, and enterprisewide environments.

As performance issues arise, a graphical map uses color to represent the network and its system elements. The hierarchical user interface design enables you to assess the entire environment's status, characterize existing and potential performance problems, and resolve problems quickly.

To help you characterize and resolve performance issues, the performance analysis software provides sophisticated alarm filtering and analysis. It also provides a high-level view of global and application performance metrics on the system or systems under investigation. Once the performance concern has been characterized, you can obtain additional detailed performance information by integrating node-specific products such as HP GlancePlus software, which assists with resolving performance issues.

Identifying and acting on exception conditions dramatically reduces performance management overhead. HP PerfView software provides an integrating umbrella for your current node-specific performance management tools, preserving your training investment in those tools. Other interfaces also provided support the integration of other vendors' performance management products.

Features

- Incorporates an easy-to-use graphical user interface based on a hierarchical design
- Utilizes powerful management-by-exception techniques
- Provides multivendor platform management (Interfaces are available to import performance data and alarms from other vendors' products.)
- Integrates with other network, system, and performance management products
- Automatically generates and updates the network map for transmission control protocol/internet protocol (TCP/IP) networks

Benefits to You

- Quickly resolve performance problems before they affect users.
- Reduce performance management overhead.
- Manage the performance of all nodes in your environment.
- Efficiently manage your environment through a single user interface.
- Reduce time spent documenting the environment configuration.

Quickly Resolve Performance Problems Before They Affect Users

Sophisticated alarming technology allows you to identify potential performance problems before they affect service levels, such as response time, transaction rates, and job turnaround. The integrated user interface supports a hierarchical approach to identifying, isolating, characterizing, and resolving performance problems. You receive notification of a problem through the graphical map. HP PerfView software also allows you to monitor, examine, and compare the performance of select nodes within your environment to isolate a problem to one or more nodes. You can then use node-specific performance monitors to determine the cause and resolve the problem. The software helps you resolve problems before your users notice any deterioration in service.

Reduce Performance Management Overhead

In the past, the performance management of large distributed environments was inefficient because you either had to monitor every node actively or react to user complaints of erratic service. HP PerfView software utilizes the concept of management by exception, implemented through sophisticated alarming technology, which allows you to concentrate on the areas requiring your attention.

Manage the Performance of All Nodes in Your Environment

Most computer environments contain hardware and operating system platforms from many vendors. HP PerfView software includes analysis software and intelligent collectors for several system platforms. Interfaces provide for the integration of third-party performance monitors to enable the management of all systems in your environment.

Efficiently Manage Your Environment through a Single User Interface

As an HP OpenView application, HP PerfView software integrates with network and system management products available from Hewlett-Packard and other vendors. This supports an integrated approach to monitoring and acting on network, system, and performance information consistently, which increases efficiency and reduces your training requirements.

Here is a practical example: A central help desk performs first-level environment management and documents more complex performance problems. A specialist receives these problems for further analysis and resolution. The specialist then uses the same interface to access integrated node-specific performance monitors in addition to the detailed information that HP PerfView software provides.

Reduce Time Spent Documenting the Environment Configuration

The auto-discovery feature automatically identifies systems and network devices within the environment and builds a map, saving hours of entering initial configuration information. The software tracks ongoing changes and dynamically updates the map to reflect those changes.

How HP PerfView Works

Intelligent agents on each monitored system capture and log performance metrics and determine if exception conditions exist. Sophisticated algorithms compare current service levels, such as response times and transaction rates, resource utilizations, and bottleneck indicators, against

predefined alarm thresholds. When an exception condition occurs, the agent notifies the central analysis workstation.

A graphical user interface that integrates with HP OpenView software allows you to assess the environment's current status quickly, including any outstanding alarm conditions. You can connect to monitored systems for complete access to performance information. You can view performance data for a single system or compare multiple systems on a single graph. Each system holds historical information for up to 7 days. The use of intelligent collectors combined with the management-by-exception approach ensures that information does not overwhelm the network and central analysis workstation.

HP Hardware and Software Product Requirements

HP 9000 Series 300,400, 600,700, and 800 analysis system requirements:

- A minimum of 32 Mbytes of random-access memory
- At least 30 Mbytes of free disk space under /usr (If Network Node Manager has not been installed, then an additional 65 Mbytes of free disk space under /usr is required.) (Not supported on diskless systems)
- Color graphics monitor with a minimum of 1024 x 768 resolution and 6 color planes; 1280 x 1024 resolution and 8 color planes recommended
- HP-UX version 8.0 or later (not supported on HP-UX BLS releases), including HP LAN/Link 9000, HP ARPA Services/9000, HP NetIPC Fileset (if MPE systems will be monitored), and X-Windows (Motif) (Motif X server display station can be a system other than the management system.)

HP-UX monitored system requirements:

- At least 10 Mbytes of free disk space
- HP-UX version 7.0 or later (not supported on HP-UX BLS releases), including HP LAN/Link 9000 and HP ARPA Services/9000

MPE/iX monitored system requirements:

- Local area network (LAN) hardware
- All supported MPE/XL and MPE/iX releases
- Network services (NS)

MPE V monitored system requirements:

- LAN hardware
- All supported MPE V releases
- NS

Sun SPARCstation monitored system requirements:

- At least 10 Mbytes of free disk space
- SunOS version 4.1 or later, including networking components

Specifications

Featured Information[1]

Class	Resource	Metric Type
Global	CPU	Percentage of CPU utilized for various system activities CPU queue depth and process wait information; number of processes
	Disk	Percentage peak activity utilization for disk Queue depth and process wait information; physical and logical I/O rates
	Memory	Memory utilization information Disk activity due to virtual memory management; swap utilization for UNIX® systems
	Network	Packet rate information for UNIX systems
Application		For the set of processes that belong to the given application: percentage of CPU utilized, disk I/O rate, and statistics indicating resources that processes are blocked on

[1] Two levels of collection agents are available. The first monitors multiuser or server systems. The second, which provides a subset of the global metrics only, is for desktop systems.

Ordering Information

Certain key parameters need to be defined to ensure appropriate exception conditions. HP's Professional Services Organization can assist in analyzing requirements to customize management policies for your environment.

HP H5288A HP PerfView integrated performance analysis software for HP 9000 Series 300 and Series 400

Options:
AA0 ¼-inch cartridge tape and manual
0B1 Manual only
UAU License-to-use for 1 HP-UX manager

HP H5289A HP PerfView integrated performance analysis software for HP 9000 Series 700

Options:
AAH Digital audio tape and manual
0BI Manual only
UAU License-to-use for 1 HP-UX manager

HP H5324A HP PerfView integrated performance analysis software for HP 9000 Series 600 and Series 800

Options:
AA0 ¼-inch cartridge tape and manual
AA1 ½-inch magnetic tape and manual
AAH Digital audio tape and manual
0B1 Manual only
UAU License-to-use for 1 HP-UX manager

HP H5290A HP PerfView MPE V agent license
HP H5291A HP PerfView MPE/iX agent license
HP H5292A HP PerfView HP-UX agent license
HP H5293A HP PerfView Sun SPARCstation agent license

Options for HP H5290A, HP H5291A, HP H5292A, and HP H5293A:
UDF Up to 5 nodes
UDG Up to 10 nodes
UDH Up to 25 nodes
UDJ Up to 50 nodes

HP H5294A HP PerfView HP-UX desktop agent license
HP H5295A HP PerfView Sun SPARCstation desktop agent license

Options for HP H5294A and HP H5295A:
UDG Up to 10 nodes
UDH Up to 25 nodes
UDJ Up to 50 nodes
UDK Up to 100 nodes

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HEWLETT® PACKARD

HP OpenView OperationsCenter

Technical Data

The New Way of Managing Multivendor Distributed Systems

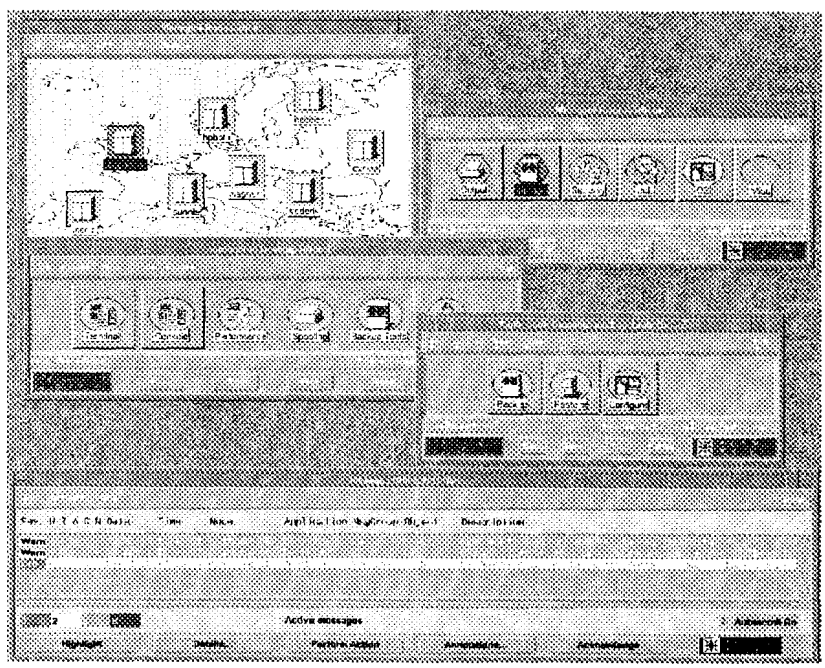
Managing multivendor distributed computing environments adds new dimensions to the responsibilities of IT organizations. Keeping these environments operating, providing the services end-users expect, and controlling the operational costs requires a new type of management solution.

HP OpenView OperationsCenter increases the IT organization's effectiveness and productivity by increasing the uptime of the distributed systems and decreasing the time to resolve problems.

HP OpenView OperationsCenter increases the IT organization's effectiveness and productivity by increasing the uptime of the distributed systems and decreasing the time to resolve problems.

HP OpenView OperationsCenter collects management information, messages and monitoring alerts from throughout the computing environment, then prepares, consolidates, and presents the information at the central management system. Once the management information is received, OperationsCenter can immediately initiate corrective actions as well as provide guidance for further problem resolutions. All management information and records of associated actions are placed in a central repository for future analysis and audit.

HP OpenView OperationsCenter's configuration flexibility meets the requirements of the IT organization and the needs of all its users. OperationsCenter



can easily be tailored to fulfill every information requirement, and provide management capabilities specific for each user. Additionally, management activities addressed by OperationsCenter can quickly be expanded by integrating other management applications.

Solution Concept

Each computing environment has a variety of management information sources. For optimal operation of the Information System this management information must be readily available.

However, the sources of management information are located throughout the organization and originate from numerous types of computer systems.

To keep operational costs and productivity of the operating staff on target, the solution required to manage these distributed systems with dissimilar information sources must provide:

- preparation and delivery of management information to a central location;
- presentation of only the relevant, significant information;
- execution of management tasks from the central location; and
- automation, problem resolution guidance and history analysis.

Solution Implementation

HP OpenView OperationsCenter is a distributed client/server software solution. Its architecture adheres to the manager/agent concept.

Within a computing environment managed by OperationsCenter a specific system is selected as the central management system. The management system performs activities such as receiving and presenting management information, initiating actions and activating the agents.

All other systems in the environment, connected by either LAN or WAN to the management system, are managed nodes. The intelligent agent on the managed node collects and processes management information, forwards pertinent information to the management system, and executes actions.

Collecting the Management Information

HP OpenView OperationsCenter provides extensive management information collection services. The agents gather management information originating from a variety of sources.

Important message sources are application and system logfiles as well as SNMP traps. The logfiles can be encapsulated to extract the complete content and the SNMP traps can be intercepted. Conversion routines can be used during the collection.

Another source is the system messages normally displayed on the system console. These console messages are intercepted by the OperationsCenter agent on each managed node, prepared and forwarded to the central management system.

In addition, management information generated by applications or custom programs and scripts can be sent directly to OperationsCenter through the documented message interface.

HP OpenView OperationsCenter also collects monitoring information for basic system variables, such as CPU load or disk usage, by accessing the SNMP Management Information Base (MIB). This service can be extended to any SNMP variable and to custom variables

provided by your own monitoring applications.

Processing and Consolidating

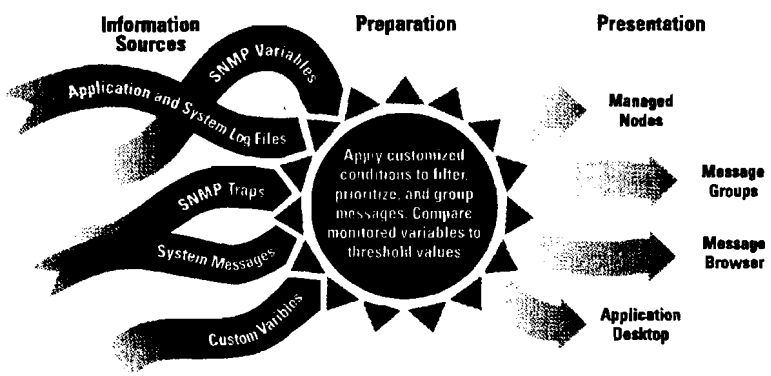
HP OpenView OperationsCenter offers extensive message management. Messages collected at the managed nodes are automatically forwarded to the central management system acting as the central console.

To minimize network traffic and to avoid overloading the user with irrelevant messages, filter conditions can be specified at managed nodes and the management system. All messages, including suppressed messages, can be logged for future analysis. Each message can be assigned to a severity class showing the relative importance of the event and helping the user to prioritize.

Messages generated by a specific source or by a similar managed element can be gathered, building a family or group of messages. For example, all messages from a backup or a spooler application can be grouped together.

HP OpenView OperationsCenter provides sophisticated status monitoring facilities so you can manage your systems more proactively. OperationsCenter can detect the development of potential problems by setting threshold values for the monitored variables. When a value is exceeded an alert is generated.

The configuration of threshold values and monitoring intervals is done at the central management system and automatically downloaded to the managed nodes. This process is completely independent from the managed node's location. Performed on the managed nodes, these monitoring services reduce network traffic. Moreover, OperationsCenter monitors its own processes guaranteeing complete and continuous availability of services.



Presenting the Information

HP OpenView OperationsCenter delivers excellent presentation services. The typical working environment for an OperationsCenter user consists of four windows: Managed Nodes, Message Groups, Message Browser, and Application Desktop.

Managed Nodes Window

The Managed Nodes window displays nodes managed by OperationsCenter as icons on a graphical map.

Message Groups Window

The Message Groups window shows icons representing the user-defined logical groups of messages and monitoring alerts.

Message Browser Window

The Message Browser window presents all management information received at the management system. Additional details, including instructions for responding to messages and monitoring alerts are also available. View criteria – event generation time, source, severity – can be defined to customize the Message Browser. Users can open a History Message Browser to review processed messages and completed tasks, comparing active messages to proven resolution procedures.

Application Desktop Window

The Application Desktop window displays icons for all applications and custom programs registered with OperationsCenter. Clicking on an icon activates the desired action.

This working environment can be configured to match the skills and responsibilities of the individual user in terms of management information supplied and capabilities granted. The result is a task-oriented working environment.

OperationsCenter's internal notification service makes users aware of critical events by changing the color of the affected icons according to the OpenView color coding scheme. In addition, external notification services such as a pager, warning light or telephone call initiation, can be activated through a command interface.

Acting on the Information

HP OpenView OperationsCenter offers several mechanisms for responding to critical events. When an event occurs which demands a unique corrective action, OperationsCenter can be configured to immediately perform such actions. They can be activated from the management system as well as by the agents.

For other significant events OperationsCenter provides event-specific instructions to guide users during problem resolution.

All other events and management activities are handled within the Application Desktop window. From this window custom scripts, programs, and management applications can be started and console windows opened on managed nodes.

The console login takes place under control of OperationsCenter and can be configured to meet specific operating policies. If the network or remote system is down, a direct connection via a separate line to the physical console port of the managed node can be established.

For similar management tasks that have to be performed on multiple managed nodes, OperationsCenter provides a broadcast facility.

HP OpenView OperationsCenter allows you to track actions taken addressing a specific event. A built-in annotation facility and an interface to external trouble ticket systems are included. The records documenting the problem resolution provide an excellent base for changing and creating message help text, defining enhanced problem resolution instructions and developing more automatic actions.

Solution Customization

Since every company has a different computing environment, a specific IT organization structure and its own unique management policies, HP OpenView OperationsCenter offers elaborate customization capabilities.

OperationsCenter can be configured to collect messages and SNMP traps from any source as well as to monitor any variable of interest to you. Once the management information is collected all follow-on activities can be defined to suit your specific IT requirements.

HP OpenView OperationsCenter also fully meets the needs of all different users. Many IT organizations define individual management responsibilities for each member of the operating staff. Using the Workspace Manager you can specify the managed nodes and message groups each user is responsible for. Only from these configured sources do messages and alerts appear in the Message Browser window.

The Workspace Manager also controls the management tasks each user can perform. Displayed in the Application Desktop window are only those icons representing applications and control programs which the user can access. Therefore, each user has his or her own task-oriented working environment. The Workspace Manager supports the configuration of many different yet concurrent user profiles.

HP OpenView OperationsCenter provides secure operations. Each user has a password ensuring that only authorized persons have access. User profiles established by the Workspace Manager control the activities of each user on management system and managed nodes. Control over all actions on the managed nodes is possible, because activities are initiated from the Application Desktop or Message Browser which are configured by the Workspace Manager.

Designed to Meet Your Needs

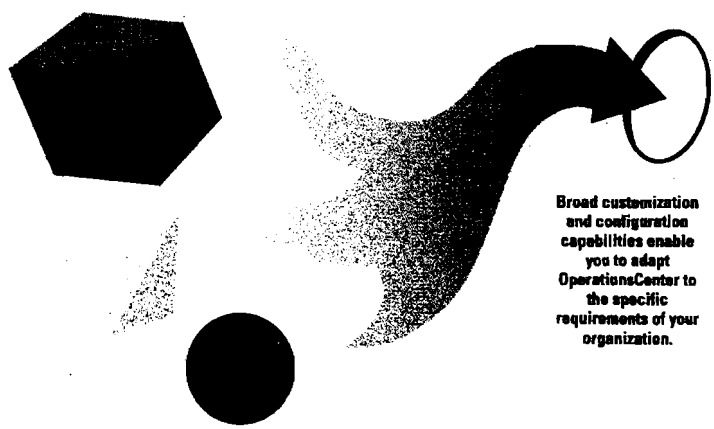
HP OpenView OperationsCenter allows you to consolidate a large number of management activities for systems distributed across the organization at a single central point. This helps reduce the cost of operations and provides the same level of management expertise for all systems in the management domain.

With HP OpenView OperationsCenter you can devote more time to improving productivity and planning, and much less to routine tasks. Management information flowing to the central management system has a consistent format and is handled in a consistent manner, although the information will originate from multivendor systems. System specialists are no longer required.

