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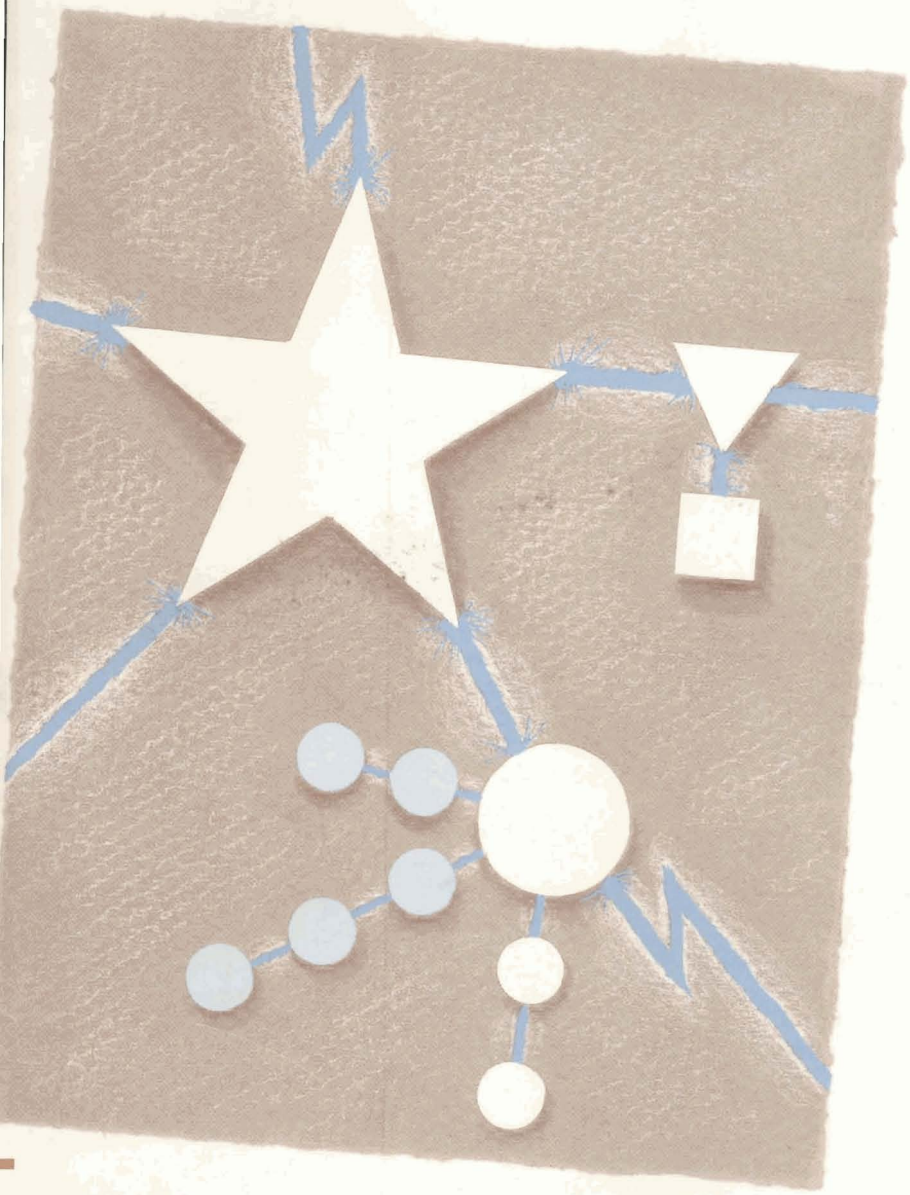

May 1992

Product data sheets
for Hewlett-Packard
networking solutions

HP Networking Communications Specification Guide

Important Information about this Specification Guide

1. This edition replaces the April 1991 HP Networking Communications Specification Guide, the August 1991 Addendum, and all other previous networking specification guides.

2. Please see page v for a description of how the May 1992 guide is organized.

Notice

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

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

Please note that the HP 3000 MPE/iX operating system is a superset of the MPE XL operating system. All MPE XL products function in an MPE/iX environment without modification.

See page v 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. Figure files were created using HP Graphics Gallery and HP scanners. The final document was printed from HP LaserJet Series III output. For further information on the production of this guide contact Chris Caldwell at HP's Information Networks Division.

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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 ten functional categories:

1. HP Domain Systems
2. HP 9000 Systems
3. HP 3000 Systems
4. HP 1000 Systems
5. HP Vectra Personal Computer
6. Network Hardware
7. Voice and Data Integration
8. Network Management
9. Network Support Services and Training
10. Software Licenses

Within the first four 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 four categories, products are grouped according to categories appropriate to the functional area.

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

OSI/De Facto Multivendor Services

HP Services

IBM Connectivity Services

IBM Connectivity Links

HP 3000 Systems

Terminal/Printer Device Connectivity

Local Area Links

Wide Area Links

OSI/De Facto Multivendor Services

HP Services

IBM Connectivity Services

IBM Connectivity Links

HP 1000 Systems

Terminal/Printer Device Connectivity

Local Area Links

Wide Area Links

OSI/De Facto Multivendor Services

HP Services

IBM Connectivity Services

HP Vectra Personal Computer

Links

Services

Network Hardware

Local Area Networks (LANSs)

Wide Area Networks (WANs)

Extended LANs

Voice and Data Integration

Network Management

OpenView Development Environment

OpenView Applications

Network Test & Measurement Instrumentation

Network Support Services & Training

Software Licensing

HEWLETT PACKARD

Apollo IEEE 802.3 (Ethernet)

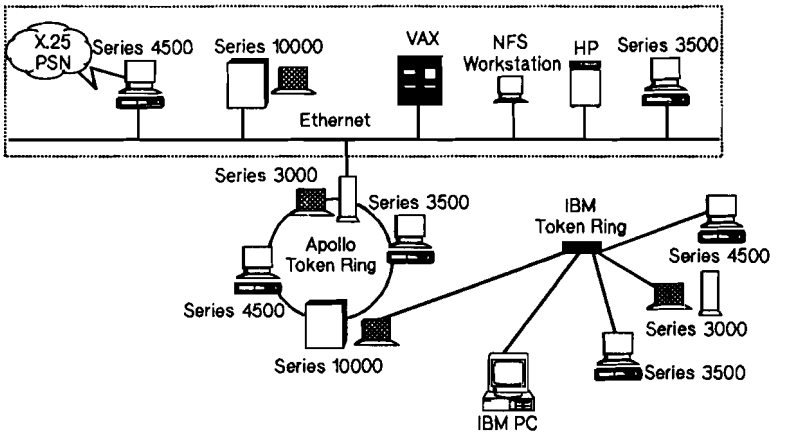
Technical Data

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-per-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 IEEE 802.5 (IBM Token Ring)

Technical Data

Product Number
A-NET-ITR

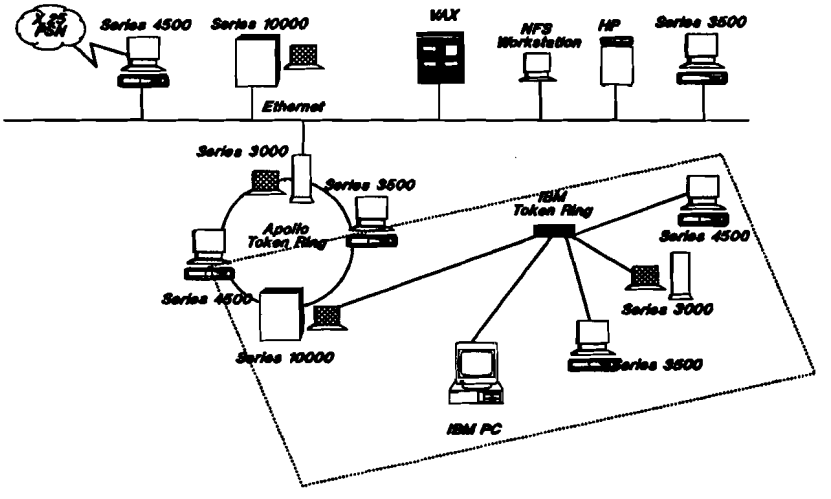
Description

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

HEWLETT PACKARD

Apollo Token Ring Network

Technical Data

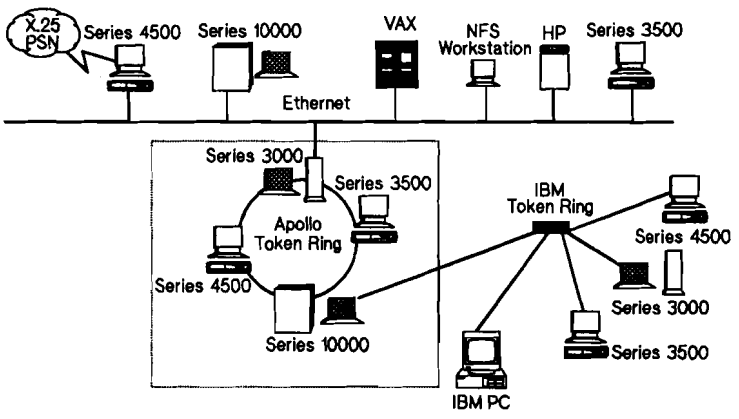
Product Numbers
A-NET-ATR
V-NET-ATR

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 fiberoptic 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