Filtering and priority setting capabilities – management by exception – let users focus on key management information and tasks. Detection of a critical event can trigger a pre-defined corrective action without involving the user; a major step towards self-managing systems.

HP OpenView OperationsCenter improves the availability of your computing resources. Monitoring key system and application variables against threshold values gives early warning of developing problems.

For those problems that do surface, the users can be provided with instructions to achieve faster resolution. The user-friendly and intuitive working environment, with its intelligent guidance and context sensitive help, limits the chance for errors.



Broad customization and configuration capabilities enable you to adapt OperationsCenter to the specific requirements of your organization, and not the other way around. You can even create individual user workspaces delivering only the relevant management information and giving access to management tasks according to company policy.

HP OpenView OperationsCenter is an open solution offering powerful extension capabilities. You can integrate any management application or custom program, collect and display the management information they generate, and then access them by a simple click on an icon.

HP OpenView OperationsCenter is implemented on top of the HP OpenView SNMP platform which allows you to quickly add other HP OpenView applications to address more management tasks.

Product Requirements

Management System

HP 9000 Series 700 Workstation, HP 9000 Series 700 X-terminals as additional displays.

- HP 9000 Series 800 Business Server with front end HP 9000 Series 700 X-terminals.
- Color graphics display 1280 x 1024, 8 color planes recommended.
- Mouse
- RAM: 32 MB minimum, 64 MB recommended
- Disk: Additional 100 MB disk space for application code and configuration data.

HP-UX Version 9.0 (including X Window System and OSF/Motif)

- HP LAN/Link 9000
- HP ARPA Services 9000
- HP OpenView SNMP Platform 3.3 with Ingres Database.

Managed Nodes

HP 9000 Series 400/700/800, HP-UX 8.07 or later

- HP 3000 Series 900, MPE/iX 4.0 or later
- IBM RS6000, AIX 3.2
- Sun SPARC, SunOS 4.1.2/4.1.3 Solaris 2.1
- Disk: Additional 20 MB disk space
- LAN: appropriate LAN software including ARPA Services

Support Services

HP offers a comprehensive set of support services for your hardware and software. Contact your HP sales representative for more information.

Ordering Information

B1960AA – License-to-use HP OpenView OperationsCenter on Management System

0AA up to 50 managed users
UBD up to 100 managed users
UBL up to 200 managed users
UBM up to 500 managed users
UD7 up to 1000 managed users
UP2 up to 2000 managed users
UP4 up to 5000 managed users

(Managed users are ASCII-terminals, X-terminals, PCs and Workstations utilizing services on Managed Nodes.)

B1961AA – License-to-use HP OpenView OperationsCenter on Managed Node

B1967AA – HP OpenView OperationsCenter Media and Documentation for HP 9000 Series 700 Management System

AAH DDS/DAT cassette
AAU CD-ROM certificate

B1968AA – HP OpenView OperationsCenter Media and Documentation for HP 9000 Series 800 Management System

AAH DDS/DAT cassette
AAU CD-ROM certificate

(Media includes software for all supported Managed Node platforms.)

HEWLETT® PACKARD

HP OpenView OpenSpool

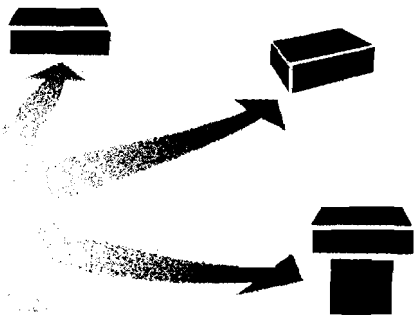
Technical Data

Functionality in the Form of Solutions

Today's processing of print data can be a slow and costly procedure. Administration of the print service is complicated and time-consuming, especially in networked, heterogeneous environments. Traditional print services just don't offer the needed functionality. For this reason, HP created the HP OpenView OpenSpool family, consisting of HP OpenSpool, HP OpenSpool/SharedPrint, and HP OpenSpool/Link, all of which offer you functionality in the form of solutions:

- Access to any printer or plotter is now possible without having to know all the network complexities. HP OpenSpool keeps the routing procedures transparent.

- HP OpenSpool/Link provides event integration into the HP OpenView management station.
- Reduced cost of operation is achieved through
  - easy administration of previously complicated tasks
  - unique capabilities which enable you to share any print or plot device anywhere in the network, thereby maximizing all available output devices
- Security for the client is addressed by keeping
  - access to print queues restricted
  - certain forms (for example, checks) protected



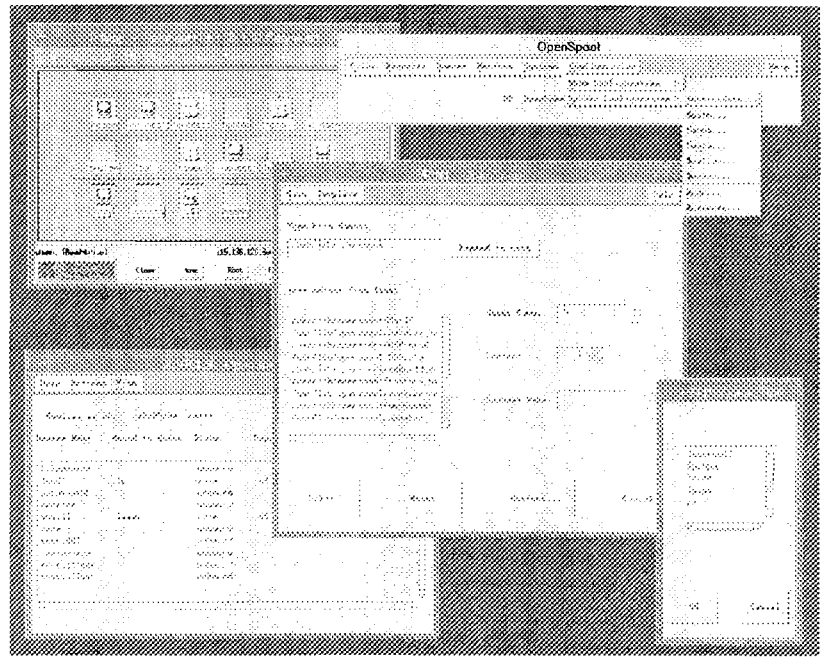
- Single point administration enables installation, configuration, and software updates from one single system in the network.
- Full control of processing print or plot requests means easy modification of either, up until they are finally completed. It is also possible to restart the printing of text files at a specific page number.
- Ease of operation is assured through a choice of three different interfaces and context-sensitive online help.

Administering a distributed print service, within a heterogeneous environment, can be a nightmare...

with HP OpenSpool, it works like a dream

For Practical Day-to-Day Usage, HP OpenSpool...

- Establishes print priorities.
- Permits status display and changing of print requests up until the request is finally printed.
- Introduces advanced print options like "keep after print."
- Provides complete font and electronic form handling.
- Accepts and manages various paper types and sizes.
- Offers templates for repetitive tasks.
- Ensures security by restricting access to queues and print requests (for example, the printing of checks).
- Emulates the commands of the lp/lpr subsystem. (All applications calling lp/lpr can be used without changes.)
- Integrates user-defined filters, models, and fonts to serve special purposes.
- Integrates PCs via LM/X and NetWare/9000.
- Supports devices connected to the LAN via the HP JetDirect card.
- Can integrate with HP VUE to allow "drag-and-drop" printing.



HP OpenSpool Offers Reduced Costs of Operation

- The HP OpenSpool administrator can delegate queue or device management tasks to the end users.
- HP OpenView integration is performed via HP OpenSpool/Link, allowing central monitoring of the print management system.
- HP OpenSpool can log account information as well as events. An administrator can now determine a particular department's resource consumption, then charge them accordingly.
- User-friendly interfaces are available for all of the configuration and administration tasks.
- HP OpenSpool uses exactly the same end-user and operator functionality across all of the supported platforms.
- HP OpenSpool makes it easy for users, anywhere in the network, to employ all of the printers and plotters available in the network.
- Printers and plotters can be connected to the next computer system enabling you to use the existing LAN cabling.
- Queue and device servers can be located anywhere in your network, making use of CPU power all over the network.

- End-users productivity is increased because they can handle their own print or plot requests.

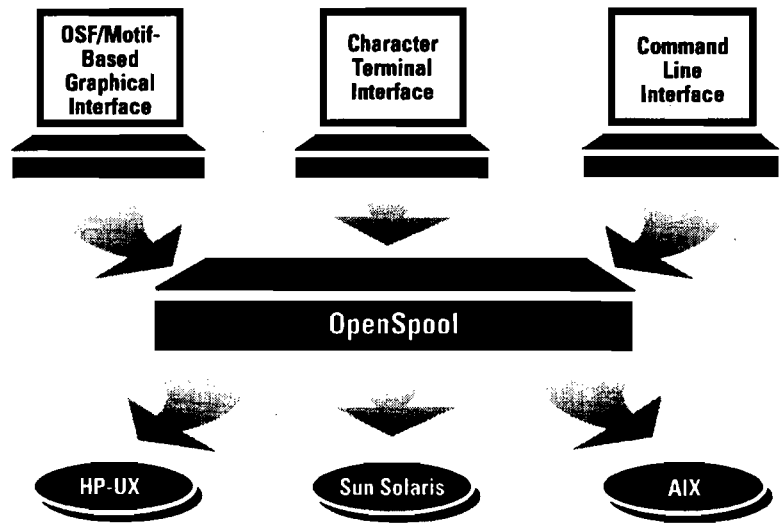
HP OpenSpool Protects your Investment

- HP OpenSpool complies to the ECMA/TC32/IG5 standard. This is the basis for the upcoming ISO/IEC DIS DPA 10175 standard. It enables interoperability with future spooling systems of other vendors.
- HP OpenSpool is based on Palladium technology (version 1). OSF has selected Palladium as the enabling technology for their print service.
- By emulating the lp/lpr commands, it is possible to use HP OpenSpool without having to modify user applications. Also, users may choose to continue using the commands with which they are familiar.

HP OpenSpool/Link

HP OpenSpool/Link easily integrates HP OpenSpool into the HP OpenView Network Node Manager or HP OpenView OperationsCenter:

- The administrator can now work in a uniform user environment, accessing HP OpenSpool through the HP OpenView Management Station.



- Problems and errors from HP OpenSpool are automatically reported to the OpenView management station. The operator or administrator is notified via a color change of the respective HP OpenSpool symbol on the OpenView map.
- HP OpenSpool print management stations can be easily located on the OpenView map.
- Direct access to the HP OpenSpool application is provided through graphical application symbols on the OpenView map.

HP OpenSpool/Shared Print

HP OpenSpool/SharedPrint provides the integration of special document and bitmap conversion filters into the HP OpenSpool product, for example:

- It will print PostScriptt files on PCL devices.
- It will print ASCII text on both PCL and PostScript devices.
- It will print PCL files on PostScript devices.
- It will print CGM files on HP-GL/2 devices.

The following bitmap formats can be printed on PCL, PostScript, and RTL devices:

- Starbase,
- TIFF (including Group 3/4 JPEG, LZW, Packbits),
- GIF,
- JFIF,
- XWD, and
- XBM.

HP OpenSpool is Suitable for the Following Environments

- commercial and engineering
- stand-alone systems
- networked systems

HP OpenSpool Supports the Following Platforms

- HP workstations
- HP Business Servers
- Sun SPARC systems
- IBM RS6000 (factory special)

Hardware Requirements

- HP 9000 Series 300, 400, or 700 workstations
- HP 9000 Series 800 Business Servers
- IBM RS6000
- Sun SPARC stations

Software Requirements

- HP-UX 8.0 or 9.0
- Sun Solaris 2.1
- AIX 3.2

Documentation

The following documentation is supplied with HP OpenSpool:

- 1 Software Release Notes
- 1 Spooler Administrator's Guide (Command Reference Guide included)
- 1 User's Guide for the Terminal Interface
- 1 User's Guide for the Graphical Interface

Native Language Support

The languages currently offered are:

- U.S. English
- German
- Spanish
- Japanese (Kanji)

Specific Requirements for HP OpenSpool/Link

- HP OpenSpool A.04.00 or later
- One of the following HP OpenView management software products:
  - HP OpenView Network Node Manager 3.1 or later
  - HP OpenView OperationsCenter 1.0 or later
  - HP OpenView SNMP Platform 3.1 or later
  - HP OpenView DM Platform 3.1 or later

Specific Requirements for HP OpenSpool/Shared Print

- HP OpenSpool A.03.00 or later.
- HP OpenSpool/SharedPrint filters must be ordered per device.
- only supported on Series 700 (HP-UX 8.07 or later versions) or Series 800 (HP-UX 9.0).

Printed in the U.S.A. 0393
5091-7059E

Ordering Instructions for HP OpenView OpenSpool

	Media & Documentation					
	License-to-Use	HP-UX S 300/400	HP-UX S 700	HP-UX S 800	Sun Solaris	AIX
HP OpenSpool	B1900B	B1903B	B1907B	B1908B	B1909B	Factory Special
HP OpenSpool/Shared Print	B1900B Option 222	–	B1917B	B1918B	–	–
HP OpenSpool/Link	B1912AA	–	B1913AA	B1913AA	–	–

HEWLETT® PACKARD

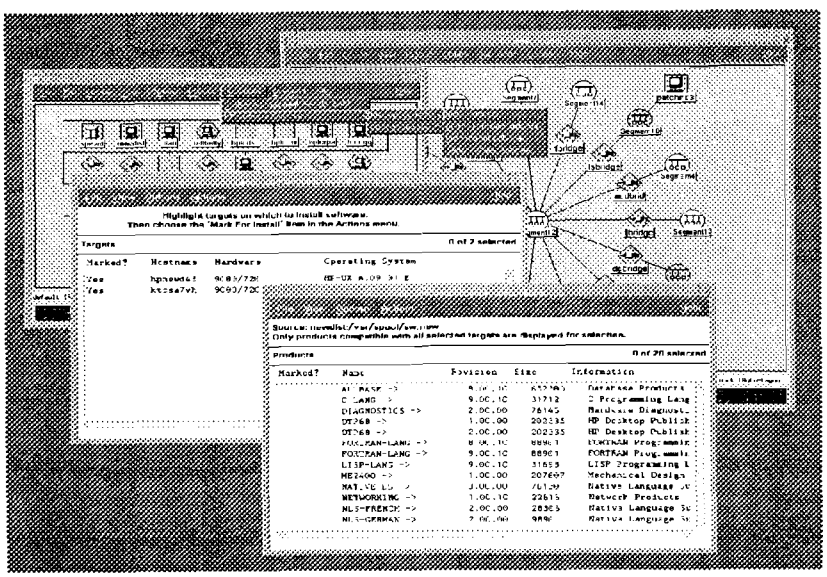
HP OpenView Software Distributor

Technical Data

Welcome to HP OpenView
HP OpenView is a complete family of products providing integrated network and system management (INSM) solutions for multivendor distributed computing environments. The HP OpenView solution consists of a family of management platforms, a complete set of INSM application development tools, an impressive portfolio of management applications, and a unifying architecture.

The New Way of Managing Software Distribution

HP OpenView Software Distributor, one of the HP OpenView management applications, is a full set of sophisticated tools that perform distributed management of software across the network. Software Distributor provides a central management organization, an industry-standard capability for single-point software distribution and management that reduces costs, improves service levels, and remains flexible enough to support unique software management policies. Software Distributor provides administrators the ability to "push" software to distributed systems. Users of those systems can "pull" software from any number of networked or local software "depots."



When included as part of the HP OpenView management solution, administrators can use Software Distributor to successfully manage the complete distributed environment.

Features and Benefits

- **Industry Standard—** HP OpenView Software Distributor was selected as the basis for the electronic Software Distribution Services (SDS) for OSF's Distributed Management Environment (DME).

  IEEE Posix 1003.7.2 Software Administration Standardization efforts has also selected

HP OpenView Software Distributor. HP has built upon these capabilities to provide a safe investment that will meet your needs today and continue to perform for years. Software Distributor follows these common interface and data format standards, providing common software packaging and management processes between different platforms.

- **Application and Data Integrity**—Automation of software distribution from a central location provides end users with the most recent application revision and accurate data sooner and at a much lower cost. Productivity is improved when everyone is working with the same software revision and same data set. In a client/server environment, it is absolutely essential that application revision changes at both ends are synchronized.
- **Cost and Time Savings**—Software distribution currently costs companies millions of dollars every year in media, travel costs, and time spent by skilled personnel. Software Distributor focuses on improving system administrators' productivity by eliminating or automating time-consuming software installation and update activities. Software Distributor assists administrators in managing every aspect of software configuration, verification, and removal, greatly reducing costs in media duplication, travel, and time.
- **Flexibility**—Software Distributor is highly flexible, fitting into any network environment. Companies can customize Software Distributor to satisfy their unique software management policies. A robust command line interface allows Software Distributor to be integrated into other network and system management environments. Software Distributor also will aid administrators in conforming with licensing agreements by providing lists of software installed on each node.

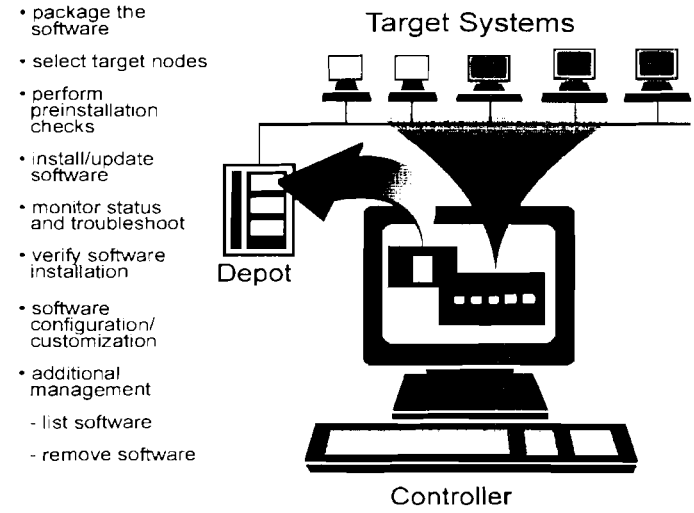


Figure 1.

Software Distribution Overview

Software Distributor supports a variety of distributed and standalone environments. This flexibility allows administrators and users to improve the overall process of software distribution and installation. (See figure 1.)

Systems can fill four roles in this model—developer system, depot, target system, and controller system. The role a system plays can change at any time to support a new policy or process.

After software is developed, it is packaged for distribution by the developer. The packaged software can be placed in a depot for distribution over a network or can be placed on a CD or serial media for distribution to non-networked systems.

One or more distribution depots contain software that is available for installation to other systems, called target systems, in the network. Multiple versions of a software product (for example, the same product with different revisions or target system attributes) can reside on a depot.

The controller system is any system using Software Distributor to manage the software distribution process. It also is used to manage software installed on the depots and the target systems. When the administrator chooses a Software Distributor command

to perform a distribution task, the controller initiates the task, providing the necessary information to one or more target systems.

Software Distributor is flexible and can adjust to a company's different software distribution policies. Any system may play a combination of roles, allowing Software Distributor to support the following typical distribution models: push, pull, and standalone.