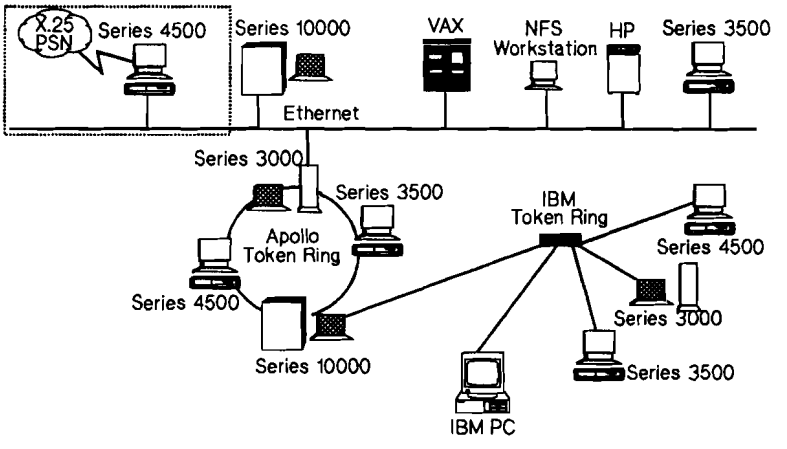
Product Number
LA67A

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 CRP (Create Remote Process) 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 stand-alone 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

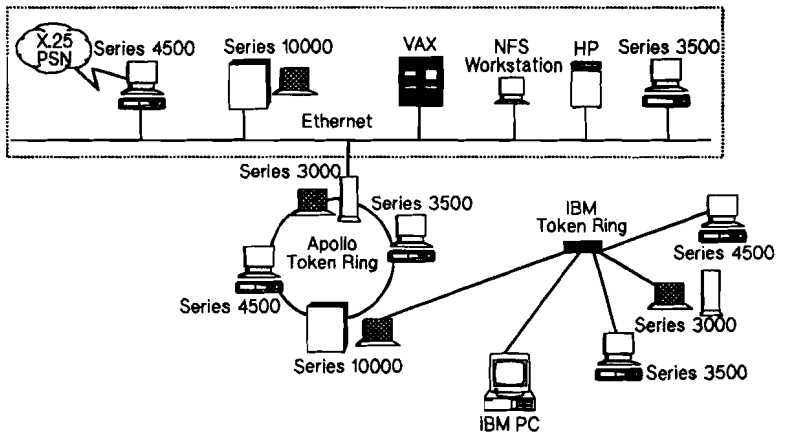
Technical Data

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 (ie, 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
D-8543-B Configuring and Managing TCP/IP Products
D-8667-B Using TCP/IP Network Applications

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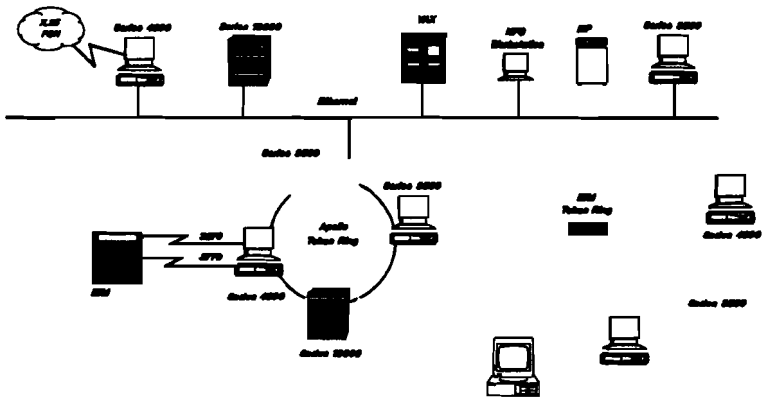
Apollo/Integrated SNA Facility

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 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 the Channel Controller-AT communications controllers.

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.

The Channel Controller-AT is a communications controller providing high-speed data transfer (up to 3 Mbits per second) between an Apollo workstation with a PC-AT compatible bus and an I/O map to connect to an IBM System/370 I/O interface multiplexer channel.

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.
- The Apollo/Integrated SNA Facility and Channel Controller-AT attached to the mainframe support line speeds up to 3 Mbps.
- 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 and can manage 255 SNA sessions per link.

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 single Apollo workstation holds a maximum of four Serial Controller-AT communications controllers (total of eight connections). Each Serial Controller-AT communications controller requires one slot.

A workstation holds a maximum of two Channel Controller-AT communications controllers (total of 16 connections). Each Channel Controller-AT product requires two slots. The product supports up to eight subchannel addresses, and thereby up to eight emulated PU 2.0 nodes to the host.

The Serial Controller-AT communications controller and Channel Controller-AT communications controller can be installed in the same workstation.

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

The Channel Controller-AT communications controller supports speeds up to 3 Mbits 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

Apollo/Integrated SNA LU 6.2

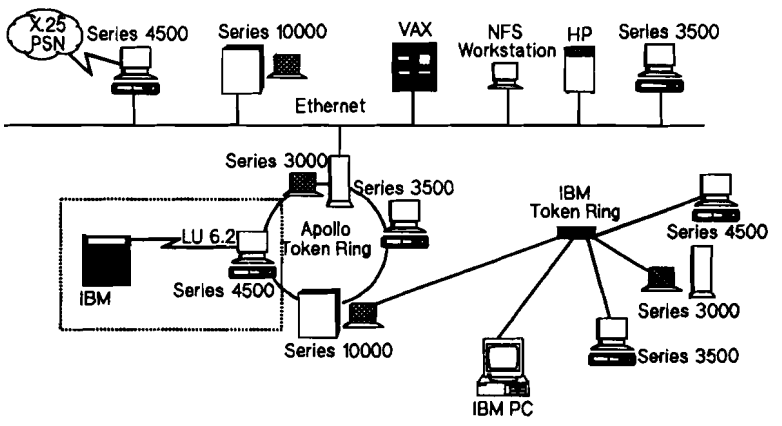
Technical Data

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

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.

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

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 3270

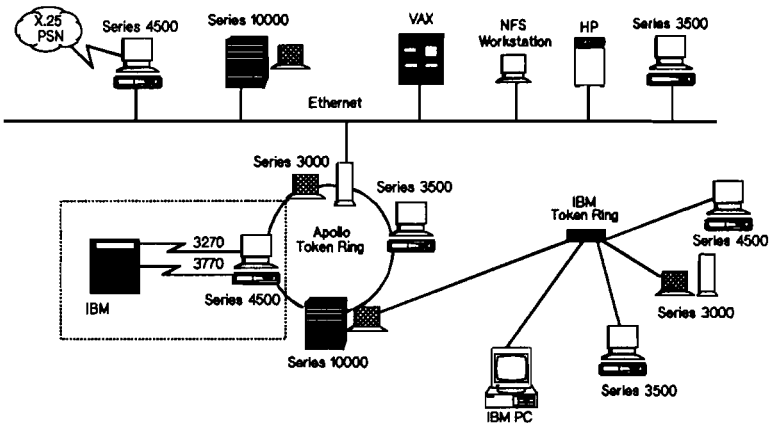
Technical Data

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.



The Apollo/Integrated SNA Facility provides the major features of an IBM 3274 cluster control unit and the four lower levels of SNA, when coupled with the SNA communications controller.

The Apollo/Integrated SNA 3270 product requires the Apollo/Integrated SNA Facility software and an SNA communications controller, either the Serial Controller-AT communications controller in an AT bus-equipped gateway node, or the Channel Controller-AT communications controllers.

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.

The Channel Controller-AT is a communications controller providing high-speed data transfer (up to 3 Mbits per second) between an Apollo workstation with a PC-AT compatible bus and an I/O map to connect to an IBM System/370 I/O interface multiplexer channel.

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 Channel Controller- AT). 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

Option:
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

Serial Controller-AT

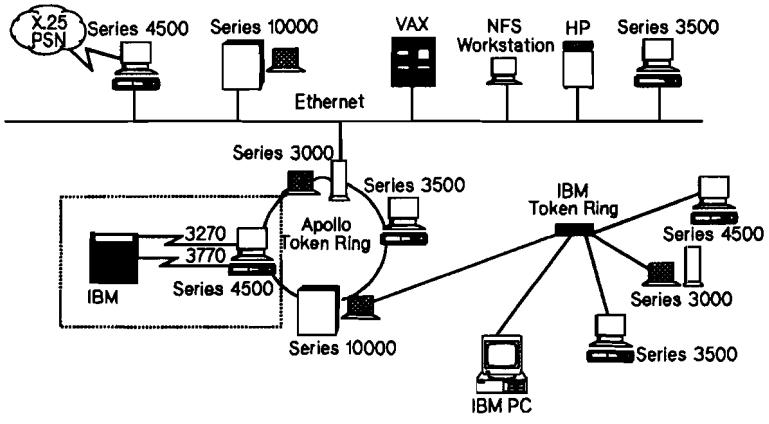
Technical Data

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

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.