Push—The "push" distribution model allows administrators to initiate a distribution and installation of software from a depot to one or more target systems. A central server plays the depot's role. The administrator's station becomes the controller when the administrator chooses a Software Distributor command. The systems receiving the "pushed" software become the target systems.

Pull—The "pull" distribution model allows end users to initiate software distribution and installation to their systems. The end user's desktop system becomes the controller, and by being the final destination of the software, it also plays the role of the target system. A central location or server continues to play the role of the depot.

Standalone—The "tandalone" distribution model allows end users to initiate a software distribution and installation from local media (tape or CD-ROM). The end user's desktop system becomes the controller of an installation task, the target system, and the depot with the source being the local tape or CD-ROM.

Designed to Meet Your Needs

Software Distributor, a complete software management product, focuses on improving administrators' productivity by automating time-consuming installation and update tasks. An administrator can install multiple copies of software on multiple target platforms from a single console. Following are steps that each software package goes through to be distributed to the network and, ultimately, to the target system.

Software Packaging

Software Distributor's packaging tools allow developers to easily package their solutions into distributable forms through a flexible keyword specification model.

Distribution Depots and Media

Software can be packaged for distribution in the following forms:

- a serial tape (such as DDS, QIC, or nine-track) containing a distribution in a tar archive
- a CD-ROM containing a distribution depot
- a distribution depot located on the network

Hierarchical Product Structure

Software Distributor supports products that are organized into products, subproducts, and filesets (collections of files). This hierarchical organization allows the administrator to specify installation of a product without inspecting the individual files within the product. It also provides flexibility when disk space is limited, to specify partial product installation through the selection of subproducts or filesets.

Software Dependencies

Applications usually require other software to be installed on the target system for correct operation. This is considered a software dependency. Software Distributor manages the installation of all software required for the application to run. This includes software required before and after installation of the application.

Software Distributor orders the installation of software dependencies appropriately, leading the industry in electronic software management.

Support of Custom Control Scripts

Software Distributor allows each target system to be fully configured and customized during each step of the installation. Through the use of custom control scripts provided with the package,

each target system is ready to run the software when the process is completed.

Distribution "Depots"

Distribution depots are repositories of software available for installation, and often are used as the source of an installation task. The depots can be configured to support the policies of the organization as follows: from a centrally located software "warehouse," to multiple depots arranged hierarchically, to a fully distributed solution on servers throughout the environment.

Software Distributor allows depots to simultaneously distribute software packages to multiple target systems and allows depots to be distributed on various servers. It also allows administrators to manage (create, populate, list, verify, and remove) distribution depots. System administrators can control the access to each individual software product on the depot.

Software Selection

Before installation, the system administrator must select the software to install or update on the target machines. Software Distributor has a number of features to complete the task in a minimum amount of time.

Software "Catalog"

Software Distributor helps the administrator locate available depots and retrieve detailed information on software products in the depot catalog. This information consists of product name, revision, descriptions, hardware, and software dependencies.

Easy-to-Understand Information Display

Software Distributor provides an easy-to-understand graphical user interface (GUI) based on OSF/Motif™. The interface provides product navigation and information allowing the user to identify and select the appropriate products quickly and easily.

Compatibility Checking

Software Distributor will, by default, only install compatible software on a target system. It checks the target operating system types, revisions, and machine attributes to determine if the product can be installed.

Session Management

With Software Distributor, the administrator can save policy definitions, software selections, and target selections to named files. The administrator can then retrieve these named session files saved in previous sessions to further enhance productivity and streamline redundant tasks.

Installation Analysis

Software Distributor automates the task of analyzing each target machine by performing a Series of checks between the target machine and the software to be installed. The target system can be checked to ensure all filesystems used during the installation are mounted and available.

A detailed disk space analysis evaluates the disk space on the target machine against the amount necessary for the software to be installed. By default, software will not be installed on a target unless enough disk space exists. Additional checks also can be performed.

Software Distributor checks the request to ensure the target system has the authorization to install the selected software. Requests from unauthorized target systems are denied.

Installation and Update

Software Distributor performs the primary task of software administration; it installs, reinstalls, or updates software from a depot onto one or more target hosts. Software Distributor supports both the installation and configuration of software products.

The user can install application software into its default location, or map the product to another location if another version is already installed at the default location.

Reliable Distribution

Software Distributor ensures successful distribution using reliable connections from the source system to the target systems. If the link is broken between the source and target, the administrator is notified. The administrator is able to recover from the error and resume the software installation task.

Task Monitoring

The administrator is kept current on the progress of software distribution tasks. A Software Distributor task operating on multiple targets displays progress information for each target. The interactive interface provides detailed information about each target's status.

File Compression

The administrator has the option to compress software files that are transferred during installation from a depot. Smaller files are sent, reducing the load on the entire network.

Software Configuration

Software Distributor supports unique configuration of each target system. The administrator can perform this configuration as part of the installation task or can defer the actual configuration to another time. Multiple software versions can be supported on a single target system through this configuration process.

Verification of Installed Products

Software Distributor provides comprehensive verifications of installed software on each depot or target system. From their central locations, administrators can build processes that monitor the integrity of the software within their networks.

Software Management

Part of managing software is knowing what applications are installed throughout the distributed environment, which allows for better planning of software purchases and license conformance.

From a central location, administrators can generate reports on the installed software within their network. Software Distributor stores the installed software information for each system in the Installed Products Database (IPD).

Each depot also has a catalog of software available for installation, and it contains all the information provided in the product packaging. Software Distributor can list the available products, along with their attributes, in various formats.

From a central location, the administrator can remove obsolete or unnecessary software products within the network. Software Distributor provides removal of software, target-specific configurations created by the product, and product files on depots or target systems. It understands software dependencies, and will not cause side effects on other products unless forced to by the administrator.

For More Information

For more information, please contact your HP Sales Representative.

Ordering Instructions

To order the following products, please contact your local sales office.

J2326AA HP OpenView Distributor Licenses

J2325AA HP OpenView Distributor Media and Documentation for Series 700/800

Printed in the U.S.A. 04/93
5091-7545E

HEWLETT® PACKARD

HP OpenView OmniBack

Technical Data

For Backup and Recovery the Choice Is Simple—HP OpenView OmniBack

The increasing number of distributed, networked computing environments, has brought the importance of central backup and recovery into clear view. As data is spread across a heterogeneous network, the availability and protection of data becomes critical. Data can be easily lost, system uptime is decreasing, and operating costs are on the rise in this type of networked environment. HP realized the need for a central backup and recovery system that would address these kinds of problems, both in the network and standalone environments. So, with a clear view of the future, HP created the HP OpenView OmniBack family. The family consists of HP OmniBack, HP OmniBack/Turbo, and HP OmniBack/Link; the choice for better backup and recovery.

Keep your data safe!

What Can HP OmniBack Do for You?

- Perform centrally controlled network backup;
- provide a user-friendly interface;
- allow unattended operation;
- supply sophisticated scheduling and journaling;
- support heterogeneous environments;
- reduce backup and recovery time;
- decrease operating costs; and
- deliver a system based on industry standards.

What Can HP OmniBack/Turbo Do for You?

Provide all the functionality of HP OmniBack plus

- skyrocket backup performance to up to 20 GB/hour;
- increase server uptime;
- deliver raw disk support; and
- allow online backup of databases (e.g. ORACLE).

What Can HP OmniBack/Link Do for You?

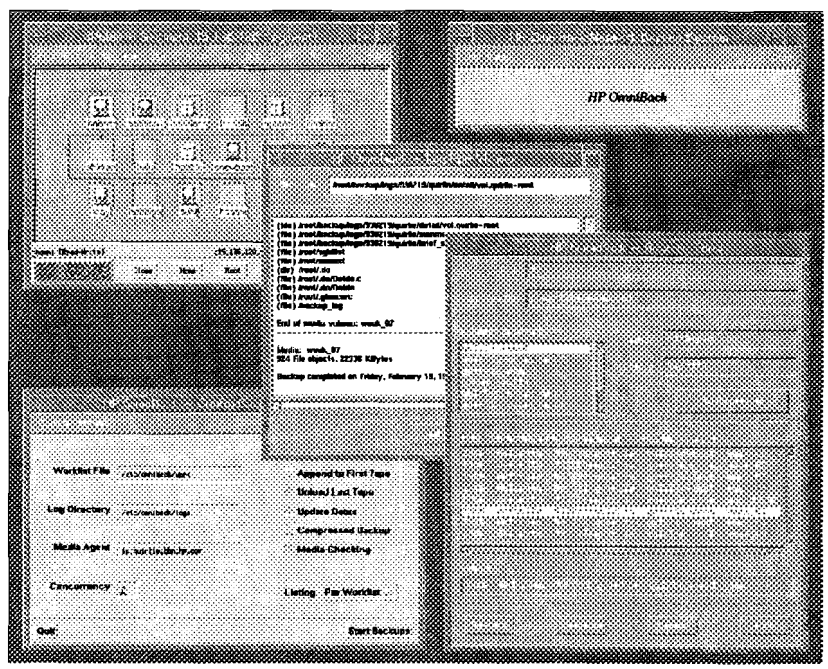
Integrate HP OmniBack into the HP OpenView management stations.

Taking Care of Business Means Taking Care of Backup – HP OmniBack and HP OmniBack/Turbo Make It Easy

- Central backup and recovery, for both systems and workstations on a LAN, is the power of HP OmniBack and HP OmniBack/Turbo.
- HP OmniBack heightens media management. Overwrite protection, log file analysis, media labeling, and the ability to recycle backup media are all part of the media management package.
- To answer the need for improved usability, HP OmniBack provides a common OSF/Motif-based graphical user interface for both backup and restore.
- Increased media capacity is achieved through HP OmniBack's data compression facility. This feature increases your backup performance while, at the same time, reduces the network traffic.
- HP OmniBack/Turbo offers all the functionality of OmniBack with the addition of a high-speed component for local data backups. Up to 20 GB/hour is attainable depending on the backup device configuration.

Bringing It All Together

The OpenView integration component, HP OmniBack/Link, allows HP OmniBack to send error notifications directly to the HP OpenView management station. This enables central management of multiple HP OmniBack servers by, for example, the HP OpenView Network Node Manager or HP OpenView OperationsCenter.



Reduced Operating Costs

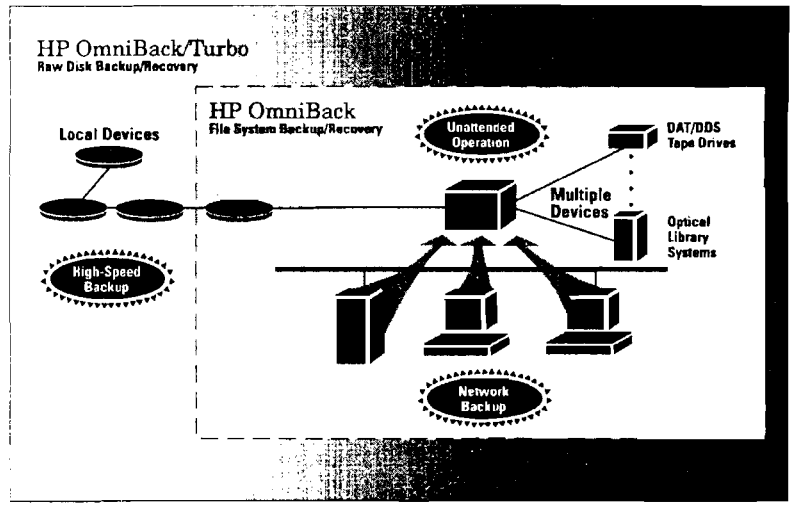
- The HP OmniBack data compression facility saves you money. It reduces media costs by increasing media capacity.
- Centralized control of network-wide backup for mixed environments lowers operating and resource costs dramatically by reducing time spent on backup and recovery.
- Unattended backup through support of DAT and optical library systems eliminates operator intervention, thereby reducing costs.
- HP OmniBack and HP OmniBack/Turbo have sophisticated journaling and scheduling capabilities. This automatically relieves the operator of the time-consuming tasks of tracking, logging, and rescheduling network and system backups.
- HP OmniBack/Turbo's high speed component greatly decreases system downtime, which translates into higher productivity.
- HP OmniBack is based on HP's Network Computing System (NCS), an industry standard. This protects your investment by allowing you to combine different machines together in a heterogeneous network.

High Performance

- High speed backup is a major requirement for systems with large amounts of online data. This is especially true for large databases. High speed backup provides a tremendous increase in system availability.
- HP OmniBack/Turbo's high speed component reaches a record high 20 GB/hour raw disk backup performance on local data, depending on the backup device configuration. Full restore capability functions here at its best.
- Simultaneous backup of multiple systems over the network is just one more reason to choose HP OmniBack. The impressive, fast search capabilities of HP OmniBack allow you to recover single files in just a matter of minutes.

Database Backups

- Offline database backup of file-system based databases is easily performed with HP OmniBack and HP OmniBack/Turbo. In addition, HP OmniBack/Turbo allows backup of databases based on raw disk.
- Online database backup can be handled by HP OmniBack/Turbo when using certain database products (for example, ORACLE).



Support of Heterogeneous Environments

- Rapid growth in computer networks means the virtual disappearance of homogeneous environments. Therefore, a software solution which supports multiple platforms is a necessity. Both HP OmniBack and HP OmniBack/Turbo enable total network backup management in mixed environments of
  - HP-UX
  - Apollo Domain
  - SunOS (backup clients only)
- In addition, it is viable to backup and recover files from/to disks that are mounted on supported platforms as NFS file systems.
- MS-DOS® PC integration into the HP OmniBack environment is attainable through interop-eration of HP OmniBack with Plan-B/UX from Quest. Of course, PC data stored on the HP-UX server via LAN Manager/X or the Netware 9000, can also be backed up and recovered.

When to Choose HP OmniBack and When to Choose HP OmniBack/Turbo

- HP OmniBack is a file system backup/recovery solution for standalone or networked systems. Through the support of DAT/DDS devices and HP's Rewritable Optical Disk Library Systems, it is well suited for unattended network backup.
- If you need fast, full backup, then HP OmniBack/Turbo is the right choice for you. HP OmniBack/Turbo compliments its inherent HP OmniBack features with high speed backup of local data via raw disk support.

HP OmniBack/Link

HP OmniBack/Link easily integrates HP OmniBack into the HP OpenView Network Node Manager or HP OpenView OperationsCenter:

- The operator or administrator can now work in a uniform user environment, accessing HP OmniBack through the HP OpenView management station.
- Problems and errors are automatically reported to the OpenView management station. The operator or administrator is notified via a color change of the respective HP OmniBack symbol on the OpenView map.
- Direct access to the OmniBack application is provided through graphical application symbols and menubar tasks on the OpenView map.

HP OpenView OmniBack Is Suitable for the Following Environments

- stand-alone systems
- networked systems (LAN)

HP OmniBack Supports the Following Platforms

- HP 9000 Series 300; HP-UX 8.0x or 9.0
- HP Apollo 9000 Series 400/700; HP-UX 8.0x or 9.0
- HP 9000 Series 800; HP-UX 8.0x or 9.0
- HP Apollo Domain workstations; SR 10.3.5 or 10.4
- Sun SPARCstations (backup clients only); SunOS 4.1.1 and 4.1.2

HP OmniBack/Turbo and HP OmniBack/Link Is Available for the Following Platforms

- HP Apollo 9000 Series 700; HP-UX 8.0x or 9.0
- HP 9000 Series 800; HP-UX 8.0x or 9.0

Supported Backup Devices for HP OmniBack and HP OmniBack/Turbo under HP-UX Are

- DAT/DDS tape drives
- rewritable optical disk library systems
- stand-alone rewritable optical disk drives
- 1/2 inch tape drives (local high speed backup of HP OmniBack/Turbo only for HP 7980A and 7980XC tape drives)
- all disks supported under HP-UX (HP OmniBack and HP OmniBack/Turbo's network component only)

Supported Backup Devices for HP OmniBack under Apollo Domain Are

- DAT/DDS tape drives
- Exabyte (8mm) drives
- rewritable optical disk Library systems (HP 9000 Series 400 only)
- 1/2-inch tape drives
- all disks supported under Apollo Domain

Native Language Support

- U.S. English
- Japanese (Kanji; documentation only)

Specific Requirements for HP OmniBack/Link

- HP OmniBack or HP OmniBack/Turbo A.03.00 or later (management station on HP-UX only)
- One of the HP OpenView management software products:
  - HP OpenView Network Node Manager 3.1 or later
  - HP OpenView OperationsCenter 1.0 or later
  - HP OpenView SNMP Platform 3.1 or later
  - HP OpenView DM Platform 3.1 or later

Prerequisites for HP OmniBack and HP OmniBack/Turbo (Network Component)

- ARPA Services
- LAN Link/9000

Ordering Instructions for HP OpenView OmniBack

		Media & Documentation							
		HP-UX	S 300/400	HP-UX	S 700	HP-UX	S 800	Domain/OS	SunOS
	License-to-Use	8.0x	9.0	8.0x	9.0	8.0x	9.0	10.3.5/ 10.4	4.1.1/ 4.1.2
HP OmniBack	B1922A	B1944A	B1944B	B1945A	B1945B	B1949A	B1949B	B1947A	B1948A
HP OmniBack/Turbo	B1923A	–	–	B1929A	B1929B	B1950A	B1950B	–	–
HP OmniBack/Link	B1926AA	–	–	B1927AA	B1927AA	B1927AA	B1927AA	–	–

HEWLETT® PACKARD

HP Network Consulting Service

Technical Data

A Service of the HP ConsultLine Program

Today's competitive global marketplace creates a greater demand for accessing and effectively using increasing amounts of information.

The degree to which you are successful in understanding your network requirements as they relate to your business, and then designing and implementing those network solutions, is often the single most important factor in helping you to achieve a competitive advantage.

With HP Network Consulting service, which is a part of the HP ConsultLine program, you gain that advantage by selecting, developing, and implementing network solutions that best fit your business objectives.

HP Network Consulting service assists in analyzing, designing, and implementing sophisticated networks that involve complex technology. Hewlett-Packard's network consulting expertise is available in a wide range of networking areas. Such areas include network requirements analysis, logical design, physical design, connectivity analysis, project management, and implementation assistance.

Features

- network-focused program worldwide
- proven methodology
- customized solution
- network requirements analysis
- network project management

Benefits to You

- Obtain a high level of network expertise and consistent worldwide delivery.
- Meet your network design and implementation goals.
- Satisfy your unique network requirements.
- Help to understand and identify your networking needs.
- Implement your total network solution smoothly.

Obtain a High Level of Network Expertise and Consistent Worldwide Delivery
Hewlett-Packard offers a leading network consulting program unsurpassed by any other vendor, and hundreds of dedicated consultants worldwide specifically focused on networks.

We design and implement effective network solutions on a consistent worldwide basis. With Hewlett-Packard's quality network consulting, you gain a competitive advantage in global markets.