Documentation

D-11904-O Installing the Serial Controller-AT

HEWLETT PACKARD

Asynchronous FIFO Interface

Technical Data

For CIO-based HP 9000 Series 800 Systems Product Number 27114B

The HP 27114B Asynchronous FIFO Interface (AFI) provides a high-speed parallel connection between a CIO-based HP 9000 Series 800 System and an external device.

The interfacing flexibility of the HP 27114B is enhanced over the HP 27114A by increased FIFO control (using a FIFO counter), more handshaking modes, and more control and status lines.

The Hardware Reference Manual and User's Design Guide provide detailed information on hardware operation, hardware-software interaction, and writing application software. Documentation includes application notes and performance information.

HP 27114B is plug-compatible with the HP 27114A in all supported applications where standard HP-UX drivers are used.

Features

- Backward-compatible with supported applications of 27114A
- Detailed Hardware Reference Manual and User's Design Guide
- Handshaking modes: Full mode (both master and slave) and FIFO master mode
- FIFO buffering using a 24-bit FIFO counter*
- Differential or single-ended line drivers/receivers**
- Separate data input and output lines
- 8- or 16-bit transfers, half-duplex operation
- Up to 6 each, user-configurable control and status lines
- FIFO buffer is up to 64 words for input, up to 58 words for output ** for single-ended transmission, order option 003

* FIFO Buffer is up to 64 words for input, up to 58 words for output.

** For single-ended transmission, order option 003.

Documentation

Reference Manual: provides detailed information on installation, configuration, and theory of operation. This manual also includes hardware troubleshooting information and schematics and PAL equations.

Programmer's Guide: provides detailed information on hardware-software interaction and writing application software for the HP 27114B.

Application Notes: provide examples of HP 27114B AFI connection to itself, a Centronics-type device, and a generic-type device. The application notes also include sample application programs. These notes are included with the manuals and are also available separately (P/N 5958-9044).

Performance Note: provides detailed performance test information on specific configurations of the HP 27114B. This note is included with the manuals and is also available separately (P/N 5958-9045).

Functional Specifications

Handshaking Modes

The HP 27114B supports three handshaking modes to accommodate the protocols of various external devices.

Full Master Mode: The full master mode handshake can be used with external devices that require the host to wait for an acknowledge from the device before the host can initiate a data transfer.

Full Slave Mode: The full slave mode handshake is useful when the external device connected to the AFI card must be the master of the handshake. This mode allows hardware support of AFI-to-AFI communication (one card uses the full master mode, and the other uses full slave mode).

FIFO Master Mode: This mode can be used with external devices that do not need to acknowledge a host's request to transfer data before the transfer occurs. This mode is the same as the pulsed mode used by the 27114A.

Data Transfer

Protocol: Transfer either 8 or 16 parallel bits at a time. The backplane channel can operate either in byte mode or word mode.

Maximum Transfer Rates: The theoretical maximum transfer rate is 4.3 Mbytes/second. Actual transfer rate is system and block size dependent. For complete information on transfer rate testing, please refer to the HP 27114B Performance Note (P/N 5958-9045).

HP 27114B AFI cabling

All HP 27114B cables come standard with connectors on both ends. The reference manual describes how to cut and custom wire the cables. A special male wire-wrap connector is also included.

- Maximum distance differential mode: 12 meters
- Maximum distance single-ended mode: 3 meters

Line Characteristics

Signal Lines *Table 1*

RD	[15:0]	Read Data Bus
SD	[15:0]	Send Data Bus
PCTL		Peripheral Control Output
PFLG		Peripheral Flag Input
CTL	[3:0]	Control Output Lines
STS	[3:0]	Status Input Lines
PDIR/CTL5		Peripheral Direction Output/Control Output 5
ATTN/STS5		Attention Input/Status Input 5
HEND/CTL4		Host End Output/Control Output 4
PEND/STS4		Peripheral End Input/Status Input 4

Backplane Polling

The HP 27114B is a CIO group 0 polling device, and therefore must be placed in slots 0 through 7. The default system slot is slot 5.

Logic Sense: Logic sense in single-ended mode transmission can be configured by the user as specified in the reference manual. Logic sense in differential mode can be configured by custom wiring the cable or external peripheral.

Control and Status Bit Communication

CTL [5:0] Control Output: User-configurable control output lines are available to send information from the AFI card to the external peripheral. CTL [3:0] are always available as control lines, while CTL[4] and CTL[5] can be alternatively configured as HEND and PDIR respectively.

STS [5:0] Status Input: User-configurable status input lines are available to receive information from the external peripheral to the AFI card. STS [3:0] are always available as status lines, while STS[4] and STS[5] may be configured as PEND and ATTN respectively.

PDIR Peripheral Data Direction Output: PDIR defines the data transfer direction (incoming or outgoing). The user may select either PDIR or CTL[5].

ATTN Attention Input: An asynchronous interrupt line from the external peripheral. The user may select either ATTN or STS[5].

HEND Host End Output: The AFI card asserts HEND when the last output transfer is about to begin or when the last input transfer has just occurred. The user may select either HEND or CTL[4].

PEND Peripheral End Input: The peripheral device asserts PEND to signal the end of the incoming or outgoing transfer. The user may select either PEND or STS[4].

Environmental Characteristics

The HP 27114B operates in any CIO-based HP 9000 Series 800 System under the operating temperature, humidity, and altitude specifications specified for the system.

Physical Characteristics

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

Weight:
Interface Card, 243 grams (8.5 oz)
3 meter cable, 440 grams (15.5 oz)

Electrical Characteristics

Direct Current Requirements

Voltage: +5 volts
Typical Current: 2.63 amps
Two standard deviation current: 2.8 amps

Line Termination Requirements (receivers):

Single-ended Mode: Equivalent of 220W/330W voltage divider (330W to GND)

Differential Mode: 120 W between + and – lines

The HP 27114B requires the following external device specifications (table 2).

External Device Specifications *Table 2*

	Minimum	Maximum	Typical
External Device Line Driver Requirements (HP 27114B uses 26LS32B Line Receivers)			
Single-ended Mode:			
VOH at IOH = -2.67 mA (max)	2.4 V		
VOL at IOL = 24 mA (max)		0.4 V	
Differential Mode:			
|VOD| at RL = 120Ω	2.0 V		
VOC at RL = 120Ω		3.0 V	
External Device Line Receiver Requirements (HP 27114B uses MC3487 Line Drivers)			
Single-ended Mode:			
VIH	2.0 V		
VIL		0.8 V	
IIH		20.0 μA	
IIL		-0.4 μA	
Differential Mode:			
VICM (common mode voltage)		+7.0 V	
VTH (differential input threshold voltage)		0.2 V	
VTL (differential input threshold voltage)		0.2 V	
VHYS (hysteresis voltage)			50 mV
II at VI = 15 V		1.2 mA	
II at VI = -15 V		-1.7 mA	

Ordering Information

The HP 27114B includes:

27114-60101 Printed Circuit Assembly
27114-63001 3-meter terminated cable
1252-1643 96 pin male wirewrap connector
27114-90004 Reference Manual
27114-90003 Programmer's Guide
5958-9044 Application Notes
5958-9045 Performance Note

HP 27114B Options:

0B0 Deletes Reference Manual (27114-90004), Programmer's Guide (27114-90003), Application Notes (5958-9044), and Performance Note (5958-9045)

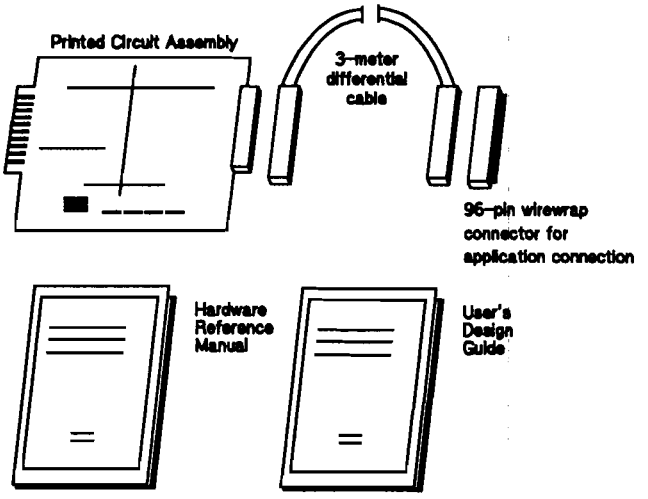
002 Adds loopback test hood (27114-60002)