Meet Your Network Design and Implementation Goals
As an industry leader in networking standards, HP's expertise is reflected in its network planning and design methodology, which has been used successfully for networks ranging from workgroup local area networks (LANs) to worldwide private X.25 networks.

Modern networks are highly complex and encompass ever-changing state-of-the-art technology. A careful design and a thorough implementation plan often make the difference between simply implementing a network and realizing the full return from your network solution, as it was originally envisioned.

HP's custom network implementation assistance ensures a thorough implementation because HP's experts in systems and network implementation will develop a thorough, effective plan for you. The implementation report provides a documented plan for the entire network implementation project. If desired, HP can also assist you in managing the project.

Satisfy Your Unique Network Requirements
Because every networking solution has unique requirements, HP's customized solution allows you to make the best use of your staff in order to realize your networking goals.

Hewlett-Packard network requirements analysis, network designs, and implementation plans are combined to provide a tailored solution for your particular needs.

Blending HP's expertise and analysis with your insights and business objectives results in superior network solutions.

Help to Understand and Identify Your Networking Needs
Understanding your networking requirements is fundamental to any successful network implementation. A thorough network requirements analysis helps you understand these requirements and document the findings.

Our requirements analysis helps you identify and better understand your real networking needs as they relate to the goals, priorities, and business objectives you have set for your organization.

Specially trained HP professionals will work with you in objectively analyzing your network requirements, based on thorough interviews with key people in your organization. Then we carefully document the needs uncovered, providing fresh insight, and leveraging HP expertise of systems and networking technology in a fast-growing, ever-changing environment. Through this alliance, you can maximize the benefit of your network to solve your business needs and gain a competitive advantage.

Implement Your Total Network Solution Smoothly
If you are to realize the expected return on your network investment, the solution must be implemented according to plan. HP can provide project management expertise specifically tailored to help you achieve a successful implementation of your total network solution.

Specifications

Customer Responsibilities

- Project Manager—You must appoint a project manager who is responsible for the overall network consulting engagement. This project manager is HP's primary contact throughout the project.

Additional Services

Hewlett-Packard also provides extensive customer education courses on various aspects of networking for developing or maximizing the productivity of your staff.

In addition, HP offers a wide range of installation and startup services to assist you in making your network operational.

Ordering Information

HP Network Consulting service is available on a custom-quote basis. To obtain additional information, please contact your local HP sales representative. For more information on terms and conditions, refer to the Customer Support Services Agreement (CSSA), Exhibit 2W.

HP Network Consulting service is subject to local availability.

For more information, call your local HP sales office listed in your telephone directory or an HP regional office listed below for the location of your nearest sales office.

Regional Sales Headquarters

United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 850-2544

Canada:
Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W5G1
(416) 206-4725

Europe/Africa/Middle East:

Hewlett-Packard S.A.
150, Route du Nant-d'Avril
CH-1217 Meyrin 2
Geneva, Switzerland
(22) 780 81 11

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-Ku, Tokyo 168
(03) 3331-6111

Latin America:
Hewlett-Packard Latin American
Region Headquarters
5200 Blue Lagoon Drive
Miami, FL 33126
(305) 267-4220

Australia/New Zealand:
Hewlett-Packard Australia, Ltd.
31-41 Joseph Street, Blackburn
Victoria 3130, Australia
(03) 272 2895

Asia Pacific:
Hewlett-Packard Asia Ltd.
22-30 Floor Peregrine Tower
Lippo Centre
89 Queensway, Central Hong Kong
(852) 848-7777

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HEWLETT® PACKARD

HP Network Management Professional Services

Technical Data

Think HP Professional Services to effectively manage your network

Computer networks have become the lifeline for many corporations. And, as companies increasingly rely on distributed data to run the business, they expect increasingly high performance from their networks. With critical mainframe applications moving to distributed environments, the need for high system and network availability is growing: problems need to be solved proactively, before they become emergencies.

Together, these demands make network management one of the greatest challenges facing large corporations today. The proliferation of multivendor computers and network elements complicates the management of this environment. Yet in most cases, network management comes as an extra burden for the information technology department. To manage your network effectively in this fast-moving, demanding environment, think HP Professional Services.

A manageable network

Experienced HP professionals can help you set the right network management strategy. We can effectively deploy a solution with the best available tools to monitor and manage your geographically dispersed multivendor environment. Whether you are in the process of deploying a network or trying to manage an existing one, HP can implement a solution that is:

- easily managed
- based on open systems
- able to handle the proliferation of client/server applications
- designed for easy expansion and modification

By properly integrating industry-leading management tools into your network, HP can help you proactively monitor the network and resolve problems before users come knocking on your door.

Gain expertise and knowledge

HP is the recognized leader in network management technology, with established techniques that have proven their value in previous implementations. We developed HP OpenView, which has become the leading open network management platform in the industry. The Open Software Foundation (OSF) selected some of the HP OpenView technology components as standards for its distributed management environment (DME).

Hewlett-Packard experts have an in-depth knowledge of all the HP applications that run under HP OpenView, such as HP Network Node Manager, HP Interconnect Manager, and HP LanProbe. HP consultants also have experience with dozens of third-party applications that run under HP OpenView and manage multivendor environments that integrate products from companies such as IBM, DEC, and Novell. For example,

Peregrine's OpenSNA can manage IBM environments from the HP OpenView management station.

HP understands the evolution of network management standards and products; the implications of managing a mixed environment that integrates mainframes and desktop workstations; the importance of your investment in computers, networks, applications, and training; and other factors that are critical for developing the right network management solution for you.

Faster implementation

By leveraging HP's consulting expertise in network management, you can accelerate the implementation of a complex network solution and avoid trial and error methods.

Lower your expenses

By making sure that you do it right the first time, you save money by not wasting development resources. Also, a faster implementation starts saving you money sooner. Once the solution to manage your network is in place, you continue saving money by:

- Increasing the availability of your network.
- Reducing the resources needed to maintain the network.

Peace of mind

If you let HP manage the project, you will not have to worry about the outcome. If you choose to manage the project yourself, you can count on HP for the best help available to assist you with the difficult tasks.

Designed for supportability

Networking technology is evolving quickly, and it is becoming very expensive to find and train people to manage the network. HP can provide a well-documented support plan for automating your network management. In addition, you can rely on HP's network support personnel, the best in the industry, to always be there to help you.

Open system education

Training is the key to successfully implementing your solution within the organization. HP Professional Services can specify and deliver the proper training for all the people involved in network management, from network managers to operators.

Whether you choose a standard or custom training option, we can train you and your staff in one of our classrooms or at your site.

Network education courses and seminars include:

- HP OpenView Network Node Manager Fundamentals for Network Managers (HP B3304S)
- HP OpenView Network Node Manager Fundamentals for Operators (HP B3305S)
- Network Administration (HP H2550S)

To order a copy of HP's education catalog in the U.S., call 1-800-HPCLASS. Outside the U.S., contact the nearest HP sales office.

HP Network Management Professional Services

HP Professional Services consultants will work with you to determine exactly what services are required for your unique situation. Here are some of the services that HP can provide:

- Determine your network management needs according to your business goals, information technology strategy, and current environment. This includes determining what elements need to be managed and how and where to manage them. It also includes developing a list of priorities.
- Find an open systems solution that best fits your needs and allows for future growth. Produce a network management architecture recommendation that includes a model of the environment and the management system.

- Implement a solution that fits your network management architecture. We can evaluate and select the right network management applications for you, and develop a project plan that includes all the tasks required to implement the solution.

- Integrate the network management applications within the HP OpenView platform.

- Develop simple new network management applications, if necessary. HP Extensible Agent, HP Application Builder, HP Event Formatter, and HP Data Formatter features to integrate your proprietary applications easily into the HP OpenView platform.

- Manage the entire systems integration project.

- Develop the support plan and operation procedures.

- Develop the training plan and deliver training as needed.

Additional services

HP has comprehensive services to help you with needs assessment, architecture design, planning, implementation, support, and education for your solution.

Some related services offered by HP include:

- Network planning and design
- Network performance analysis
- Remote network operation
- Multivendor network support
- Network installation and startup

Connect with HP Professional Services today

In the early 1980s, when most computer companies were focused on proprietary systems, HP had already embraced a technical strategy based on open systems. That strategy applied not only to products, but to support as well.

Today, the HP Professional Services organization is uniquely qualified to assist you in determining your open systems options and to help at every step as you evolve to a more open environment. HP can provide comprehensive support, even in multivendor environments that include non-HP products.

Think HP Professional Services to effectively manage your network.

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Regional Sales Headquarters

United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 850-2544

Canada:
Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W5G1
(416) 206-4725

Europe/Africa/Middle East:

Hewlett-Packard S.A.
150, Route du Nant-d'Avril
CH-1217 Meyrin 2
Geneva, Switzerland
(22) 780 81 11

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-Ku, Tokyo 168
(03) 3331-6111

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HEWLETT® PACKARD

HP's Wire-Testing Service

Technical Data

Service Description

Hewlett-Packard's Wire-Testing Service provides complete and reliable testing of your existing cabling. Using sophisticated testing equipment, HP works with you to help preserve your investment in wiring wherever possible.

This service evaluates the suitability of existing cable as a network media and tests its compliance with network specifications. Testing prior to network installation helps avoid intermittent problems and performance degradation problems.

Benefits to You

- Maximized value of existing wiring system.
- Ensured ongoing supportability.
- Single source of support for network-testing services.
- Cost-effective evaluation.
- Verified cabling for startup.

Service Features

- Comprehensive testing of all media types.
- Evaluation of existing coaxial and fiber-optic cables.
- Evaluation of existing twisted-pair wiring for use with 10BaseT networks.
- Complete test documentation and recommendations.
- Single point-of-contact for all cable-testing activities.

Specifications

Service Features

Comprehensive testing of all media types.
The wire-testing service is applicable to all media types (coaxial, unshielded and shielded twisted-pair, and fiber-optic). HP uses specific and sophisticated test equipment for each media type to verify that the wiring complies with specifications.

HP performs a complete audit of the existing cabling topology to ensure that all network-related components are correctly located and the distances between drops are within specifications. Any discrepancies are documented and recommendations for correction are provided. HP electronically certifies that all transmission components adhere to predefined specifications.

Evaluation of existing coaxial and fiber-optic cables.
As applicable, the certification specifically includes the following:

- All coaxial cable runs are tested with a Time Domain Reflectometer to ensure that every cable segment is properly terminated and of correct, uniform impedance. Fiber-optic cables are tested with an Optic Time Domain Reflectometer.
- Transceivers, media access units, and fiber-optic link sets are visually inspected for proper termination and integrity.
- Proper grounding and signal shielding is verified.

Evaluation of existing twisted-pair wiring for use with 10BaseT networks.
Twisted-pair cable allows for variations in physical characteristics and has dynamic performance requirements. HP's wire-test instrument verifies and troubleshoots twisted-pair cabling to evaluate the key parameters specified by the IEEE 802.3 to 10BaseT standard: crosstalk attenuation, signal attenuation over frequency, burst noise, and continuity. Specially trained HP engineers perform testing and evaluation of the results. This service provides you with the assurance that the existing wiring complies with specifications for 10BaseT data transmission.

Complete test documentation and recommendations.
HP documents certification test results and provides appropriate recommendations for enhanced performance.

Single point-of-contact for all cable-testing activities.
When appropriate, HP works with selected experienced vendors to ensure timely, high-quality, and cost-effective testing that spans all installed media types. Trained HP engineers always manage the testing process, evaluate the results, and provide recommendations.

Ordering Information

HP's Wire-Testing Service is quoted to meet your specific business requirements. For more information, call your local HP sales office listed in your telephone directory or an HP regional office listed below for the location of your nearest sales office.

Regional Sales Headquarters

United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 850-2544

Canada:
Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W5G1
(416) 206-4725

Europe/Africa/Middle East:

Hewlett-Packard S.A.
150, Route du Nant-d'Avril
CH-1217 Meyrin 2
Geneva, Switzerland
(22) 780 81 11

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-Ku, Tokyo 168
(03) 3331-6111

Latin America:
Hewlett-Packard Latin American Region Headquarters
5200 Blue Lagoon Drive
Miami, FL 33126
(305) 267-4220

Australia/New Zealand:
Hewlett-Packard Australia, Ltd.
31-41 Joseph Street, Blackburn
Victoria 3130, Australia
(03) 272 2895

Asia Pacific:
Hewlett-Packard Asia Ltd.
22-30 Floor Peregrine Tower
Lippo Centre
89 Queensway, Central Hong Kong
(852) 848-7777

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HEWLETT® PACKARD

HP's Cabling Service

Technical Data

Service Description

Hewlett-Packard's cabling service provides complete network cabling project management from design to installation. HP can implement an entirely new cable system or expand or modify an existing network. HP scales the cabling service to fit your network environment and size.

Based on a thorough needs analysis, our technical experts work with you to develop the best solution to meet your business requirements for cabling. By managing all aspects of the project, HP ensures a smooth and timely implementation.

Because in-house technical resources vary from company to company, you can select the cabling implementation plan that best supports your needs.

Project implementation may include installation of hardware and associated network components when HP's Startup Service is included.

Benefits to You

- Minimized costs through quality cable plant design and installation.
- Built-in modularity to protect your cabling investment.
- Cabling systems based on industry standards to ensure future flexibility.
- Simplified implementation through a single-source service provider.
- Verified cable functionality.
- Documentation for ongoing supportability and management.

Service Features

- Coordination Of All Activities
- Cabling Requirements Analysis
- Expert Cable Plant Design
- Quality Cabling Installation
- Media Verification And Certification Acceptance Test
- Comprehensive Cable Documentation

Specifications

Service Features

Coordination of all activities.
HP manages the complete implementation activity to ensure a smooth, timely, and well-coordinated cabling installation. HP reviews the ongoing process through periodic progress updates. Successful multiple-site cable plant implementation may require extensive coordination with multiple partners and subcontractors. HP manages all activities to ensure proper and timely installation.

Cabling requirements analysis.
A thorough needs analysis ensures that you receive a flexible, cost-effective cable foundation that fully supports your computing and business infrastructure. HP works with you to determine the appropriate cable system specifications, implementation requirements, and completion criteria.

Expert cable plant design. HP makes specific design recommendations regarding the placement of wiring closets and associated network components as well as appropriate media selection and network topology. HP will perform a site survey and recommend any necessary site preparation requirements before the cabling implementation is performed. HP can also implement these recommendations as part of the overall project. HP supports the following standards: IEEE 802.3, IEEE 802.4, IEEE 802.5, IEEE 802.7, EIAMA-568, and fiber-optic cabling for compliance with FDDI requirements.

Quality cabling installation. HP provides installation of the cabling system by a team of experienced professionals. All installation tasks are completed by HP or HP-selected vendors.

Media verification and certification acceptance test. After completing the cabling installation activities, HP performs standard tests to verify proper functionality, then corrects any problems detected. HP follows industry standards and uses sophisticated test equipment as part of this process. Acceptance testing of the newly installed or modified cable plant is included in the implementation.

Comprehensive cable documentation. Accurate documentation is critical for the successful management and on-going supportability of your cabling infrastructure. HP provides detailed documentation that represents your exact cabling system as installed. The documentation also includes the list of key support contacts and site logs to help you administer the cable system. Cable tracking and management systems can also be provided (subject to local availability).

Additional Information

Network Logical Design. A complete, documented network logical design must be available to HP before cabling service begins. The logical design document must include these items:

- A physical network map that identifies communication links.
- A description of all network hardware.

HP's network planning and design service can assist you in developing your network logical design if one does not exist.

Ordering Information

HP's cabling service is quoted to meet your specific business requirements. For more information, call your local HP sales office listed in your telephone directory or an HP regional office listed below for the nearest sales office.

Regional Sales Headquarters
United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 850-2544

Canada:
Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W5G1
(416) 206-4725

Europe/Africa/Middle East:

Hewlett-Packard S.A.
150, Route du Nant-d'Avril
CH-1217 Meyrin 2
Geneva, Switzerland
(22) 780 81 11

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-Ku, Tokyo 168
(03) 3331-6111

Latin America:
Hewlett-Packard Latin American
Region Headquarters
5200 Blue Lagoon Drive
Miami, FL 33126
(305) 267-4220

Australia/New Zealand:
Hewlett-Packard Australia, Ltd.
31-41 Joseph Street, Blackburn
Victoria 3130, Australia
(03) 272 2895

Asia Pacific:
Hewlett-Packard Asia Ltd.
22-30 Floor Peregrine Tower
Lippo Centre
89 Queensway, Central Hong Kong
(852) 848-7777

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HEWLETT® PACKARD

HP's Startup Service

Technical Data

Service Description

Hewlett-Packard provides technical expertise and project management to assist you in implementing your computing environment. HP's comprehensive set of capabilities ranges from the physical preparation of the computing site and the equipment, to the installation and configuration of hardware, software, and networks.

HP's Startup Service helps get computing environments up and running quickly by coordinating the installation, configuration, and testing of systems, devices, and networks. HP brings a new system or network online or adds new connections to an existing network, scaling the solution to fit your system and network requirements.

Benefits to You

- Timely and coordinated implementation.
- Quality installation and configuration of systems and networking components.
- Verified system and network. operation.
- Assured ongoing supportability.

Service Features

- Single-vendor coordination of implementation activities
- System installation and configuration
- Network configuration
- Verification
- Documentation

Specifications

Service Features

Single-vendor coordination of implementation activities. HP works with you to develop a complete startup schedule that outlines installation tasks and resources, both within and across user sites. HP helps identify all implementation activities, a time frame for each startup activity, and the responsible party—HP, your staff, or other vendors. The schedule also identifies critical path activities and contingency plans, when appropriate.

System installation and configuration. Startup service provides installation and configuration of hardware, software, and network devices when the product purchase price does not include these services. During system installation, HP performs the following tasks:

- Supervise the uncrating, positioning, and racking of products.
- Inventory the shipment against the packing list(s).
- Interconnect the products.
- Check the primary power line voltage.
- Execute initialization procedures.
- Perform electronic and mechanical adjustments as required.
- Perform any necessary repairs to make warranty-covered products operational.
- Execute standard HP diagnostic or verification programs and tests.
- Instruct operators on daily care and proper use of the products.

For large implementations with redundant hardware and software configurations, HP can provide system staging. HP consolidates and assembles equipment hardware and software in one of HP's integration centers, then configures and fully tests prior to shipment.

Network configuration.
HP goes beyond standard configurations and verification tests to provide a customized network implementation solution. HP works with your staff and other vendors to jointly determine configuration parameters for each newly installed component to meet your network specifications.

A complete, implementable network design must be made available to HP before startup service begins. The design document must include:

- The physical network map with communication links identified
- A description of all network hardware and software
- A description of the applications utilizing the network

HP can provide assistance in developing the network design through our network planning and design service.

If you purchase startup service to add nodes to a network, HP works with your staff to determine the impact on the existing network components.

HP's network configuration ensures connectivity and operational functionality up to layer 3 and layer 4 of the Open Systems Interconnect (OSI) model. HP can provide further assistance in implementation beyond the specifications of this service.