003 For single-ended transmission, adds 6 single inline pin resistor packs (1810-0906 and 1810-0677)

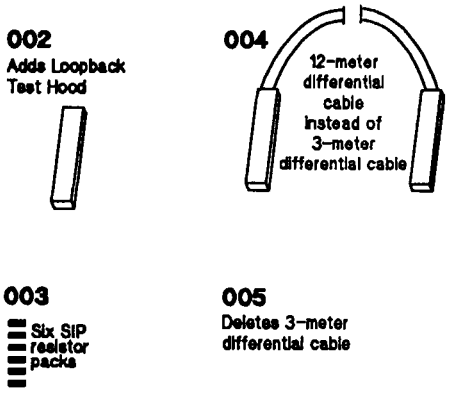
004 Replaces 3-meter terminated cable (27114-63001) with 12-meter terminated cable (27114-63003)

005 Deletes 3-meter terminated cable (27114-63001)

Standard Items



Options



HEWLETT PACKARD

Data Communications Interface

Technical Data

For HP 9000 Series 300 Computer Systems Product Number 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 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 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 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

HEWLETT PACKARD

Direct I/O Asynchronous 8-Channel Multiplexer

Technical Data

Product Number
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,

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

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	1.8A	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 the HP Direct Marketing Division (DMK).

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

Channel I/O Asynchronous 16-Channel Multiplexer

Technical Data

Product Number 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.

Supported Signal Lines: (See table 1)

***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

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

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" Cartridge Tape. This option is not required for HP-UX 8.0 or later.

AA1 ½" 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

HEWLETT PACKARD

HP-PB 16-Channel Asynchronous Multiplexers

Technical Data

Product Numbers
HP J2092A, J2093A, J2094A

The 16-channel Asynchronous Multiplexers provide a means to connect up to sixteen asynchronous serial devices to PA-RISC HP9000 Series 800 Computers which use the HP-PB (Hewlett-Packard Precision Bus) as their primary system input/output bus (8x2 and 8x7 Series) and have HP-UX operating system version 8.0 or later installed.

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

The 16-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

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 three 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 with the use of loopback hood supplied with the product
- Online diagnostic tools are also available to support engineers to troubleshoot the card

Features specific to the **J2092A** product:

- EIA RS-232-C and V24/V28 compatibility for data only connections (no modem control) on default DB-25 female standard connectors provided with the product, or on customized connection scheme
- 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 DB-25 female standard connectors provided with the product, or on a customized connection scheme. This allow the operation of RS-423 & RS-422 devices such as HP terminals (HP700/32, HP700/92, HP700/94, HP2392A) 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 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-channel Asynchronous Multiplexers comprise three major functional assemblies:

- The MUX card: A single width HP-Precision Bus card that interfaces with the system backplane
- Two "distribution panels" (8 ports each) offering standard DB-25 connectors for peripheral attachment. For the J2092A and J2093A products, they are known as "Direct Distribution Panel - DDP." For the J2094A product, they are known as "Active Distribution Panel - ADP II." These distribution panels can be rack mounted in standard 19" bays. (Refer to the section "related products" of this data sheet for more details)

  Optionally, these distribution panels can be removed for the direct connect multiplexers - J2092A, J2093A - thus allowing the MUX to be linked to any type of connectors or cabling scheme (i.e. RJ11, RJ45, punch panels, data switches...). See "functional specification" section of this data sheet for connector pin-out.
- The link cable between the MUX card and the distribution panels (4 meters).

At the heart of the HP 16-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 DB-25 connectors of either the DDP or ADP II 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	1
AB	102	SG	Signal Ground	N/A	7	7
BA	103	SD	Transmit Data	O	3	3
BB	104	RD	Receive Data	I	2	2
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 DB-25 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	--	1
Transmit Data (+)	O	15 & 16
Transmit Data (-)	O	17 & 3
Receive Data (+)	I	19 & 14
Receive Data (-)	I	25 & 2

Note: The pins 15, 17, 19, 25 provide compatibility with the RS-423 interface. The signals are also provided on pins 16, 3, 14, 2 to offer an interface compatible with the standard mechanical interface: RS-530.

To allow flexible and customized cabling scheme using connectors other than the default DB-25 connectors distribution panels, the direct connect products - J2092A, J2093A - offer on the MUX card a single sub-D high density 78 pins connector (female) for the 16 ports. To facilitate cable realization, a 78 pins connector (male, to crimp) is supplied with the product when the default distribution panels are deleted through the product option (see ordering information below)

Pin-out of the 78 Pins Connector:

Naming convention for the pin name in the table:

- Each of the 16 ports use up to 4 wires
  - **NtxP** = Transmit Data (-) output signal
  - **txP** = Transmit Data (+) output signal (GROUND for RS-232-C)
  - NrxP = Receive Data (-) input signal
  - **rxP** = Receive Data (+) input signal (not used for RS-232-C)
- Where P is the port number (from 0 to 15). The pins unused in the connector are noted: NA

Name	Pin No	Name	Pin No
Ntx8	A1	Ntx9	C1
Nrx8	A2	Nrx9	C2
Ntx10	A3	Ntx11	C3
Nrx10	A4	Nrx11	C4
Ntx12	A5	Ntx13	C5
Nrx12	A6	Nrx13	C6
Ntx14	A7	Ntx15	C7
Nrx14	A8	Nrx15	C8
NA	A9	NA	C9
NA	A10	NA	C10
NA	A11	NA	C11
NA	A12	NA	C12
Ntx0	A13	Ntx1	C13
Nrx0	A14	Nrx1	C14
Ntx2	A15	Ntx3	C15
Nrx2	A16	Nrx3	C16
Ntx4	A17	Ntx5	C17
Nrx4	A18	Nrx5	C18
Ntx6	A19	Ntx7	C19
Nrx6	A20	Nrx7	C20
tx8	B1	tx9	D1
rx8	B2	rx9	D2
tx10	B3	tx11	D3
rx10	B4	rx11	D4
tx12	B5	tx13	D5
rx12	B6	rx13	D6
tx14	B7	tx15	D7
rx14	B8	rx15	D8
NA	B9	NA	D9
NA	B10	NA	D10
NA	B11	NA	D11
tx0	B12	tx1	D12
rx0	B13	rx1	D13
tx3	D14	tx2	B14
rx3	D15	rx2	B15
tx4	B16	tx5	D16
rx4	B17	rx5	D17
tx6	B18	tx7	D18
rx6	B19	rx7	D19

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. In addition, 38400 bits/s is supported with J2092A and J2093A products.

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

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)

Throughput: The 16-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 product is usually bundled with the system when purchased with the system option 60x, however, it may also be purchased, as an add-on product as can the J2093A and J2094A products. All three products are customer installable, however, customers can choose to purchase installation services from Hewlett-Packard if they wish.

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 ADP II status (power-on and link) of J2094A.

A customer diagnostic utility is available to perform verification of each port data path through the use of a loopback hood provided with the product.

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

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

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
ADP II 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 5062-3066)	215 mm (8.47 in.)	100 mm (3.94 in.)	30 mm (1.18 in.)	0.7kg

Electrical Specifications

Direct Current Requirements:

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

Ordering Information

The 16-channel RS-232-C direct connect multiplexer (J2092A) with DB-25 connectors is bundled with the HP 9000 Series 800 systems when ordered with the system option 60x (refer to the HP9000 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

Software media options (MUST

add one of them for use in a system running HP-UX 8.0):

AA0 software on ¼" cartridge tape
AA1 software on ½" magnetic tape
AAH software on DDS cartridge

Interface option (can order with J2092A, J2093A products):

1BZ delete the DB-25 port connection kit" (cable and DDPs)

The J2092A includes the following assemblies:
- 1 * MUX card: J2092-60001
- 1 * link cable: 5062-3052
- 2 * DDP: 5062-3066
- 1 * loopback hood: 5181-2030
- 1 * installation manual: 5959-4972

The J2093A includes the following assemblies:
- 1 * MUX card: J2093-60001
- 1 * link cable: 5062-3052
- 2 * DDP: 5062-3066
- 1 * loopback hood: 5181-2030
- 1 * installation manual: 5959-4972

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

Related Products

The DDP and ADP II are standalone boxes but may be rack mounted in standard cabinets such as the 46298B/C (EIA 19 inch x 1m or x 1.6 m) especially when used in large configurations.

A DDP/ADP Rack Installation Kit has been designed specially to install the DDP/ADP into the above cabinets. Refer to the D2350A 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.