Verification.
After completing the installation and configuration activities, HP uses standard tests to verify that all major connections involved in the startup communicate properly. HP diagnoses any operational problems and works with your staff until all connections implemented with startup service are functional.

Documentation.
Accurate documentation is critical for successful management and operation of a network. HP provides you with a complete set of system and network support documentation upon completion of the installation and verification process.

Additional Information

HP, upon request, performs additional implementation activities, including receiving and uncrating products, relocating new or existing products, and reconfiguring hardware and software systems. Cabling can be performed through HP's cabling service.

Ordering Information

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Regional Sales Headquarters

United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 850-2544

Canada:
Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W5G1
(416) 206-4725

Europe/Africa/Middle East:

Hewlett-Packard S.A.
150, Route du Nant-d'Avril
CH-1217 Meyrin 2
Geneva, Switzerland
(22) 780 81 11

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-Ku, Tokyo 168
(03) 3331-6111

Latin America:
Hewlett-Packard Latin American
Region Headquarters
5200 Blue Lagoon Drive
Miami, FL 33126
(305) 267-4220

Australia/New Zealand:
Hewlett-Packard Australia, Ltd.
31-41 Joseph Street, Blackburn
Victoria 3130, Australia
(03) 272 2895

Asia Pacific:
Hewlett-Packard Asia Ltd.
22-30 Floor Peregrine Tower
Lippo Centre
89 Queensway, Central Hong Kong
(852) 848-7777

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HEWLETT® PACKARD

HP's Staging and Distribution Service

Technical Data

Service Description

Hewlett-Packard's Staging and Distribution Service provides users with installation-ready personal computers, workstations, multiuser systems, portables, and peripherals representing a wide variety of manufacturers. Service is tailored to your specific testing and delivery requirements.

HP works with you to document system content and configuration specifications. Acting as your agent, HP coordinates the receipt of all system components in one staging area.

All components are tested upon receipt and then assembled into systems. Hard drives are formatted and initialized. Operating systems and applications are loaded. And network components, if part of the system, are configured and tested.

Each system is packaged and sent, installation-ready, to your end users at locations and times specified by you. The result is a smooth, efficient rollout of turn-key desktop systems and products with minimal end-user disruption.

Benefits to You

- Increase your confidence that new systems are expertly assembled and configured.
- Eliminate the time delays and frustration involved with identifying and correcting initial system failures.
- Put new products and systems into productive use upon receipt, with minimal user disruption.
- Minimize internal support requirements for a smooth, effective rollout of new desktop and portable systems.

Service Features

- hardware and software integration
- system and network testing
- user-ready packaging
- monthly reporting

Specifications

Service Features

Hardware and software integration.
All systems are documented per your specifications. This includes all hardware, network cards, modems, operating systems, and applications. All hardware components are tested, cabled, and configured, with defective components identified and replaced. Hard disk drives are formatted and initialized. Operating systems and applications are installed and configured. For networked systems, each PC or workstation is configured to operate with the others in its cluster.

System testing.
HP works with you to define the systems, including hardware, software, and networking devices. System test specifications are developed with you to ensure that all systems meet usability requirements. All tests are conducted at HP's integration center to conform to your

specifications prior to packaging and shipment.

User-ready packaging.
HP works with you to develop packaging specifications, including all physical components and product documentation. HP repackages assembled systems and gathers product documentation into a separate subpackage. Packaged systems are sent directly to end-user locations according to a timetable that HP develops with you.

Monthly reporting.
HP provides you with regular reports. Reported information includes products and components received, on-hand inventory at the HP integration center, and systems shipped.

Optional Service Features

Acquisition service.
HP staffs a remote acquisition desk to validate and qualify orders from your users and then generate component orders to product vendors specified by you. HP works with you to define standards, guidelines, and procedures for end-user order placement to HP's acquisition desk. HP personnel, in conformance to your standards, process user requests for products and systems. HP qualifies user requests and recommends products per your guidelines. HP documents product price and availability information and forwards this information to your designated contact for purchase authorization. HP processes user purchase authorizations and, as your agent, places orders with the appropriate product vendors. Received products are collected and queued for staging and distribution.

System installation.
HP works with you to specify which systems and end users require postshipment installation service from HP. HP schedules and physically installs all specified systems, performing the necessary tests to validate system functionality.

Additional Information

Hewlett-Packard offers a variety of related services that complement HP's Staging and Distribution Service. HP offers multivendor maintenance services for a wide range of HP and non-HP PCs, workstations, portables, and peripherals. In addition, HP's help desk service is available for end-user usage assistance for the PC hardware, software, and networking products most commonly used in business environments. These services are available separately or in combination with HP's Staging and Distribution Service, providing you with seamless, integrated one-vendor support for your desktop computer environments.

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United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

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Atlanta, GA 30339
(404) 850-2544

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Mississauga, Ontario L4W5G1
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Lippo Centre
89 Queensway, Central Hong Kong
(852) 848-7777

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HEWLETT® PACKARD

HP System Support Service

Technical Data

Product Number
HP H5355A

HP System Support Service, Hardware, Software, and Network Support

Service Description

HP System Support service provides high-quality hardware, software, and network support that enables you to increase productivity and computer system uptime. You get the flexibility to choose the hardware response time and coverage periods that meet your service needs. Complete software maintenance support increases the availability of your systems and applications.

HP Response Center engineers work with your system managers and operators to resolve problems with HP software and supported non-HP applications. Sophisticated remote support tools enable HP to link directly to your environment and access system configuration and support information.

Network support is essential to maintaining end-user productivity. Network support provides the level of fault isolation and problem management you need for your environment, including HP, multivendor, and multisite networks.

Benefits to You

- Increase the availability of systems, applications, and your networked environment.
- Improve productivity of system managers and operators.
- Increase the return on your system investment.
- Increase system performance and reduce downtime.

Service Features

- Onsite hardware support
- Software assistance
- Escalation management
- Flexible call submittal
- License for software updates
- Software media and documentation
- HP SupportLine electronic support
- Network support*
- Complete network documentation*
- Assigned contract administrator

For Select HP Products
- Assigned customer engineer
- Preventive hardware maintenance
- Remote support
- HP PowerPatch tapes
- Site environmental surveys
- Installation of add-on hardware products

* Network features are excluded if network support is not ordered.

Specifications

Service Features

Onsite hardware support.
- Work to completion
- Engineering improvements

HP travels to your site and provides all labor, parts and materials necessary to maintain your hardware products in good operating condition. HP diagnoses and corrects product malfunctions and failures. Replacement parts are new or equivalent to new; replaced parts become the property of HP.

Once an HP engineer arrives at your site, the engineer continues service, uninterrupted, until your products are operational or as long as reasonable progress is being made. Work may be temporarily suspended if additional parts or resources are required, but resumes when they become available. With the Scheduled support service level, work resumes on the following business day. HP installs appropriate engineering improvements on your system to ensure maximum performance and maintain compatibility with HP-supplied hardware replacement parts.

Software assistance.
Remote assistance is available for software problems. Unlimited, toll-free access to the HP Response Center is provided for authorized callers. Response is immediate for critical calls and within 2 hours for all calls. Assistance is available from Monday through Friday, excluding HP holidays, during normal HP Response Center hours for all HP and select non-HP software products. Extended-hours support is available for certain operating system, subsystem, and application software products. Refer to the HP SupportLine database for details of products and coverage hours.

Escalation management.
HP has established formal escalation procedures to solve very complex hardware, software, and network problems. Local HP management coordinates problem escalation, rapidly enlisting the skills of key problem-solving experts throughout HP. At HP's discretion, the HP Response Center may dispatch an HP service representative to your site to assist with problem resolution. In most cases, resources arrive within 1 working day if your site is within 100 miles of the nearest HP support office.

Flexible call submittal
Authorized callers can submit calls electronically to the HP Response Center via HP SupportLine electronic support and request a call back within 2 hours (or the next business day if after normal hours) or a written electronic response the next business day.

If you've selected a hardware service level that only provides coverage during normal business hours, you can still place an after-hours service call. The HP Response Center logs the call and notifies your local office the following business day. Outside the U.S., hours are subject to local availability.

License for software updates.
You can use and copy updates to HP software on each system covered by HP System Support service as described in HP Terms and Conditions of Sale and Service, Exhibit 5, HP System Support Service.

Software media and documentation
As HP releases updates to your HP software, the latest revisions of the software and reference manuals are made available to your system manager. Media types available for software and documentation updates include tape, disk, paper, electronic, and compact disc read-only memory (CD-ROM). HP value-added businesses (VABs) can request priority delivery of software releases.

HP SupportLine electronic support
HP SupportLine provides electronic access to a database of current product and support information. HP SupportLine includes new product information, software status bulletins, engineering and application notes, and information about available software patches and HP PowerPatch tapes. Keyword search and browse capabilities make it easy to locate appropriate information. Software patches, when available for HP 9000 systems, can be downloaded to your system. HP SupportLine is available Sunday through Friday from 2:00 am to midnight, and Saturday from

2:00 am to 9:00 pm eastern time (U.S.). Outside the U.S., hours are subject to local availability.

Network support*.
Resolution of a network problem begins within 2 hours of your call to the HP Response Center. Network specialists isolate the problem remotely and, if HP deems necessary, HP sends a support engineer to your site. Since the HP Response Center can manage the resources required to solve multivendor and multisite problems, HP can cover your entire network. To efficiently solve your problem, HP may contact the appropriate vendor.

Complete network documentation*.
Customer-specific network documentation for all of your sites is updated annually by your HP representative. Your network map is included in the HP Response Center's database.

Assigned contract administrator.
An account-assigned contract administrator serves as your single point of contact for contract administration.

* Network features are excluded if network support is not ordered.

Service Features
(For Select HP Products)

Assigned customer engineer.
In addition to delivering day-to-day support, an assigned customer engineer works with you to develop a support plan to meet your current and future needs. (select accounts)

Preventive hardware maintenance.
An HP engineer visits your site at regularly scheduled intervals to perform diagnostics on your system, adjust mechanical or electronic system components as needed, and replace worn or defective parts if necessary.

Remote support.
Prior to any necessary onsite assistance, an HP engineer may initiate and perform remote diagnostics to facilitate problem resolution, By using an HP-qualified support modem to resolve problems remotely, HP can have your system up and running more quickly. HP performs remote support only upon receipt of your authorization. Remote support tools include HP Predictive Support software, which helps to transform unplanned downtime to scheduled maintenance through early warning and prevention of potential problems, and HP Remote Watch software, an HP proprietary support management tool that helps you to manage your HP-UX workstation systems better by documenting and reporting configuration changes.

HP PowerPatch tapes.
Operating and subsystem patches are available for supported MPE V and MPE iX releases. You can order HP PowerPatch tapes from the HP Response Center at any time, for installation with a new release or between major software updates. HP PowerPatch solutions are subjected to the same quality assurance testing as all HP software releases.

Site environmental surveys.
HP computer products are designed to operate within specific power, temperature, airborne contaminant, and humidity ranges. Your HP engineer periodically monitors these environmental conditions at your site and advises you of necessary modifications.

Installation of add-on hardware products.
Additional HP hardware products purchased directly from HP and added to your HP System Support service agreement are installed at no additional charge. This does not apply to hardware that is designated as customer-installable.

Hardware Service Levels

The right coverage hours and response times for your business depend upon the critical nature of your applications and the availability of alternate computing resources. With HP System Support service, you can choose from the four

hardware service levels described in below. While these service levels meet the needs of most customers, HP also has the flexibility to individualize service for you.

Response Time

When your call is received at HP, an engineer quickly responds to gather information about the problem and begin work. If remote support is available, the engineer may access your system to run diagnostics. If onsite assistance is required, an HP engineer arrives at your location as quickly as possible within the response time specified in your agreement.

Travel Zones

If your system is within 100 miles (160 km) of a primary HP Support Responsible Office, you receive the response time you've selected as specified below. Response times to locations beyond 100 miles are specified in below. Travel to sites located within 200 miles (320 km) of your primary HP Support Responsible Office is provided at no additional charge. If your site is more than 200 miles (320 km) from the primary HP Support Responsible Office, you will be charged for travel based on the distance to your location.

Hardware Service Level Selection Guide

Hardware Service Level	Coverage Hours*	Response Time	Environment
Priority Plus	24 hours a day, 7 days a week	Best response; not to exceed	Highly critical 4 hours
Priority	8:00 am-9:00 pm, Monday-Friday, excluding HP holidays**	Best response; not to exceed 4 hours	Urgent
Next Day	8:00 am-5:00 pm, Monday-Friday, excluding HP holidays	Next working day	Less critical
Scheduled	8:00 am-5:00 pm, Monday-Friday, excluding HP holidays	Scheduled weekly visits	Multiple units; spare equipment

* Outside the United States, hours are subject to local availability. Please check with your local office for detailed coverage hours.

**If you request service before 5:00 pm, an HP engineer responds onsite within 4 hours if necessary.

HP's Response Time for Extended Travel

Distance from Primary HP Support Responsible Office	Response Time		
	Priority Plus	Priority	Next Day
101-200 miles coverage day	8 hours	8 hours	1 additional
201-300 miles coverage days	*	*	2 additional
Beyond 300 miles	*	*	*

* Established at time of order and subject to resource availability

Optional Features and Services

Additional HP Response Center caller.
This feature allows one additional caller access to the HP Response Center. Response is immediate for critical calls and within 2 hours for all calls. Additional callers must meet HP training requirements.

Software update installation.
HP installs one software update at your site, scheduling the installation at least 1 week in advance at a mutually agreed-upon time. Installation is available Monday through Friday, 8:00 am to 5:00 pm local time, excluding HP holidays (U.S.).

Off-hours software update installation.
HP installs one software update during specified off hours, scheduling the installation at least 1 week in advance at a mutually agreed-upon time. Off-hours installation is available Monday through Friday, 6:00 am to 8:00 am, or 5:00 pm to 9:00 pm local time, excluding HP holidays (U.S.).

Per-call services.
On occasion, you may require hardware services that are not included in your HP System Support agreement, such as deinstallation or data recovery. As an HP System Support customer, you can purchase certain one-time services at a rate lower than HP's standard service rate. This lower service rate only applies to services performed on products covered by HP System Support service.

Extended coverage.
You can extend your hardware coverage hours and improve response time on a per-call basis, subject to local resource availability, for an additional fixed charge. To buy these options, you must have an open purchase order on file with HP, specifying all persons authorized to request these services.

Media retention.
This service waives HP's right to maintain possession of a failed disk drive component on which sensitive data is stored. (select products)

Eligibility

Priority Plus Support.
HP computer products may be covered by the Priority Plus support service level if your monthly HP System Support service charges for a site exceed a minimum amount. If remote support is available on your equipment, you must allow remote access to receive Priority Plus support.

Scheduled Support.
This service level covers all designated eligible products and their eligible accessories. To qualify for the Scheduled support service level, your HP System Support service monthly charges for products covered by this service level at a site must exceed a minimum amount. If your charges do not qualify you for this service, your HP representative can discuss other support alternatives with you.

Additional Information

Problems with installed HP software or updates can be submitted to the HP Response Center via telephone or through HP SupportLine electronic support, or to your local HP sales office. HP acknowledges receipt of the service request, but retains the right to determine the final disposition of all reported problems.

Service features are available for HP software; all service features may not apply to select supported non-HP software.

Ordering Information

Service is usually purchased for a 12-month period, billable in advance annually, quarterly, or monthly.

You immediately begin receiving the benefits of HP support if you order an HP System Support service contract when you purchase or lease a new system. For hardware products with a 90-day onsite warranty, HP provides the level of hardware service ordered or the level of warranty coverage, whichever is better, during the onsite warranty period.

When you place your order, select the types of software and documentation media you would like to receive. Available media types depend on your SPU and system software.

You must include all contractual optional features and services on the original order (or renewal) for HP System Support service.

Availability of service features may vary according to local resources. To obtain further information or to order HP System Support service, contact your HP representative.

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5091-5043E Support

HEWLETT® PACKARD

HP's Network Operations Service

Technical Data

Service Description

Hewlett-Packard's network operations service provides flexible, secure network operations support for multivendor, Ethernet or IEEE 802.3, TCP/IP, and SNMP-based distributed local area networks (LANs). Dedicated HP Customer Network Centers worldwide can operate your LAN remotely. LANs located on a single site, or distributed over diverse geographic regions, can be effectively managed on a full or part-time basis. HP works closely with you to provide a customer-specific operations solution that meets your requirements.

Benefits to You

- Increased network uptime.
- Core business focus.
- Around-the-clock coverage.
- Periodic reports that enhance decision-making ability.
- Enhanced supportability through up-to-date network documentation.
- Off-loaded routine administrative tasks and processes.
- Minimized disruptions associated with network modifications.

Service Features

- Real-time network monitoring.
- Multivendor fault management.
- Centralized network expertise.
- Status and performance reporting.
- Network documentation maintenance.
- Limited change management.

Specifications

Service Features

Real-time network monitoring.
HP Customer Network Center monitoring systems periodically poll network components such as hosts, internet devices, and communication lines to ensure that the network is up and running. Real-time monitoring of network events results in increased network uptime for your distributed multivendor LAN.

Multivendor fault management.
Remote access tools are utilized to isolate faults at the node and component level. Onsite assistance is also available when the fault cannot be eliminated remotely. Whether the isolated fault occurs on an HP or non-HP product, HP works with selected vendors to provide a single point-of-contact during the problem resolution phase.

Centralized network expertise.
HP Customer Network Centers provide monitoring and telephone assistance 24 hours a day, 7 days a week. These dedicated network centers are backed up by the HP Response Center network and the HP field organization worldwide. You can access HP's network expertise by placing one call to the HP Customer Network Center.

Status and performance reporting.
Status reports, such as backbone and router outage history, are made available monthly to alert you to exceptions and problems with your multivendor network. Monthly performance reports enable you to examine the evolving traffic patterns and loads, optimize the current network, and plan for growth. Ad hoc reports are available at your request.

Network documentation maintenance.
HP maintains and distributes accurate network documentation of your constantly evolving network environment. When changes such as additions, deletions, and moves occur, HP updates the network documentation to better reflect the current network topology.

Limited change management.
Minor changes, such as reconfiguring router ports, are provided remotely by the HP Customer Network Center. HP also manages network modifications, which includes developing an implementation schedule and organizing both HP's and the customer-designated vendor's implementation and verification activities.

Optional Features

Network administration.
Network administration functions include adding and removing users to and from the network; assisting users; maintaining network documentation; coordinating moves and changes, including assisting in scheduling designated vendor deliverables; and acting as a local focal point to vendors, including HP, during maintenance activities.

Onsite change management.
This feature includes the management and implementation of major network changes that require onsite assistance by HP, such as adding routers to existing and new sites on the network. When major additions, deletions, and moves occur within the network, HP can provide and manage the implementation schedule as well as provide the implementation and verification of the change.

Ordering Information

HP's Network Operations Service is quoted to meet your specific business requirements. For more information, call your local HP sales office listed in your telephone directory or an HP regional office listed below for the location of your nearest sales office.