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

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

	Recommended	Also supported
ADP II connected to a modem	40233A	92219Q
ADP II connected to a terminal (without hardware flow control)	40234A	40242Y, 13242Y 40242M, 13242M 13242N
DDP (RS-232) connected to a terminal	40234A	40242Y, 13242Y 40242M, 13242M, 13242N

Note: A DDP or ADP II 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

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 by a selftest error message.

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

Direct I/O HP-IB* Interface

Technical Data

Product Number
98624A

The HP 98624A HP-IB* Interface card implements the IEEE 488-1978 (and the supplement IEEE 488A-1980) Standard Digital Interface for Programmable Instrumentation. The interface can communicate with as many as 14 HP-IB compatible instruments connected with a maximum of 20 meters (65.5 feet) of cable.

Functional Specifications

Input/Output Lines

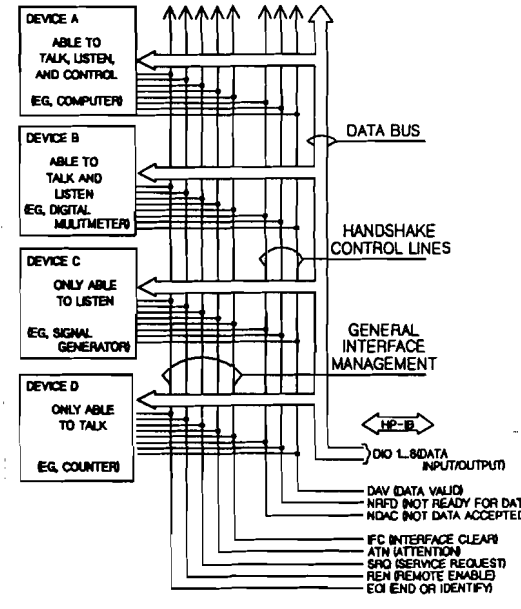
Either bi-directional data lines provide data input/output; three lines are for control and five lines are used for Interface Management. (see figure 1)

Maximum Transfer Rates

See table 1 for transfer rates for the HP 98624A HP-IB interface and the internal HP-IB that is standard on the system.

Interface Functions

The chart below specifies the level of implementation in terms of IEEE 488-1978 mnemonics. The Device Trigger, Device Clear, and Remote/Local state responses are achieved by programming the Series 200 computers for end-of-line interrupts on those conditions.



* 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.

Maximum Transfer Rates *Table 1*

	Input (bytes/s)	Output (bytes/s)
BASIC 2.0		
Handshake	42 K	65 K
BASIC Advanced Program Binary Capability		
Interrupt, burst	40 K	55 K
Fast handshake	110 K	80 K
DMA, regular	340 K	270 K
HPL 2.0		
Interrupt	6 K	6 K
Fast read/write	42 K	70 K
DMA, regular	330 K	230 K

Interrupt Capability *Table 2*

The internal and 98624A HP-IB are capable of generating interrupts under the following conditions (Pascal has no interrupt capabilities):

	HPL	BASIC
Controller addressed	X	X
Talker addressed	X	X
Listener addressed	X	X
Service Request (SRQ) detected	X	X
Parallel Poll configuration change		X
EOI received		X
Serial Poll active		X
Remote/Local configuration change		X
MY Address mode change		X
Group Execute Trigger received	X	X
Source handshake error		X
Unrecognized universal command		X
Unrecognized address command		X
Secondary command received		X
Device Clear received	X	X
Interface Clear detected	X	X

DMA Capability

The internal and HP 98624A HP-IB interfaces are optionally capable of carrying out DMA transfer via the two-channel HP 98620A DMA Controller Card. Byte Mode DMA and Regular (no Burst) DMA transfers are supported.

Source Handshake	SH1
Acceptor Handshake	AH1
Talker	T6
Listener	L4
Service Request	SR1
Remote/Local	RL1
Parallel Poll	PP1
Device Clear	DC1
Device Trigger	DT1
Controller	
System Control	C1
IFC & Take Charge	C2
REN	C3
Respond SQR	C4
Miscellaneous control	C5
Drivers	E2

Interrupt Capability

See table 2.

Switched Configuration

The following switches are configurable:

Select Code: The factory select code setting is 8 (select code 7 for internal HP-IB); valid select codes settings are:

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

Interrupt Level: The factory priority level setting is 3 (internal HP-IB level is 3); valid interrupt level settings for the HP 98624A are from 3 to 6.

Interface Bus Address: A 5-bit talker/listener address. The factory-set bus address for the HP 98624A is 21 decimal (21 for internal HP-IB; if the computer is not a system controller, then its default bus address will be 20); the HP 98624A card can have a bus address setting from 0 to 30.

System Controller: A 1-bit switch allows the HP 98624A interface to act as a system controller or nonsystem controller. The factory setting is system controller.

Ordering Information

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

The HP 98624A includes:
98624-66501 HP-IB Interface
98624-90000 Installation Note

Compatible Cables from Direct Marketing Division
10883A 1-meter (3.3 ft) cable
10833B 2-meter (6.6 ft) cable
10833C 4-meter 13.2 ft) cable
10833D 0.5-meter (1.6 ft) cable

Fuse for Replacement/Spare: 2110-0712

HEWLETT PACKARD

HP Precision Bus HP-IB* Interface

Technical Data

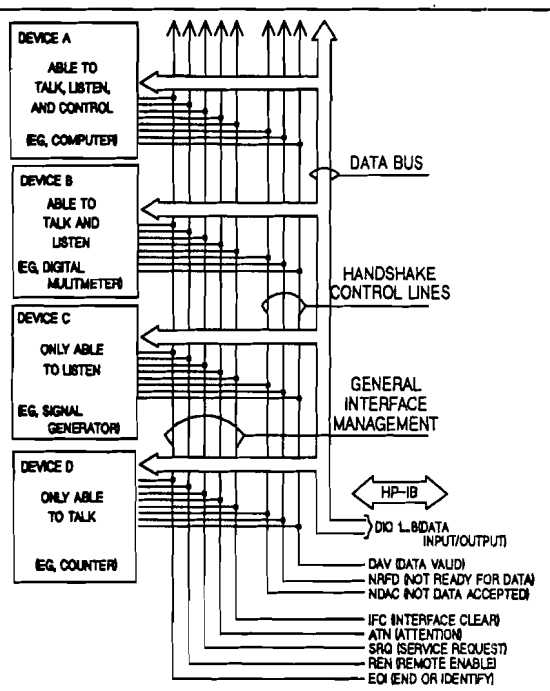
For HP-PB based HP 9000 Series 800 Computer Systems Product Number 28650B**

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.

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: IOCTL 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.

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

HEWLETT PACKARD

EISA HP-IB* Adapter

Technical Data

For HP Apollo 9000 Series Computer Systems Product Number 25560A

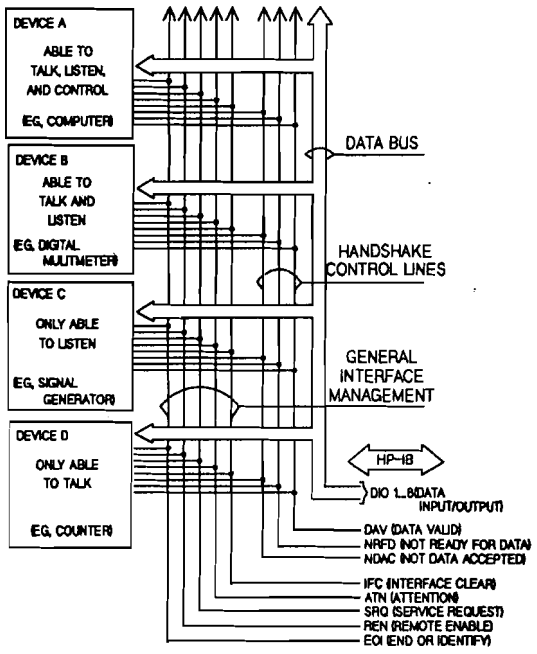
The HP 25560A EISA HP-IB* host adapter allows customers to connect supported HP-IB devices to HP Apollo 9000 Series 700 systems**.

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
25525A

The HP 25525A 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 25525A 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 25525A 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 25525A 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 25525A

- 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 25525A 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 25525A. 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 (P/N 5091-1198EUS) 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

HEWLETT PACKARD

Direct I/O Programmable Data Communications Package

Technical Data

Product Numbers
98690A and 98691A

The Programmable Datacom Interface product provides a spectrum of capabilities that can be tailored to meet special datacom and/or serial interfacing needs. The product consists of two pieces – the PDI Development Package, HP 98690A, and the Programmable Datacom Interface Card, HP 98691A. The Development Package contains the essential information and tools required by a sophisticated user to do firmware programming of the Programmable Datacom Interface (including source listing of self-test). The Programmable Interface Card is a microprogrammable serial interface which is intended to be a foundation for designing application-oriented communications products. It is based on the Z-80 CPU, Counter Timer Chip, and Serial I/O Chip.

Features

- Z-80A CPU microprocessor control
- One Z-80A CTC Counter Timer Chip for timing and baud rate generation
- 4 Kbytes of Dynamic RAM (supports up to 16K)
- 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
  - Capability for two independent RS-232-C primary channels
- One EPROM/ROM socket capable of using 2712s, 2732s, 2764s, and similar devices up to a maximum of 32 Kbytes
- Supports EIA RS-423, EIA RS-422, EIA RS-232-C
- Internal loopback of clocks and transmitted data under firmware control for self-test

Functional Description

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 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.

RAM

Two RAM sockets for onboard memory allow 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. The card comes standard with 4 Kbytes of RAM and will accommodate up to 16 Kbytes.

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
- Parity, overrun, and framing error detection

Optional generation of a vectored interrupt:

- 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 (HDLC)

Z-80A Counter Timer Chip Characteristics

Channels: Four independently programmed channels used for programmable general-purpose system timer, and baud rate generator for SIO channel A.

Baud rate limits are:

Asynchronous: max 57.6 K, min 50 baud
Synchronous: max 460.8 K, min 50 baud
Synchronous External: max 736 Kbaud

Note: that the speed of transmission depends on and may be limited by the type of firmware protocol implemented.

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: Eight input lines with balanced or unbalanced receivers.

Output Lines: Four output lines that can be driven by unbalanced or balanced line drivers.

Electrical Characteristics

Card power consumption:

+5V	720 mA typical
+12V	37 mA typical
-12V	60 mA typical

Accessory power consumption (supplied by the computer):

Data Link Adapter, HP 13264A

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

300 Baud Modem, HP 13265A

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

Current Loop Interface, HP 13266A

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

If these pods are used, care must be taken not to exceed the power specifications of the I/O backplane.

Support Policy

Because the PDI card is a customizable system, the customer must assume responsibility for its support. Consequently, there is no Service Contract applicable to the PDI product. If the PDI product develops problems, it will be the responsibility of the customer to diagnose and replace both its hardware and firmware. The self-test source listing in the PDI Development Package (98690A) 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 PDI card. It is suggested the customer maintain spare cards which can be swapped by the customer if a problem arises in the field.

Ordering Information

Note: It is strongly recommended that purchase of the HP 98691A for program development be done jointly with the purchase of the HP 98690A PDI Firmware Development Package.

Earliest Language Versions Required:
BASIC 2.0, Pascal 1.0, or user-written driver

HP 98690A Development Package

The HP 98690A includes:

09826-66544 PC Extender
5061-4247 Test Connector
5061-4248 Test Connector
98628-90001 Installation Manual
98690-90001 Firmware Development Guide

HP 98690A Options:

630	PDI Document Package on 3½-inch floppy
650	PDI Document Package on 5¼-inch floppy for external drive
655	PDI Document Package on 5¼-inch floppy for internal drive

HP 98691A Programmable Serial Interface Card

The HP 98691A includes:

98691-66502 PDI Interface
98628-90001 Installation Manual

HP 98691A Options:

001	4.9-meter (16 ft) RS-232-C DTE (male) cable (5061-4215) with test connector (1251-6625)
002	4.9-meter (16 ft) RS-232-C DCE (female) cable (5061-4216) with test connector (1251-6624)
003	4.9-meter (16 ft) RS-449/423 DTE (male) cable (5061-4250) with test connector (5061-4220)

Fuse for Replacement/Spare:
2110-0712

HEWLETT PACKARD

Direct I/O RJE Interface

Technical Data

For HP 9000 Series 300 Computer Systems Product Number 98641A

The HP 98641A RJE Interface is used to allow a Direct I/O-compatible host computer system to simulate an IBM 2780 or 3780 workstation. This permits the host HP computer to be used as a Remote Job Entry (RJE) station for batched-job communication with IBM 360/370 (or compatible) computers using IBM Bisync protocol.

The interface features a plug-in card incorporating micro-processor intelligence that offloads ALL communications overhead from the host. This means the interface card performs all protocol generation and interpretation, as well as modem control tasks and pre-processing functions such as character conversion, blocking, and deblocking.

The specific needs of many different applications are met by selecting programmable configuration parameters.

Communications status and statistics, as well as hardware self-test provides complete monitoring and check out of the interface.

Features

- Direct I/O RJE provides communications for allowing a host computer with complementary software to simulate an IBM 2780 or 3780 Remote Job Entry workstation
- Is supported with computers that utilize the Direct I/O architecture running the HP-UX operating system
- Makes it possible to communicate with other standard IBM 2780/3780 emulators
- Offloads all RJE communications overhead from the host computer
- Operates over modems at data rates up to 64 Kbits/s
- Meets EIA RS-232-C specifications and is compatible with CCITT V.24 or CCITT V.35
- Supports Bell type 208B, 209A, and 212 data sets or equivalent
- Works with full or half-duplex modems and supports auto answer and originate
- Provides link control functions: line bid, normal, and transparent data modes, all responses, and link termination
- Assures data integrity with CRC error checking on all data blocks
- Meets specific application needs with configurable parameters and special character handling
- Accumulates long-term communication statistics
- EBCDIC character set recognized
- Has built-in hardware self-test

Functional Description

Direct I/O RJE provides a communication link used by a host HP computer to transmit batch jobs and receive output from a processor that can support standard IBM 2780/3780 devices. Additionally, one can use the Direct I/O RJE link to exchange files between a host HP computer and other processors that simulate standard IBM 2780/3780 devices.

Direct I/O RJE works with modems over switched and non-switched lines. The maximum data rate supported by the interface is 64 Kbits/second, but the interface also operates slower rates to accommodate different modems (Bell Type 208B, 209A, and 212).

Link control is managed entirely by the on-Card microprocessor. All functions including line bid, normal, and transparent data modes, as well as all responses (ACK/NAK/WACK/ TTD/RVI) and link termination are implemented by the card upon request by software in the host computer.

Card parameters and special character handling may be configured from the host computer or allowed to retain their default values.

Configurable parameters include: Record and block sizes, timeouts, retry counts, conversion tables, record separators, formatting functions, and others.

Special character handling includes: Character code translation, automatic record terminations, adding and stripping of record and block separator sequences, blank truncating and padding, and blank compression and expansion.

To assist in line quality and link troubleshooting, the Direct I/O RJE interface card accumulates communication statistics. A continuous trace log can collect all sent or received link control characters and independently collect all sent or received data characters. One may collect the link control characters trace log without also collecting the data characters trace log, thus permitting link troubleshooting without violating data security. A trace log also collects all internal firmware state changes.

A resident interface self-test, initiated upon reset, is provided with the Direct I/O RJE Interface.

Functional Specifications

Direct I/O RJE meets all requirements for communication allowing simulation of the 2780/3780 systems.

Direct I/O RJE does not recognize horizontal tabulation and vertical forms control codes. This capability, when it exists, must be host resident.

Ordering Information

The HP 98641A includes:

98641-66502 PSI Card
5061-4215 5-meter RS-232-C modem cable with a 25-pin DTE male connector
98641-90001 Installation Manual

HP 98641A Option:

001 V.35 PSI Card (98641-66510) with 5-meter V.35 cable (5062-3301) and test hood (5062-3302), and Installation Manual (98641-90005)

A self-test loopback connector for optional use with the on-Card self-test is available. Order HP part number 1251-6625.

HEWLETT PACKARD

Direct I/O RS-232 Serial Interface

Technical Data

For HP 9000 Series 200/300 Computer Systems Product Number 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 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 98644A uses a standard 25-pin female DTE connector instead of the 50-pin connector used in the 98626A.
- The 98644A will not support the following connection products: 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 98644A does not provide power through its 25-pin connector.
- The 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's Direct Marketing Division (DMK).