Regional Sales Headquarters

United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 850-2544

Canada:
Hewlett-Packard Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W5G1
(416) 206-4725

Europe/Africa/Middle East:

Hewlett-Packard S.A.
150, Route du Nant-d'Avril
CH-1217 Meyrin 2
Geneva, Switzerland
(22) 780 81 11

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-Ku, Tokyo 168
(03) 3331-6111

Latin America:
Hewlett-Packard Latin American Region Headquarters
5200 Blue Lagoon Drive
Miami, FL 33126
(305) 267-4220

Australia/New Zealand:
Hewlett-Packard Australia, Ltd.
31-41 Joseph Street, Blackburn
Victoria 3130, Australia
(03) 272 2895

Asia Pacific:
Hewlett-Packard Asia Ltd.
22-30 Floor Peregrine Tower
Lippo Centre
89 Queensway, Central Hong Kong
(852) 848-7777

Technical information in this document is subject to change without notice.

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5091-5912E Support

HEWLETT® PACKARD

Introduction to Data Communications

Technical Data

Course Number
HP 35051S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course provides operations and technical support staff, software engineers, and telecommunications professionals with fundamental knowledge of networks and data communications, using lectures, labs, and group activities to teach these basic concepts.

Course Features

- Understand data communications and telecommunications and their basic components.
- Contrast asynchronous and synchronous transmissions.
- Learn to describe the features of four modulation methods, and the bisync and high-level data link control (HDLC) protocol.
- Define the RS-232-C interface standard.
- Become familiar with three switching techniques.
- Understand the difference between baseband and broadband signaling techniques.
- Learn the goals of data communications testing and areas of responsibility.
- Understand integrated services digital network (ISDN), the X.400, and fiber distribution data interface (FDDI) standards.

Specifications

Course Length: 5 days

Audience: Technical support staff, operations staff, software engineers, and telecommunication professionals.

Prerequisites: Data processing experience.

Delivery Method: Classroom, onsite

Format: Instruction consists of approximately 60 percent lecture and 40 percent group discussions and hands-on lab exercises. The discussions increase student interaction, and center on the presentation of a realistic example problem. The lab uses a breakout box as a basis for studying the RS-232-C interface standard.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.

- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- Regularly scheduled classes.
  - Plan training months in advance.

Course Outline

Day 1
- Introduction to communications
- Transmission media and services

Day 2
- Transmission methods: multiplexing, modulation, and modems
- Interface standard: RS-232-C, RS-449, RS-423, X.21, IEEE-488

Day 3
- Protocols: binary synchronous (bisync or BSC), high-level data link control (HDLC)

Day 4
- Network architecture: International Standards Organization's OSI model
- Wide area networks (WANs): switching techniques, CCITT recommendations (X.25)
- Local area networks (LANs): signaling techniques
- LANs: access methods, IEEE 802 standard, private branch exchange, client and server model

Day 5
- Basic troubleshooting: network testing at various layers, testing equipment, value of consulting service
- New standards: ISDN, X.400, Network Management, FDDI
- HP AdvanceNet strategy, Manufacturing Automation Protocol, cellular radio system, premises wiring

Ordering Information

To order Introduction to Data Communications (HP 35051S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

HP Customer Education Centers in the U.S.

Atlanta, GA
Boston, MA
Chicago, IL
Dallas, TX
Detroit, MI
Los Angeles, CA
New York/Metro, NJ
San Francisco/Bay Area, CA
Washington, D.C

Regional Sales Headquarters

United States:
Hewlett-Packard Company
2101 Gaither Road
Rockville, MD 20850
(301) 258-2000

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 342-2000

Hewlett-Packard Company
5805 Sepulveda Blvd.
Van Nuys, CA 91411
(818) 786-5800

Hewlett-Packard Company
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Atlanta, GA 30339
(404) 850-2544

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Mississauga, Ontario L4W5G1
(416) 206-4725

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CH-1217 Meyrin 2
Geneva, Switzerland
(22) 780 81 11

Japan:
Yokogawa-Hewlett-Packard Ltd.
3-29-21, Takaido-Higashi
Suginami-Ku, Tokyo 168
(03) 3331-6111

Latin America:
Hewlett-Packard Latin American Region Headquarters
5200 Blue Lagoon Drive
Miami, FL 33126
(305) 267-4220

Australia/New Zealand:
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31-41 Joseph Street, Blackburn
Victoria 3130, Australia
(03) 272 2895

Asia Pacific:
Hewlett-Packard Asia Ltd.
22-30 Floor Peregrine Tower
Lippo Centre
89 Queensway, Central Hong Kong
(852) 848-7777

HEWLETT® PACKARD

Local Area Network Seminar

Technical Data

Course Number
HP 50747S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Gain a broad overview of local area network (LAN) technologies and their applications. This course includes a thorough discussion of LAN features, benefits, and limitations, as well as the critical factors in LAN selection and implementation.

Course Features

- Learn the essential characteristics of a LAN.
- Gain the ability to compare and contrast different types of LANs in a work environment.
- Learn about network topologies and LAN hardware requirements.
- Understand baseband and broadband access methods, various transmission media, access protocols, and the open systems interconnection (OSI) model as it relates to LANs.
- Gain experience in following the critical steps and criteria for selecting a LAN by completing student exercises.
- Become familiar with implementation issues and common pitfalls of installing a LAN in a work setting.

Specifications

Course Length: 2 days

Audience: Professionals who support networks and who operate computer networks and managers who are responsible for the selection and implementation of local area networks.

Prerequisites

- Basic understanding of computer hardware and software and general knowledge of computer terminology and
- Knowledge of how computers are used in a business environment.

Delivery Method: Classroom, onsite

Format: Approximately 50 percent of the course is lecture format. The remaining 50 percent is divided between structured class discussions and group exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- LAN fundamentals
- Uses of LAN technologies
- Types of LANs
- Components of a LAN
- Measurement of LAN capabilities
- A look at a LAN
- Transmission media
- LAN topologies
- Baseband and broadband

Day 2

- LAN-to-LAN interconnectivity
- International standards
- Environmental impact of a LAN
- Planning issues
- Network operation issues
- Evaluating a LAN
- Needs assessment
- Designing a network
- Future trends for LANs

Ordering Information

To order Local Area Network Seminar (HP 50747S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

Wide Area Network Seminar

Technical Data

Course Number
HP 50748S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Gain a broad overview of wide area network (WAN) technologies and their applications. This course reviews basic concepts underlying these technologies and defines appropriate terminology. Examples illustrate the functional components and operating principles of wide area networks, as well as the critical factors in WAN selection and implementation.

Course Features

- Understand the principal features that distinguish wide area networks from local area networks.
- Learn about packet switching, including the costs and benefits of different products and technologies.
- Gain an overview of WAN architectures and their relationship to open systems interconnection (OSI) standards.
- Learn a method for systematic information gathering to evaluate both your company's communications needs and a WAN's potential to meet those needs.

Specifications

Course Length: 2 days

Audience: Professionals who support or who operate computer networks, and managers who are responsible for the selection or implementation of wide area networks

Prerequisites

- Basic understanding of data communications concepts and terminology, including transmissions, signaling concepts, communication protocol, transmission media, multiplexing, and network services, and
- Introduction to Data Communications Course (HP 35051S).

Delivery Method: Classroom, onsite

Format: Approximately 50 percent of the course is lecture format. The remaining 50 percent is divided between structured class discussions and group exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.

- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- WANs, from concept to practice
- WAN structure
- WAN components
- Switched services
- Leased services
- Packet switching services
- OSI model

Day 2

- Criteria for evaluating WANs
- T1 networks
- Private packet switching networks
- Public packet switching networks
- Steps in selecting a WAN
- Steps in implementing a WAN
- Elements of network management
- Future trends

Ordering Information

To order Wide Area Network Seminar (HP 50748S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

HP Multivendor Networking Seminar

Technical Data

Course Number
HP B2784S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This seminar is designed to assist network planners, designers, and administrators in understanding multivendor networking. Learn networking concepts and various network vendors' strategies.

Course Features

- Understand network needs for system-to-system communication and the advantages of system interconnectivity.
- Understand common network topologies.
- Understand the uses of electronic mail.
- Learn the benefits of wireless local area networks (LANs), file transfer and access management (FTAM), and technical office protocol (TOP).
- Understand the future direction of open systems interconnection (OSI) standards and implementation.
- Understand the functionality of a virtual terminal.
- Understand the networking strategies of a variety of vendors and identify some of the interconnection products from those vendors.

Specifications

Course Length: 1 day

Audience: New network administrators and professionals involved in network design.

Prerequisites: None

Delivery Method: Classroom, onsite

Format: 90 percent lecture and 10 percent case studies and discussion questions.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

- Review protocol standards
- Identify network services
- Define network communications
- System-to-system communications
- File transfer usage
- Virtual terminal facility usage
- Electronic mail usage
- Programmatic communication
- Network-to-network communication
- Common network topologies
- Bridge, router, and gateway functionality
- Wireless LAN technology
- Network management
- Protocols and architectures including FTAM, TOP, manufacturing automation protocol (MAP), and government open systems interconnection profile (GOSIP)
- Vendor network offerings including SUN, Novell, Banyan, IBM, Apple, DEC, and HP
- Directions in networking
- OSI standards, implementation, and evolution

Ordering Information

To order HP Multivendor Networking (HP B2784S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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HEWLETT® PACKARD

TCP/IP and LAN Fundamentals

Technical Data

Course Number
HP B2969S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Learn about local area network (LAN) technologies and Transmission Control Protocol/Internet Protocol (TCP/IP) specifics. Learn the differences between IEEE 802.3, 802.4, 802.5, and the fiber distributed data interface (FDDI).

Learn how the Internet Protocol (IP) routing works and understand the Berkeley Software Distribution (BSD) and Net InterProcess Communication (NetIPC) sockets interfaces for network application programming.

Course Features

- Understand the concepts and benefits of LANs, including access methods and topologies.
- Understand the need for hubs, bridges, repeaters, and routers.
- Understand the IEEE 802.3 LAN protocol.
- Understand technical specifics of the IP, the Transmission Control Protocol (TCP), and the User Datagram Protocol (UDP).
- Understand the routing of IP packets.

Specifications

Course Length: 2 days

Audience: Network administrators, network managers, and network application developers.

Prerequisites: Introduction to Data Communications (HP 35051S).

Delivery Method: Classroom, onsite

Format: 80 percent lecture, 20 percent labs

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from a skilled HP instructor experienced in client/server technologies and concepts.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

- LAN concepts and standards
- Physical level implementation
- LAN topologies and access methods
- Network devices: hubs, repeaters, bridges, and routers
- Data link level: differences between Ethernet and IEEE 802.3
- Interface at level 2: service access points
- Network layer protocol: IP
- Transport layer protocols: TCP and UDP
- Interface at level 5: BSD sockets and NetIPC sockets

Ordering Information

To order TCP/IP and LAN Fundamentals (HP B2969S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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HEWLETT® PACKARD

NetWare for the HP 9000 Fundamentals for Network Administrators

Technical Data

Course Number
HP B3312S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Learn about Hewlett-Packard's implementation of NetWare for UNIX® on HP 9000 Series 700 and 800 systems. This hands-on course teaches you to install, configure, manage, and troubleshoot PC clients and HP 9000 servers running NetWare for the HP 9000 system. You will acquire the technical expertise and knowledge necessary to administer a NetWare network from an HP 9000 system perspective.

Course Features

- Learn how to install and configure both PC clients and HP-UX NetWare servers.
- Learn how to install and configure HP-UX NetWare print servers.
- Learn how to manage the HP-UX NetWare environment.
- Understand NetWare utilities and learn how to use SCONSOLE.
- Understand how to troubleshoot HP-UX NetWare problems, including communication, PC client, and performance problems.
- Learn how to install and use HP's ARPA services for NetWare.

Specifications

Course Length: 3 days

Audience: Network administrators, network managers, and technical network support personnel.

Prerequisites:

- Novell's NetWare 3.11 System Administration class (NE 505).
- HP-UX System Administration for the HP 9000 Series 800 (HP 51482S) or HP-UX Workstation Administration for the HP 9000 Series 300/400/700 (HP 51436S).
- Experience with MS-DOS® and familiarity with basic local area network (LAN) concepts.

Delivery Method: Classroom, onsite

Format: 70 percent lecture, 30 percent labs

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from skilled HP instructors experienced in client/server technologies and concepts.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Introduction to NetWare for the HP 9000 system
- Understand the HP and Novell relationship
- NetWare for the HP 9000 system features and benefits
- NetWare for the HP 9000 system product structure
- NetWare protocols and services
- Plan activities for installation
- Understand the SCONSOLE utility
- Install and configure NetWare for the HP 9000 system

Day 2

- Installing and configuring NetWare on PC clients
- Configuring, managing, and using NetWare printers
- Managing users, data, and the NetWare network
- Tuning performance
- Understanding Internet protocol (IP) tunneling

Day 3

- NetWare and network troubleshooting of communication, PC client
- MS-DOS, NetWare, and performance problems
- Configuring the server and client for packet burst mode
- Backing up and restoring files
- Accessing, maintaining, and repairing bindery files
- Managing hybrid users
- Using the network virtual terminal (NVT)
- Installing, configuring, and using HP ARPA services for NetWare
- Understanding the interoperability issues between NetWare versions and implementations

Ordering Information

To order NetWare for the HP 9000 Fundamentals for Network Administrators (HP B3312S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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HEWLETT® PACKARD

HP LAN Manager/X Fundamentals

Technical Data

Course Number
HP B2781S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course covers how to plan, install, setup, and manage an HP LAN Manager/X environment running under the HP-UX operating system on HP 9000 computers.

Course Features

- Understand the product structure, features, and benefits.
- Practice installing and configuring MS-DOS® and OS/2PC clients.
- Learn to tune and manage PC-client memory.
- Learn to set up the HP LAN Manager/X server in both share-level and user-level security modes.
- Practice installing, configuring, and verifying the HP LAN Manager/X server.
- Gain expertise in managing the HP LAN Manager/X server.
- Learn to use HP ARPA Services 2.1 for MS-DOS clients.
- Practice troubleshooting HP LAN Manager/X problems.

Specifications

Course Length: 3 days

Audience: Members of technical support staffs, office automation coordinators, system administrators, or other professionals who install, configure, and/or maintain networks.

Prerequisites: Experience with MS-DOS and UNIX® (preferably HP-UX) system administration and experience with local area networks.

Delivery Method: Classroom, onsite

Format: 70 percent lecture, 30 percent lab exercises

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to complement our product manuals when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Introducing HP LAN Manager/X
- Planning the network and PC client software installation
- Using the NETSETUP installation program to install a PC network
- Tuning PC client memory

Day 2

- HP LAN Manager/X clients
- HP LAN Manager/X server installation
- HP LAN Manager/X server setup

Day 3

- Managing HP LAN Manager/X server
- Using ARPA services
- Using the NetDiag utility
- Running HP LAN Manager/X on an HP 3000 system

Ordering Information

To order HP LAN Manager/X Fundamentals (HP B2781S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

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HEWLETT® PACKARD

HP LAN Manager

Technical Data

Course Number
HP 22864S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Learn how to plan, install, configure, and verify a PC network using HP LAN Manager software, HP's network operations services, and HP ARPA services.

Course Features

- Understand the product structure, features, and benefits of these PC networking products.
- Practice using the HP LAN Manager software on MS-DOS® and OS/2.
- Gain expertise in using the PC Network services and HP ARPA services.
- Practice planning a PC network.
- Install, configure, and verify the PC client and server.
- Learn to administer an OS/2 HP LAN Manager server.
- Gain experience in using the PC networking diagnostic utilities and procedures to identify and resolve network problems.
- Practice installing and configuring HP OfficeShare III to operate with HP LAN Manager.

Specifications

Course Length: 4 days

Audience: Office automation coordinators, PC technical support staff, PC systems administrators, and other professionals who install, configure, and maintain a PC network.

Prerequisites

- Experience with MS-DOS and OS/2 systems and
- Experience with local area networks would be useful.

Delivery Method: Classroom, onsite

Format: This course is 50 percent lecture and 50 percent lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Introducing PC networking and integration products
- Using HP LAN Manager software
- Using HP Network version 2.0 and MS-DOS
- Using the network file transfer and virtual terminal

Day 2

- Using HP ARPA version 2.0 and MS-DOS
- Using Telnet, File transfer protocol, RCP, and RSH
- Planning installation and configuration parameters
- Using the NETSETUP utility to install a PC network

Day 3

- Planning network users and shared resources
- Using the NETADMIN utility to set up users and resources
- Managing an OS/2 HP LAN Manager server

Day 4

- Using the PC diagnostic utility, NETDIAG
- Troubleshooting problems on a PC network
- Understanding backward compatibility to HP OfficeShare III

Ordering Information

To order HP LAN Manager (HP 22864S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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HEWLETT® PACKARD

X.25 Packet Switching Network

Technical Data

Course Number
HP 50752S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Gain an understanding of the X.25 network standard and learn technical details of the X.25 physical, link, and network layers, and network customization. The course provides hands-on experience with equipment used to support an X.25 network. It also covers user facilities that allow network customization.

Course Features

- Become familiar with the X.25 network standard.
- Understand the information transmitted by the physical, link, and network layers.
- Learn how packets are assembled, disassembled, and routed through a network.
- Understand how errors are checked and controlled.
- Learn how to use essential equipment to support an X.25 network.

Specifications

Course Length: 3 days

Audience: Professionals who provide technical support for wide area networks or who design and implement networks.

Prerequisites: Introduction to Data Communications (HP 35051S) or equivalent knowledge [Wide Area Networks Seminar (HP 50748S) is recommended.]

Delivery Method: Classroom, onsite

Format: This course introduces new topics in lecture sessions, illustrates major points with audiovisual presentations, and solidifies concepts through demonstrations and hands-on labs.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Introduction to X.25 fundamentals
- X.25 hardware and the physical layer

Day 2

- Layer 2: functions, frames, and fields
- Packets disassembled
- Layer 3: processes and packets

Day 3

- User facilities and options
- Packet assembler and disassembler (PAD)
- X.25 networks connections

Ordering Information

To order X.25 Packet Switching Network (HP 50752S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

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HEWLETT® PACKARD

Network Programming with BSD Sockets

Technical Data

Course Number
HP 50783S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course teaches application designers and programmers how to use Berkeley stream sockets for communication among processes residing on different computers within a network. The course also covers the interactive aspect of ARPA and Berkeley user services.

Course Features

- Learn how to use interactive ARPA and Berkeley services.
- Understand connection establishment, data exchange, and connection shutdown phases in conjunction with Berkeley stream sockets.
- Understand data exchange and connections in conjunction with internet datagram sockets.
- Use select(2) and ioctl(2) system calls to perform asynchronous input/output with Berkeley sockets.
- Use the inetd system call to configure a server.
- Understand library calls and the circumstances under which these calls should be used.

Specifications

Course Length: 4 days

Audience: Designers and programmers of network application software.