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

Direct I/O Serial Interface

Technical Data

For HP 9000 Series 300 Computer Systems Product Number 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
Ouptut	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

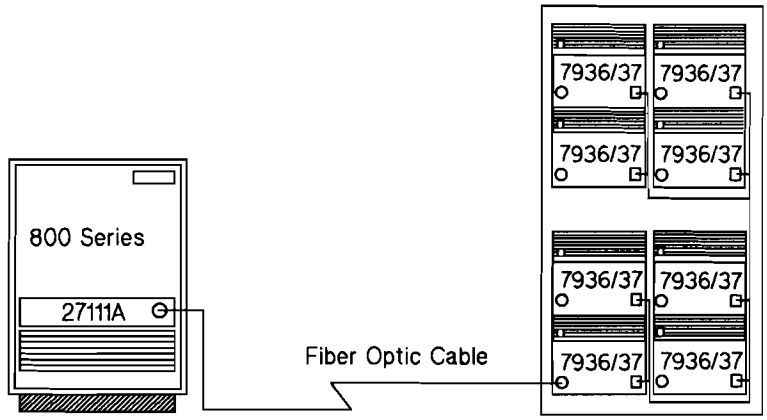
Fiber-Optic Peripheral Interface

Technical Data

For HP 9000 Series 800 Computer Systems Product Number 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

From HP Finance and Remarketing Division (FRD):

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

Four-Channel Asynchronous Multiplexer

Technical Data

For HP 9000 Series 200/300 Computer Systems
Product Number 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

HEWLETT PACKARD

GPIO Interface

Technical Data

For HP 9000 Series 300 Computer Systems Product Number 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

High-Speed Disk Interface

Technical Data

For HP 9000 Series 300 Computer Systems
Product Number 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

High-Speed RS-422 Interface

Technical Data

For HP 9000 Series 300 Computer Systems
Product Number 98659A

The HP 98659A High-Speed RS-422 Interface allows high-speed transfer of object code between HP 9000 Series 300 computers and HP 64700 Series emulators, and provides the communication link between the HP 64700 Series emulator and the user at the HP 9000 Series 300. The 98659A allows the HP 64700 Series emulator to be an effective, high-performance component of the HP 64000-UX Advanced Integration Environment. The HP 98659A interface card is used with HP 9000 Model 320, 330, 350, 360, and 370 computers.

Features

- Asynchronous serial RS-422 communications
- Optimized for communication links with HP 64700 Series emulators
- Supports data transfer rates up to 460,800 baud
- Data formats of 5, 6, 7, or 8 bits/character and 1 or 2 stop bits
- Selectable odd, even, or no parity

Functional Specifications

The 98659A is a character device using block mode structures to improve performance when transferring large amounts of data. It is not a standard TTY type device.

Baud Rates Supported

The following data rates are supported with internal clocking:

50	75	150
200	300	600
1200	1800	2400
4800	7200	9600
19200	57600	230400
460800		

External Clocking:
- EXTA is an external 16X clock
- EXTB is an external 1X clock

Character Size: 5, 6, 7, 8 bits

Stop Bits: 1 or 2

Parity: Odd, Even, None

Handshaking:
- Supports HP 64700 Series Hardware Handshaking Protocol
- Xon/Xoff pacing at baud rates up to 19200

Modem Control:
- DTR and DSR
- CTS is used only to control output pacing
- RTS is used as a reverse channel CTS
- Does not support CCITT modem control protocol

Input Processing Supported:
- Canonical EOF, EOL, and LF processing
- Non-Canonical Time and Minimum Character processing

Internal Buffers on Card:

- Write Buffer is 6144 bytes
- Read Buffer is 8192 bytes or 255 lines when in Canonical input mode

Electrical Specifications

HP 98659A power consumption (typical):

+5 V at 710 mA
+12 V at 37 mA
-12 V at 60 mA

Electrical Interface Compatibility: RS-422 (similar to CCITT V.11)

Physical Description

Size: 13.5 cm by 17.0 cm (5.3 in by 6.6 in)

Weight: 310 grams (11 oz)

Environmental Characteristics: See SCSI Peri Host Adapter

Operating Temperature: 0°C to 45°C (32°F to 113°F)

Relative Humidity: 0% to 80% noncondensing

Ordering Information

HP 98659A includes:

5-meter cable (terminates in 25-pin male connector for use with HP 64700 Series emulators)

HEWLETT PACKARD

HP Precision Bus SCSI/Parallel Host Adapter

Technical Data

For HP 9000 Series 800 HP-Computers
Product Number 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

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.

28655A Accessories:
5061-6565 Loopback Hood

HEWLETT PACKARD

HP JetDirect Cards for UNIX® Network Peripheral Interface

Technical Data

For HP-UX, SunOS, and SCO UNIX® Systems
Product Numbers
C2059T, C2071T, and C207

- **TCP/IP Ethernet**
- **For HP LaserJet II, IID, III, IIID, and IIISi Printers**
- **For HP DesignJet Plotter**

Introducing the interface designed specifically for directly connecting your HP LaserJet printer or HP DesignJet plotter to a UNIX® Ethernet network.

HP's JetDirect cards avoid the slowdowns caused by standard serial or parallel interfaces. Your peripheral connects directly to your network and thus takes advantage of much faster network data transmission speeds.

There are no external boxes to install and no additional client workstation software to interfere with your applications. There are no restrictions on where you can connect your peripheral. Instead, simply slide the HP JetDirect card into your HP peripheral's I/O slot and connect it to your network cabling. Load the host software, run a configuration utility, and you're done. It's that simple.

Peripheral location: anywhere you want it
Your HP peripheral can be located where it's wanted; where it's needed; where it's most convenient. Connect it to your network the same way you'd connect a new workstation or PC. Users can now enjoy instant access to the peripheral. Administrators can centralize network servers for optimum network support and security, free from restrictions on serial and parallel cable lengths.

Performance: tuned for maximum network performance
The network peripheral interface delivers a high performance connection to your HP peripheral, faster and more efficient than standard serial or parallel interfaces. The interface improves performance for both graphics and complex documents, especially in the case of the HP LaserJet IIISi printer that requires a faster interface to support it. Server loading is minimized by transferring data in large blocks, rather than the one-byte-at-a-time loading of parallel-connected peripherals.

Compatibility: plug right in
HP JetDirect cards let you plug directly into UNIX networks with systems running HP-UX, SunOS (SPARCsystem line only), and SCO™ UNIX. The peripheral fits right in with the "look and feel" of your existing network. The interface is compatible with standard SNMP-based network management applications.

Integration: no more sacrifices
Unlike many software-based network printing/plotting solutions, HP JetDirect cards have no effect on client PCs or workstations. No extra client software is required, so your PCs and workstations are freed up to handle your applications. Unlike most hardware-based network printing/plotting

solutions, the interface is fully integrated—free of serial cables, parallel cables, print-server boxes, or power supplies that clutter your work area. This also eliminates the performance bottlenecks imposed by serial or parallel connections to your peripheral.

Go with the leader: HP

Because the HP JetDirect cards come from HP, you can standardize on HP printing and plotting solutions across a wide range of operating environments, with the versatile family of HP LaserJet printers and the HP DesignJet plotter—all backed by the reliability, service, and support you've come to expect from HP. For MIS managers, end-users, and everyone in between, that's the best network connection of all.

RFI Regulations

FCC Level A
FTZ-1046/84 (Germany)
VCCI Class I (Japan)
CISPR-22 Class A (Europe)
EN-55022-Class A (Europe)

Safety

EN 60950 (IEC 950 for Europe)
UL 1950 (U.S.)
CSA C22.2 No. 950 (Canada)

Ordering Information

Number	Network Type	Operating System	Connectors and Cabling
For the HP LaserJet IIISi Printer and the HP DesignJet Plotter:			
C2059T	TCP/IP Ethernet	HP-UX 7.X, 8.X*, SunOS 4.1.1**, and SCO UNIX V/386 3.2.2***	BNC port supports 10Base2 thin coaxial cable AUI port supports 10Base5 thick coaxial cable, 10Base-T twisted-pair cable via twisted-pair transceiver (such as the HP 28685B EtherTwist Transceiver)
For the HP LaserJet II, IID, III, and IIID Printers:			
C2071T	TCP/IP Ethernet (Thin Ethernet)	HP-UX 7.X, 8.X*, SunOS 4.1.1**, and SCO UNIX V/386 3.2.2***	BNC port supports 10Base2 thin coaxial cable
C2071S	TCP/IP Ethernet (10Base-T)	HP-UX 7.X, 8.X*, SunOS 4.1.1**, and SCO UNIX V/386 3.2.2***	RJ-45 port supports 10Base-T twisted-pair cable

* Current version of HP-UX depends on the HP 9000 system being used.
** SunOS 4.1.1 is supported only on Sun SPARCsystems.
*** SCO UNIX V/386 3.2.2 is supported directly by The Santa Cruz Operation Inc. Necessary software, documentation, and support is available only from The Santa Cruz Operation Inc.
Note: Interface is installed by the end-user into the peripheral's I/O slot.