Prerequisites:

- At least 6 months experience with operating systems or network programming and
- Knowledge of HP-UX programming concepts, such as fork, exec, read, and write, and their uses as system calls, and
- Fundamentals of the UNIX® System (HP 51434S) and
- ANSI C Programming (HP 35130S).

Delivery Method: Classroom, onsite

Format: Instruction consists of 40 percent lecture and 60 percent hands-on lab exercises.

Because this course requires a minimum of one terminal per two students, class size depends on equipment on hand.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.

- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Networking overview
- Berkeley services review
- Introduction to Berkeley stream sockets
- Internet stream sockets

Day 2

- Internet stream sockets (continued)
- UNIX stream sockets
- Internet datagram sockets

Day 3

- Advanced socket programming

Day 4

- System calls and library routines

Ordering Information

To order Network Programming with BSD Sockets (HP 50783S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

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HEWLETT® PACKARD

HP NS3000 Services and Link Configuration

Technical Data

Course Number
HP 22814S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Learn basic skills necessary to configure HP NS3000/iX and HP NS3000/V local area network (LAN) links and router links and HP NS3000/V X.25 links. Gain an understanding of the network implementation cycle and practical knowledge about how to make the products work together.

Course Features

- Understand HP NS3000 services.
- Learn about network node installation.
- Gain expertise with network operation and maintenance.
- Learn basic troubleshooting techniques using MPE and NS functionality and utilities.
- Learn how to use the new features of the HP NS3000/iX product.

Specifications

Course Length: 5 days

Audience: Professionals responsible for the design, configuration, and maintenance of a network, including system managers, network managers, and others with equivalent experience or responsibilities.

Prerequisites:

- MPE/iX System Management Skills (HP 31119S) or MPE V System Management (HP 22802S) and
- Ability to log on to the HP 3000 system, create groups and users, use fcopy and editor, run programs, and perform basic user functions, and
- Knowledge of HP 3000 functions, such as console commands, system configuration, resource management, and operations.

Delivery Method: Classroom, onsite

Format: Instruction consists of approximately 60 percent lecture and 40 percent hands-on lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.

- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1
- HP NS3000 product overview
- HP NS3000 network services
- HP NS3000 network architecture

Day 2
- The job of the network manager
- Network planning
- Hardware and software installation and configuration

Day 3
- Configuring the network
- Starting and testing the network
- Maintaining the network

Day 4
- Network problems resolution
- HP NS/VE X.25 overview
- HP NS X.25 installation
- HP NS X.25 configuration

Day 5
- HP NS X.25 troubleshooting
- HP NS X.25 packet assembler and disassembler (PAD) support
- HP NS X.25 migration
- HP NS 2.0/MS-DOS® PC LAN

Ordering Information

To order HP NS3000 Services and Link Configuration (HP 22814S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).
The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

OSI Overview: Architecture, Technology, and Standards

Technical Data

Course Number
HP H2521A

Open Systems Interconnection (OSI) Overview self-paced course enables a student to learn fundamental OSI technology information. This course provides technical concepts of the OSI model and related standards in a self-paced manner. In specific this course covers the details of standardization environment, OSI Architecture, File Transfer Access and Management (FTAM), Message Handling Systems (MHS), OSI Management, and Migration from today. This course takes approximately 8-10 hours to complete.

Benefits

This course will give you:

- The knowledge to describe the OSI reference model.
- An understanding of OSI standards and profiles.
- The ability to identify areas not covered by OSI.

Special Features

Approximately 70 percent of this course will be presentational, consisting of lecture. The remaining 30 percent will be paper-pencil exercises. This self-paced course is composed of six VHS video cassettes in PAL or NTSC formats, one course book, one student guide, and one OSI Primer. Equipment needed for the course are one VHS video cassette player and a monitor. This course is divided into lessons which can provide natural beginning and ending points for instruction. At the end of each lesson, there is a review quiz to reinforce the key points of the lessons.

A special feature of this self-paced course is that you can learn at your own pace. You can proceed through this course as quickly or as slowly as you wish and stop at any time. When you start again, you begin right where you left off. You can also study at your own desk. No need to travel to get the training you need. Sit at your own desk or in a nearby training room. You are available to answer those important questions while learning how to get the most from your HP product.

Finally, you can use the course many times. Other people in your organization can be trained using the same self-paced courseware. Or you can use it again later to refresh your memory on specific points.

Audience: Technical support professionals and professionals who design and implement networks.

Prerequisites: The student of this course needs a basic understanding of computers. Students should read the OSI Primer before taking this course. The primer is enclosed in the package.

Course Outline

Lesson 1
- Information technology environment
- OSI perspective

Lesson 2
- Standardization environment
- ANSI, CCITT, ISO/IEC, NBS/NIST, COS—DP, DIS, IS

Lesson 3
- OSI architecture concepts
- OSI reference model

Lesson 4
- Transport service
- Transport, network, data link, and physical layers

Lesson 5
- Application service concepts
- Application layer functions
- Application Control Service Elements (ACSEs)
- Application Service Elements (ASEs) (e.g., FTAM, MMS, VT)
- OSI Application Process (AP)

Lesson 6
- File Transfer, Access, and Management (FTAM)
- Purpose and functionality

Lesson 7
- Message Handling Service (MHS)
- Structure and purpose—X.400

Lesson 8
- Presentation and session layers
- Functions and services

Lesson 9
- OSI management
- Structures and protocols
- X.500

Lesson 10
- Community of interest functional profiles
- MAP 3.0, TOP, and GOSIP

Lesson 11
- Migration from today
- Migration strategies

Ordering Information

To order OSI Overview: Architecture, Technology, and Standards (HP H2521A) in the U.S. call HP DIRECT, (800) 538-8787 or, in Canada (800) 387-3154. Toronto customers call 671-8383. Outside the U.S. and Canada, contact your local HP sales office, (PAL video cassette format option is available).

For more information, call your local HP sales office listed in your telephone directory or an HP regional office listed below for the location of your nearest sales office.

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HEWLETT® PACKARD

Message Handling Systems—X.400

Technical Data

Course Number
HP B1797A

This self-paced course enables network professionals to understand the message handling systems (MHS) standard contained in the consultative committee of the International Telegraph and Telephone X.400 Series of recommendations. The estimated time needed to complete this course is 12 hours.

Benefits

- Acquire an overview of computer-based message systems and understand the need to establish messaging systems standards.
- Identify major functional elements of the MHS 1984 model and new capabilities of the 1988 X.400 model.
- Learn the relationship of MHS in the application layer and OSI in the presentation and session layers.
- Gain expertise in the MHS roles of interpersonal messaging (IPM) and message transfer (MTS).
- Understand how MHS operates in a customer environment.
- Understand MHS topics such as conversion rules.
- Learn rules and guidelines for interoperability and conformance for the implementation of X.400 standards.

Special Features

This self-paced course consists of eight VHS video cassettes in either PAL or NTSC formats, one student guide, and one student workbook. Equipment needed to use the course are ½-inch VHS video cassette player and a monitor.

A special feature of this self-paced course is that you can learn at your own pace. You can proceed through this course as quickly or as slowly as you wish and stop at any time. When you start again, you begin right where you left off.

You can also study at your own desk. No need to travel to get the training you need. Sit at your own desk or in a nearby training room. You are available to answer important questions while learning how to get the most from your HP product.

Finally, you can use the course many times. Other people in your organization can be trained using the same self-paced courseware. Or you can use it again later to refresh your memory on specific points.

Audience: This course is intended for technical support staff, network managers, and system managers who have data communications experience and who are new to MHS but not to the OSI reference model.

Prerequisites: OSI Overview (HP H2521A) self-paced training course.

Course Outline

- MHS introduction
- Basic MHS model-1984
- Basic MHS model-1988
- MHS in OSI
- MHS elements of service
- MHS scenario
- IPM
- MTS
- Remote access protocols
- Other MHS topics
- MHS functional standards—NIST implementation

Ordering Information

To order Message Handling Systems—X.400, specify course number HP B1797A. Customers in the U.S. call HP DIRECT, (800) 538-8787, in Canada call (800) 387-3154. Toronto customers call 671-8383. Customers outside the U.S. or Canada should contact their local HP sales office.

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HEWLETT® PACKARD

Network Management Seminar

Technical Data

Course Number
HP 50749S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This seminar provides intensive coverage of network management topics and standards, and it allows students to become more knowledgeable about network management and its impact on their networks. In addition to learning about basic network management components and terminology, students will see demonstrations of the HP OpenView network management applications.

Course Features

- Understand what network management is and why it is needed.
- Learn about the available network management tools and services and why a company might want to install a network.
- Understand network life cycles.
- Learn open system interconnection (OSI) network management definitions.
- Understand the role of network management vendors.
- Learn about future trends in network management.

Specifications

Course Length: 1 day

Audience: Network managers, telecommunications managers, and others interested in obtaining information about management tools for effective network communications.

Prerequisites: Basic understanding of data communications and networks.

Delivery Method: Classroom, onsite

Format: This seminar includes lectures and classroom discussions. Students will perform group exercises and view a demonstration of an HP OpenView network management application.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

- Introduction to network management
- Network management components
- Network management standards and architectures
- HP network management products
- Future directions of network management

Ordering Information

To order Network Management Seminar (HP 50749S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

HP OpenView Network Node Manager Fundamentals for Network Managers

Technical Data

Course Number
HP B3304S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course teaches network managers how to use HP OpenView Windows and HP OpenView Network Node Manager software. It is the bridge to the OSF distributed management environment (DME), the open management environment of the future. If you are thinking about buying the product, this course is a good opportunity to take an in-depth look at all of its features.

Course Features

- Learn the basics of the standard protocols used in today's network management environment.
- Learn how to customize your network management environment.
- Learn about main features, including managing your network, node discovery, and graphs.
- Learn to interpret the data in the management information base (MIB).
- Perform basic troubleshooting procedures.
- Learn how to install the software and edit the network map.

Specifications

Course Length: 4 days

Audience: Network managers in charge of local area networks (LANs) or workgroup environments that run over transmission control protocol/internet protocol (TCP/IP). (This course is not intended for application developers.)

Prerequisites: HP-UX System Administration for Workstations (HP 51436S) or equivalent knowledge, and HP-UX Network Administration (HP H2550S) or equivalent knowledge.

Delivery Method: Classroom, onsite

Format: This course consists of 50 percent lecture and 50 percent lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.

- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Introduction to network management
- HP OpenView basics
- How to use maps and submaps

Day 2

- Using objects and symbols
- Monitoring the network
- Diagnosis and fault management

Day 3

- Setting up HP Openview Network Node Manager
- Configuration basics
- The simple network management protocol (SNMP)
- Browsing the MIB

Day 4

- Data collection and event configuration
- Advanced customization
- SNMP extensible agents

Ordering Information

To order HP OpenView Network Node Manager Fundamentals for Network Managers (HP B3304S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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United States:
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HEWLETT® PACKARD

HP OpenView Network Node Manager Fundamentals for Network Operators

Technical Data

Course Number
HP B3305S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course teaches network operators how to use HP OpenView Windows and HP OpenView Network Node Manager software. It is the bridge to the OSF distributed management environment (DME), the open management environment of the future. It presents the HP technology on which DME is based.

Course Features

- Learn the basics of the standard protocols used in today's network management environment.
- Learn how to install the software and edit the network map. For example, add your own background map to the network map.
- Learn about main features, including how to start up and stop the software, check the status of network objects, understand alarms, use HP OpenView Windows, and deal with alerts.
- Perform basic troubleshooting procedures.
- Practice managing a network through extensive hands-on training.

Specifications

Course Length: 2 days

Audience: Network operators who monitor local area networks (LANs) or workgroup environments that run over transmission control protocol/internetprotocol (TCP/IP).

Prerequisites: UNIX® System Basics I (HP 51489S) or equivalent knowledge and basic understanding of networking.

Delivery Method: Classroom, on site

Format: This course consists of 50 percent lecture and 50 percent lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on labs exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Introduction to network management
- HP OpenView basics
- How to use maps and submaps

Day 2

- Using objects and symbols
- Monitoring the network
- Diagnosis and fault management

Ordering Information

To order HP OpenView Network Node Manager Fundamentals for Network Operators (HP B3354S) in the US., call 1-800-HPCLASS (1-800-472-5277).

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HEWLETT® PACKARD

HP OpenView DTC Manager Fundamentals

Technical Data

Course Number
HP B2664S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course teaches experienced system operations personnel and network managers how to configure and maintain the HP OpenView DTC Manager product.

Course Features

- Learn about the four main features of the data communications terminal controller (DTC) running under the HP OpenView DTC Manager product.
- Practice configuring an asynchronous interface card and configuring DTC/TIO using the HP OpenView DTC Manager product.
- Learn to define local area network (LAN) planning considerations.
- Gain expertise at drawing a network map using HP OpenView OVDraw features.
- Practice performing HP 3000 Series 900 host configuration tasks.
- Gain expertise at managing online terminal input and output (TIO).

Specifications

Course Length: 2 days

Audience: System operators, system managers, network administrators, and network managers who have experience with the HP 3000 Series 900 system, MS-DOS®, Microsoft® Windows, and LANs.

Prerequisites: MPE/iX System Management Skills (HP 31119S) or Moving from MPE V to MPE/iX: System Management (HP 31110S).

Delivery Method: Classroom, onsite

Format: This course is 60 percent lecture and 40 percent lab.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

Overview
- DTC/TIO host- and PC-based configuration
- DTC user interface
- HP OpenView family of products and HP OpenView Windows

Planning the network
- LAN planning considerations
- Node names and addresses
- Direct access/security issues
- MPE/iX migration tools

Installing HP DTC Manager
- HP OpenView DTC Manager software installation
- Software compatibility
- HP OfficeShare configuration

Drawing the map and associated tasks
- HP OpenView OVDraw features
- HP OpenView OVDraw templates
- HP OpenView DTC Manager modem configuration
- Password modification

Day 2

Configuring the DTC/TIO
- HP OpenView OVRun features
- CPU and port configuration
- Asynchronous interface card configuration
- Copy and paste facility
- Saving the configuration

Configuring the MPE/iX and HP-UX host
- Host configuration tasks
- MPE/iX NMMGR device profiles, nailed device mapping, and DTC configuration
- SYSGEN and the TTUTIL workstation configurator

DTC online management of TIO
- Show events, alarms, and the DTC event log
- Diagnostics
- DTC features and DTC Manager features (Release 10.5)
- HP ARPA Telnet and HP ARPA Telnet Express access

Ordering Information

To order HP OpenView DTC Manager Fundamentals (HP B2664S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

HP OpenView DTC/X.25 iX Fundamentals

Technical Data

Course Number
HP B2667S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course teaches experienced system operations personnel and network managers how to configure the HP OpenView DTC/X.25 iX product using the HP OpenView DTC Manager product.

Course Features

- Learn about the features of X.25 system-to-system access and data communications terminal controller (DTC) X.25 packet assembler and disassembler (PAD) support.
- Practice configuring system-to-system switching information and X.25 logging.
- Learn to start up and shut down network services on the host and X.25 in the HP OpenView product and the MPE/iX operating system.
- Gain expertise at configuring the parameters for PAD switching of incoming calls.
- Gain expertise at configuring the parameters for incoming PAD security.
- Learn to interpret the DTC status display and perform online and offline DTC self-tests.

Specifications

Course Length: 1 day

Audience: System operators, system managers, network administrators, and network managers who have experience with the HP 3000 Series 900 system, MS-DOS®, Microsoft® Windows, local area networks (LANs), wide area networks (WANs), and HP NS3000/iX network services.

Prerequisites: HP OpenView DTC Manager Fundamentals (HP B2664S).

Delivery Method: Classroom, onsite

Format: This course is 60 percent lecture and 40 percent lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

System-to-system configuration

- HP NS3000/iX product
- X.25 iX system access features
- Synchronous network processor (SNP) connections to modems and switches
- System-to-system gateways, local user groups, and X.25 configuration
- SNP configuration
- X.25 level 1, 2, and 3 configurations
- Network start up and shut down

PAD access configuration

- Supporting DTC/X.25 iX PAD
- Configuring PAD devices
- Incoming PAD security

Maintenance and troubleshooting

- Troubleshooting and cure analysis
- Offline and online testing of the DTC
- DTC self-testing sequence
- Online diagnostic tools—TIO
- Port problems resolution
- X.25 diagnostic tools, status tools, monitor, and maintenance

Ordering Information

To order HP OpenView DTC/X.25 Fundamentals (HP B2667S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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HEWLETT® PACKARD

HP OpenView DTC Manager and HP OpenView DTC/X.25 iX Fundamentals

Technical Data

Course Number
HP B2800S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course teaches experienced system operations personnel and network managers how to configure and maintain the HP OpenView DTC Manager product (release 12.0).

Course Features

- Learn about main features of the data communications terminal controller (DTC) running under the HP OpenView DTC Manager product.
- Learn about the features of X.25 system-to-system access and DTC X.25 packet assembler and disassembler (PAD) support.
- Practice configuring an asynchronous interface card and configuring DTC/TIO using the HP OpenView DTC Manager product.
- Practice configuring system-to-system switching information and X.25 logging.
- Practice performing MPE/iX and HP-UX configuration tasks.
- Learn to start up and shut down network services on the host and X.25 in the HP OpenView product.
- Gain expertise at managing online terminal input and output (TIO).

Specifications

Course Length: 3 days

Audience: Experienced system operators, system managers, network administrators, and network managers who have experience with the HP 3000 Series 900 system, MS-DOS®, Microsoft® Windows, local area networks (LANs), wide area networks (WANs), and HP NS3000/iX network services.

Prerequisites: MPE/iX System Management Skills (HP 31119S) or Moving from MPE V to MPE/iX: System Management (HP 31110S).

Delivery Method: Classroom, onsite

Format: This course consists of 60 percent lecture and 40 percent lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.

- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1
- Overview
- Planning the network
- HP DTC Manager
- Installing and upgrading
- Configuring the DTC TIO

Day 2
- Configuring the host—MPE/iX
- Configuring the host—HP-UX
- Maintenance and troubleshooting

Day 3
- PAD access configuration
- X.25 PAD maintenance and troubleshooting

Ordering Information

To order HP OpenView DTC Manager Fundamentals (HP B2800S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

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HEWLETT® PACKARD

Client/Server Concepts and Capabilities

Technical Data

Course Number
HP B2958S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This management seminar explores the client/server computing architecture and how it helps solve many of today's toughest computing challenges.

- Understand the basic principles and components of client/server computing, and identify common client/server applications.
- Evaluate migration considerations and implementation challenges.
- Learn how other organizations have implemented client/server computing.

Course Features

- Understand the benefits and challenges of client/server computing.
- Learn how each element of the client/server model functions and contributes to the overall architecture.
- Understand how specific standards and products fit into the client/server model.
- Examine actual client/server installations.
- Understand the guidelines for migrating to a client/server environment.

Specifications

Course Length: 1 day

Audience: Technical managers and senior engineers who need to learn about the open client/server computing architecture

Prerequisites: Familiarity with open systems concepts and capabilities is recommended.

Delivery Method: Classroom, on site

Format: 100 percent lecture

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from a skilled HP instructor experienced in client/server technologies and concepts.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

- Evolution from centralized computing to client/server computing
- Definition of client/server computing and related terminology
- Common client/server applications
- Characteristics of efficient client/server systems
- Client/server architecture components
- Client hardware
- Server hardware
- Multivendor networking connectivity
- Application software
- Graphical user interface
- Client and server operating systems
- Programming languages
- Client/server computing benefits
- Client/server computing challenges
- Implementation options and guidelines
- Migration steps
- Case studies: client/server installations
- Future directions of client/server computing

Ordering Information

To order Client/Server Concepts and Capabilities (HP B2958S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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HEWLETT® PACKARD

Hands-On with Open Client/Server Technologies

Technical Data

Course Number
HP H5286S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This workshop educates you on a wide range of open systems technologies. Using the latest tools and technologies, build a standards-based, distributed application. Learn to choose the best tools for your environment and see how the latest open technologies work together. Also understand the HP open systems road map for implementing open systems.

Course Features

- Develop a working understanding of open technologies in the following areas:
  - Graphical user interfaces (GUIs)
  - System interoperability
  - Application interoperability
  - Open online transaction processing (OLTP)
  - Network management
- Learn to evaluate the trade-offs between key open technologies, tools, and products.
- Understand the process of creating distributed applications.
- Practice using available tools to develop and integrate a distributed application.
- Understand how open systems provide a viable computing solution today and in the future.

Specifications

Course Length: 4 days

Audience: Technology managers, senior engineers, and project leads who are responsible for selecting and guiding the implementation of open information technology solutions.

Prerequisites:
- Experience programming in C
- Experience in application development recommended
- Familiarity with editors
- Familiarity with open systems concepts
- Some network experience

Delivery Method: Classroom, onsite

Format: This course is 60 percent lecture and 40 percent lab exercise. The structure of the lab exercises reinforces the concepts presented in the lectures.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers.
- **Taught by experienced HP instructors.**
  - Learn from skilled HP instructors experienced in the latest open technologies and tools.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Open systems concepts, standards, and technologies:
  - Client/server architecture
  - Distributed computing architecture
- User interface concepts, technologies, and tools:
  - Survey of GUIs
  - Survey of tools for building GUIs
  - Tutorials on Open Software Foundation (OSF) Motif and Interface Architect
- Lab 1: Create a GUI

Day 2

- Application interoperability concepts, technologies, and tools
- Application programming with OSF Distributed Computing Environment (OSF DCE)
- Lab 2: Create an interface definition language (IDL) file
- Lab 3: Use remote procedure calls to test a sample client/server application

Day 3

- Lab 4: Integrate a GUI into a client/server application
- System interoperability concepts, technologies, and tools
- Lab 5: Network File System
- Distributed File System (DFS)
- OSF DCE security
- Lab 6: Using the Network Registry

Day 4

- Open OLTP technologies concepts, technologies, and tools
- DTP monitors: Encina, Open CICS, Tuxedo, and Top End
- Network management concepts, technologies, and tools
- OSF Distributed Management Environment (OSF DME)
- Lab 7: HP OpenView Network Node Manager

Ordering Information

To order Hands-On with Open Client/Server Technologies (HP H5286S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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HEWLETT® PACKARD

Survey of Distributed Computing Technologies

Technical Data

Course Number
HP H5864S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course educates you on a wide range of open distributed computing technologies. Survey today's standards, technologies, tools, and products, and find out how to choose the best alternatives for your environment. Learn how the latest distributed computing technologies work together. Also understand the HP open systems road map for implementing open distributed systems.

Course Features

- Develop a working understanding of open technologies in the following areas:
  - Graphical user interfaces (GUIs)
  - System interoperability
  - Application interoperability
  - Open online transaction processing (OLTP)
  - Network management
- Learn to evaluate the trade-offs between key distributed technologies, tools, and products.
- Understand the process of creating distributed applications.

Specifications

Course Length: 2 days

Audience: Any technical professional who is in the process of evaluating or implementing distributed computing technologies.

Prerequisites:
- Familiarity with the UNIX® operating system.
- Familiarity with open systems concepts.
- Experience using a network.

Delivery Method: Classroom, onsite

Format: 100 percent lecture

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from skilled HP instructors experienced in the latest distributed computing technologies and tools.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Open systems concepts, standards, and technologies:
  - Client/server architectures
  - Distributed computing architecture
- User interface concepts, technologies, and tools:
  - Survey of GUIs
  - Survey of tools for building GUIs
  - Open Software Foundation (OSF) Motif
  - Interface Architect
- Application interoperability concepts, technologies, and tools
- OSF Distributed Computing Environment (OSF DCE)

Day 2

- Open online transaction processing concepts, technologies, and tools:
  - Client/server computing models of transaction processing
  - X/Open distributed transaction processing (DTP) model
- DTP monitors: Encina, Open CICS, Tuxedo, and Top End
- System interoperability concepts, technologies, and tools
- Distributed File System (DFS)
- OSF DCE security
- Network management concepts, technologies, and tools
- OSF Distributed Management Environment (OSF DME)
- HP OpenView Network Node Manager

Ordering Information

To order Survey of Open Distributed Computing Technologies (HP H5864S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

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HEWLETT® PACKARD

The OSF Distributed Computing Environment Seminar

Technical Data

Course Number
HP H2594A

HP Educational Services: Your Key to Higher Productivity

Course Overview

This seminar provides an introduction to the distributed services and data-sharing services of the OSF Distributed Computing Environment (DCE) as well as an architectural overview. Learn that OSF/DCE is an integrated set of technologies that overcomes the barriers to distributed computing in a multivendor environment.

Course Features

- Learn an overview of Distributed Computing.
- Understand DCE architecture and its components.
- Understand threads.
- Understand Remote Procedure Calls.
- Learn different services available.
- Understand the Distributed File System components.

Specifications

Course Length: 1 day

Audience: Wide technical audience, including system programmers or application developers.

Prerequisites: Programming experience; knowledge of UNIX® recommended.

Delivery Method: Classroom, onsite

Format: 100 percent lecture

Education Benefits

- **Available at conveniently located hotels or by arrangement.**
  - Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor.
- **Comprehensive student manual.**
  - Receive a comprehensive student manual that can serve as a valuable reference.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

- Introduction to Distributed Computing
- DCE architecture
- DCE components
- Threads
- Remote Procedure Call
- Directory service
- Security service
- Time service
- Distributed File System
- Diskless support
- Personal computer integration
- DCE components summary
- Summary and conclusions

Ordering Information

To order The OSF Distributed Computing Environment Seminar (HP H2594A) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

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(818) 786-5800

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HEWLETT® PACKARD

HP Distributed Computing Environment Application Programming

Technical Data

Course Number
HP H5855S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This 5-day course helps application programmers learn to build distributed applications using the Open System Foundation (OSF) Distributed Computing Environment (DCE).

Course Features

- Learn about a distributed environment and its benefits.
- Understand the issues that arise when components of an application are distributed across a network.
- Learn about DCE services and how to use them within an application.
- Design a basic distributed application that uses the DCE remote procedure call (RPC) and other DCE services.
- Use the Interface Definition Language (IDL).
- Develop a basic client and a basic server.
- Compile, link, and run a distributed application.

Specifications

Course Length: 5 days

Audience: Experienced application programmers.

Prerequisites: Experience with C programming language plus knowledge of DCE concepts and terminology similar to that gained in the OSF Distributed Computing Environment Seminar (HP H2594S).

Delivery Method: Classroom, onsite

Format: 60 percent lecture, 40 percent labs

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Taught by experienced HP instructors.**
  - Learn from a skilled HP instructor experienced in client/server technologies and concepts.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1

- Application development DCE concepts and service components
- RPCs
- Design and distribution issues
- Using the IDL

Day 2

- Using DCE directory services
- Developing a server
- Developing a client

Day 3

- Programming to the DCE RPC
- Using RPC features lab

Day 4

- Using DCE security services
- DCE application development steps
- Using the distributed time service

Day 5

- Using the distributed file system
- Using threads

Ordering Information

To order HP Distributed Computing Environment Application Programming (HP H5855S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

HP-UX Network Administration: LAN Link, ARPA/Berkeley, NFS, and NIS

Technical Data

Course Number
HP H2564S

HP Educational Services: Your Key to Higher Productivity

Course Overview

This course teaches you how to configure LAN Link, ARPA/Berkeley, network file system (NFS) services, and network information services (NIS) on HP 9000 Series 300, Series 400, and Series 800 HP-UX systems.

Course Features

- Learn about networking concepts, components, and HP 9000 networking products.
- Learn to assemble and configure an HP-UX system local area network (LAN).
- Gain expertise on installing, configuring, and maintaining LAN Link, ARPA/Berkeley, NFS, and NIS services.
- Learn to troubleshoot ARPA/Berkeley and NFS services.
- Understand networking tools and commands, such as network backups, network updates, and remote spooling.

Specifications

Course Length: 4 days

Audience: Persons responsible for administering both systems and networks in an HP-UX environment. (The course covers HP 9000 Series 300, Series 400, and Series 800 tasks.)

Prerequisites: HP-UX Workstation Administration for the HP 9000 Series 300/400/700 (HP 51436S) or HP-UX System Administration for the HP 9000 Series 800 (HP 51482S) or HP-UX System Administration Basics (HP 50722S).

Delivery Method: Classroom, onsite

Format: This course is 60 percent lecture and 40 percent lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1
- LAN concepts
- LAN hardware
- Network connectivity configuration
- Network connectivity lab configuration

Day 2
- ARPA/Berkeley service review
- ARPA services configuration
- Additional ARPA services—BIND, send mail
- ARPA services configuration and usage lab

Day 3
- NFS concepts
- NFS configuration
- Additional NFS services—file locking, REX, VHE
- NFS configuration labs

Day 4
- Configuring NIS
- Troubleshooting
- Understanding network tools and commands
- Configuring NIS services
- Troubleshooting and tools labs

Ordering Information

To order HP-UX Network Administration: LAN Link, ARPA/Berkeley, NFS, and NIS (HP H2564S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

HP-UX Network Administration: LAN Link, ARPA/Berkeley, NFS, NIS, and Diskless

Technical Data

Course Number
HP H2550A

Course Overview

This course teaches you how to configure LAN Link, ARPA/Berkeley, network file system (NFS), network information server (NIS), and diskless clusters on Series 300, Series 400, and Series 800 HP-UX systems.

Course Features

- Learn to discuss networking concepts and components and identify HP 9000 networking products.
- Learn to assemble and configure a HP-UX system local area network (LAN).
- Gain expertise on installing, configuring, and maintaining LAN Link, ARPA/Berkeley, NFS, and NIS services.
- Learn to troubleshoot ARPA/Berkeley and NFS services.
- Understand networking tools and commands, such as network backups, network updates, and remote spooling.
- Learn to configure and administer nodes in a cluster environment.

Specifications

Course Length: 5 days

Audience: Persons responsible for administering both systems and networks in an HP-UX environment and persons responsible for administering diskless clusters. (The course covers Series 300, Series 400, and Series 800 tasks.)

Prerequisites: HP-UX System Administration for the HP 9000 Series 300 (HP 51436C) or HP-UX System Administration for the HP 9000 Series 800 (HP 51482C) or HP-UX System Administration Basics (HP 50722B).

Delivery Method: Classroom, onsite

Format: This course is 60 percent lecture and 40 lab exercises.

Education Benefits

- **Available at HP classrooms or your site.**
  - Take advantage of HP's dedicated learning facilities, equipment, and interactive learning environment by attending class at one of HP's education centers. Or, save travel expenses and time by organizing an onsite delivery at your location.
- **Extensive hands-on practice.**
  - Learn how to use the full capabilities of your system through hands-on lab exercises.
- **Taught by experienced HP instructors.**
  - Learn from an experienced instructor familiar with HP products.
- **Comprehensive student manual.**
  - Receive a valuable reference source to assist you when you are back on the job.
- **Regularly scheduled classes.**
  - Plan training months in advance.

Course Outline

Day 1
- LAN concepts
- LAN hardware
- Network connectivity configuration
- ARPA/Berkeley service review
- Network connectivity configuration lab
- ARPA services usage lab

Day 2
- ARPA services configuration
- Additional ARPA services—BIND, send mail
- NFS concepts
- ARPA services configuration lab

Day 3
- NFS and NIS configuration
- Additional NFS services—file locking, REX, VHE
- NFS and NIS configuration labs

Day 4
- Troubleshooting
- Understanding network tools and commands
- Introducing HP-UX clusters
- Troubleshooting and tools labs

Day 5
- HP-UX cluster configuration
- Cluster concepts and operation
- Cluster management
- CDFs creation
- Cluster configuration and management labs

Ordering Information

To order HP-UX Network Administration: LAN Link, ARPA/Berkeley, NFS, NIS, and Diskless (HP H2550A) in the U.S., call (800) HPCLASS [(800) 472-5277].

The HP Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as information about onsite delivery.

Outside the U.S., contact your nearest HP Customer Education Center or local HP sales office.

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HEWLETT® PACKARD

AppleTalk Services for the HP 3000

Technical Data

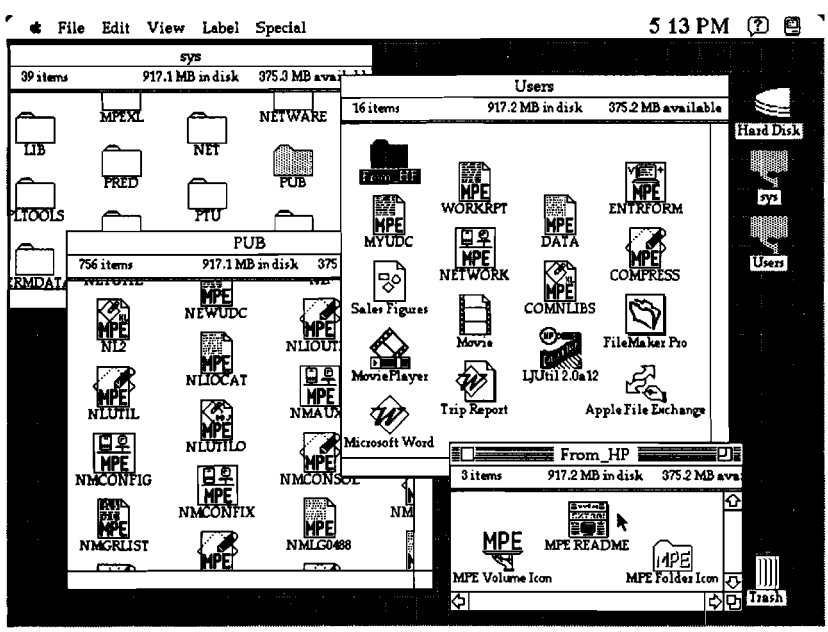
Product Number
HP J2244A

AppleTalk Services for the HP 3000 allows the HP 3000 Series 900 to act as an AppleShare compatible File Server for a network of Macintosh clients. To a Macintosh client, the HP 3000 Series 900 looks identical to a dedicated Macintosh running as an AppleShare version 2.1 File Server.

AppleTalk Services for the HP 3000 provides the AppleTalk protocol and AppleShare File Server services. The file services allow a Macintosh client to store files on the HP 3000 and share those files with other Macintosh clients, providing extended capacity in large Macintosh networks. AppleTalk Services for the HP 3000 provides high performance for bulk data transfers. Full AppleShare concurrency handling is provided, including byte-range locking.

In addition to AppleShare File Server services, AppleTalk Services for the HP 3000 provides other features including:

- **Access to MPE files.** Perusal and simple administration of the MPE file system is now easier than ever. Macintosh clients can directly access files residing in the POSIX file system of MPE. Files residing in the non-POSIX file system of MPE can also be accessed if the files are in MPE file format with fixed or variable lengths. AppleTalk Services for the HP 3000 file security is built on top of MPE file security. File access is governed by the user's MPE file access rights. MPE ASCII files appear as Macintosh text files.



Sample Screen containing MPE Files

- **Access to multiple volumes.** AppleTalk Services for the HP 3000 allows multiple volumes to be defined on the HP 3000. A Macintosh client can access one or more volumes simultaneously. Each volume (an MPE account, group, or directory in the POSIX file system) looks like a disk on the Macintosh. Each directory under that volume looks like a folder within that disk and individual files on the HP 3000 look like Macintosh files.

- **APIs**: Access to the AppleTalk protocol stack, including the ADSP, ASP, ATP, DDP, NBP, PAP, and ZIP is available. Access to ADSP and DDP protocols is available through the industry-standard TLI interface.

- **MPE based security**. Access to Apple and MPE files is governed by the user's MPE access rights. No "special" user logins are required to use AppleTalk Services for the HP 3000.

  AppleTalk Services for the HP 3000 is supported over Ethernet LANs using EtherTalk Phase II. Clients connecting from other networks (such as TokenTalk or LocalTalk) require appropriate gateways or bridges.

Connecting to AppleTalk Services for the HP 3000 server requires only the AppleShare client software (version 6.0.8 or later) included with Macintosh system software. No additional software is required. On the HP 3000, MPE/iX 5.0 and a 802.3 LANIC card are required.

Terminal Services

Virtual terminal access is provided by terminal emulation products such as HP Advancelink for the Macintosh or one available from an HP Value-added Business.

Print Services

AppleTalk Services for the HP 3000 does not support print services (i.e. printing to a printer attached to the HP 3000,) since most Apple printers are already connected to the network, printers can be shared by the Macintosh clients without the HP 3000.

Maximum Connections

AppleTalk Services for the HP 3000 currently supports a maximum of 50 logged in users.

Requirements

Macintosh (Macintosh Plus or later)

- System (version 6.0.8 or later)
- Finder (version 6.0.8 or later)
- AppleShare Client (version 6.0.8 or later, included with System Software)
- 1MB memory

HP 3000 Series 900

- MPE/iX 5.0
- 802.3 LANIC
- 32MB memory
- 20K sectors (about 5MBytes) free disk space

Installation Policy

AppleTalk Services for the HP 3000 is a customer installable product. The product includes license to use and documentation. The server software is supplied on an MPE/iX subsystem tape. (API documentation available to developers on request.) Installation instructions are included in the HP 3000 MPE/iX Installation and Update Manual supplied with the MPE/iX tape.

Environment

The HP 3000 must be connected to the same EtherTalk Phase II network as the Macintosh clients. An alternative is to route the data through an EtherTalk Phase II compatible router.

Support Products

Contact your local HP sales representative for further information on software and network support options.

Ordering Information

HP J2244A: AppleTalk Services for the HP 3000

0B0 Delete Manual

User License Options
UA3 8-user license
0AF 20-user license
UA7 32-user license
0AA 50-user license

Upgrade Credit Options
UB3 Credit for 8-user license
UD8 Credit for 20-user license
UB7 Credit for 32-user license

API information is available to developers upon request.

Documentation

The following documentation is provided with AppleTalk Services for the HP 3000:

J2244-90000 AppleTalk Services Installing and Administering Guide

Printed in USA M1093
5091-9389E