Product Options: Media *(one must be specified)*
#AA0: ¼ inch Cartridge Tape for HP-UX
#AAH: DAT (DDS) Tape for HP-UX
#AAV: ¼ inch Cartridge Tape (QIC 24) for SunOS
#1AK: No media tape included

HEWLETT PACKARD

Fiber-Optic SCSI Extender

Technical Data

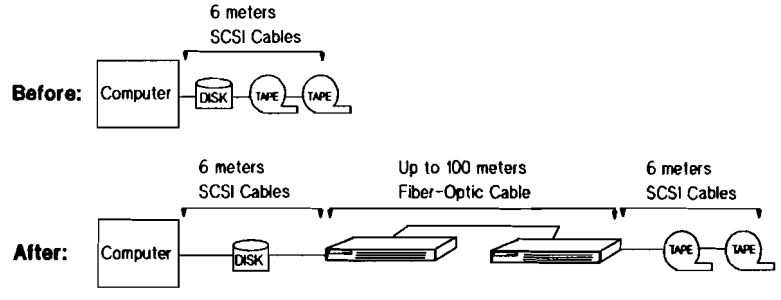
For HP 9000 Series 800 and HP 3000 Series 900 Computer Systems Product Number 28643A

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

* 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

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

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

HEWLETT PACKARD

HP-IB* Interface for HP 9000 Series 500/800 Computer Systems

Technical Data

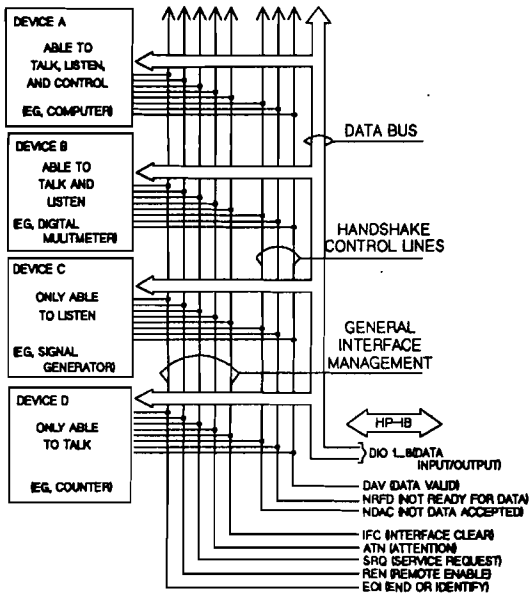
For HP 9000 Series 500/800 Computer Systems
Product Number 27110B

The HP 27110B HP-IB* Interface allows connection of up to 14 HP-IB compatible devices to HP 9000 Series 500/800 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.

Features

- 980 Kbyte/s high-speed, 500 Kbyte/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**
- Parity check and Cyclic Redundancy Check-16 for error detection
- Support of Command Set 80 protocol for CS/80-based disks and tapes
- Simple implementation of computer-controlled instrumentation and peripheral systems
- Selectable HP-IB controller or slave capabilities
- Firmware-based self-test to help ensure interface integrity
- Programmatically enabled or disabled parallel poll mode

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.

** 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 27110B 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 27110B 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 980 Kbytes/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: A two-position switch enables HP 27110B 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, RL2, PP1, DC1, SH1, AH1, T1, TE1, L1, LE1, DT1, E2. TE1 and LE1 require host system support.

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.

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 Lenth (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 27110-90005).

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 27110B.

Electrical Specifications

Voltage	Current	Power Dissipation
+5V	1.8A	9.0 W
+12V	35 mA	0.42 W

Physical Characteristics

Size: 17.3 cm long by 17.2 cm wide (6.80 in by 6.75 in)

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% at 40°C (104°F)

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

Ordering Information

The HP 27110B includes:

27110-60301 HP-IB Interface Card for HP 9000 Series 500/800
27110-63001 2-meter HP-IB Cable
27110-90005 Installation Manual for HP-UX Systems
30070-00043 HP-IB Backplate

HP 27110B Options:

0B0	Delets Reference Manual
800	Substitutes 4-meter HP-IB Cable

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

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

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.

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

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

SCSI Peripheral Host Adapter

Technical Data

For HP 9000 Series 800 CI(
Computers
Product Number
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 through Complementary Products Sunnyvale (CPS).

HEWLETT PACKARD

SCSI Peripheral Host Adapter

Technical Data

For HP 9000 Series 300 DIO Computers
Product Number 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, part number 5951-6796.

HEWLETT PACKARD

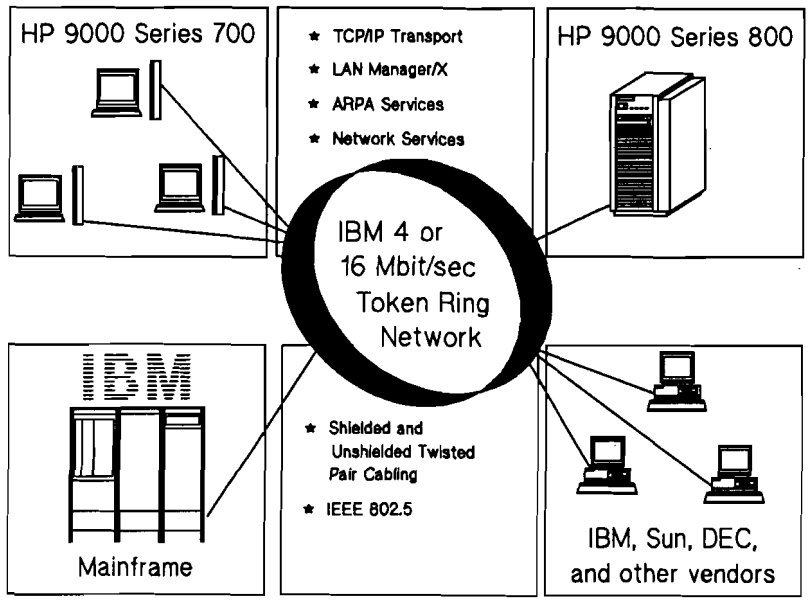
HP Token Ring/9000 for Series 700 Computers

Technical Data

Product Number
J2165A

HP Token Ring/9000 provides all the necessary hardware to interface between an HP 9000 Series 700 computer and a HP Token Ring Local Area Network. Also included in this link product is networking software corresponding to Layers 2 through 5 of the Open Systems Interconnection (OSI) Reference Model 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.

HP Token Ring/9000 Features

- A complete link connection to the HP Token Ring network, which includes hardware and transport software
- Full interoperability with IEEE 802.5 and IBM Token Ring
- 4 Mbits/second or 16 Mbits/second burst transfer rate
- Network transport software based on de facto industry-standard Defense Advanced Research Projects Agency (DARPA) protocols, corresponding to the transport and network layer functions
- 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 STP (Shielded Twisted Pair) cable that plugs into a Multi-station Access Unit (MsAU). The HP Token Ring adapter also comes with an RJ45 connector for UTP (Unshielded Twisted Pair) 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.

Features

- Uses TMS380C16 TI Token Ring communication processor
- Uses 256K bytes of DRAM space for MAC code and data storage
- Operates as bus master, tranferring 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 software corresponding to Layers 2 through 5 of the Open System Interconnection (OSI) Reference Model. The link layer, corresponding to layer 2 of the OSI model, consists of the link level IEEE 802.5 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 Networking Layer, corresponding to OSI Layer 3, is based on the ARPA Internet Protocol (IP). IP provides fragmentation and reassembly of data as well as internal addressing.

The Transport Layer, corresponding to OSI Layer 4, is based on the ARPA Transmission Control Protocol (TCP). TCP provides end-to-end reliable, connection-oriented services with flow control and multiplexing. TCP has mechanisms for detecting duplicate, lost, or out-of-sequence packets. Layer 4 also provides the User Datagram Protocol (UDP) supported by BSD IPC. UDP

- Network transport software based on de facto industry-standard Defense Advanced Research Projects Agency (DARPA) protocols, corresponding to the transport and network layer functions
- 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 IEEE 802.5 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 Multi-station Access Unit (MsAU). 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 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.

Features

- Uses TMS380C16/04 TI Token Ring communication processor
- Uses 512K bytes of DRAM space for MAC code and datastorage
- 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.

Software Components

HP Token Ring/9000 includes software corresponding to Layers 2 through 5 of the Open Systems Interconnection (OSI) Reference Model. The link layer, corresponding to layer 2 of the OSI model, consists of the link level IEEE 802.5 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 Networking Layer, corresponding to OSI Layer 3, is based on the ARPA Internet Protocol (IP). IP provides fragmentation and reassembly of data as well as internal addressing.

The Transport Layer, corresponding to OSI Layer 4, is based on the ARPA Transmission Control Protocol (TCP). TCP provides end-to-end reliable, connection-oriented services with flow control and multiplexing. TCP has

mechanisms for detecting duplicate, lost, or out-of-sequence packets. Layer 4 also provides the User Datagram Protocol (UDP) supported by BSD IPC. UDP provides an unacknowledged datagram service.

BSD Sockets is an interface between the upper layers and the product's transport proto-cols. BSD Sockets enable customers to establish peer-to-peer communications between pro-cesses running on HP 9000 computers and processes running on other systems using BSD 4.2 or later.

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 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 MsAUs 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," part number J2166-61001 and the "Quick Installation Guide," part number J2166-61002.

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 8X7 computer systems. The product supports up to two Token Ring adapter cards per system on the Series 8X7.

Ordering Information

HP Token Ring/9000 for the Series 8X7 includes the Token Ring adapter card, the Token Ring software driver and TCP/IP transport, 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

J2166A – HP Token Ring/9000

The HP Token Ring/9000 product (J2166A) must be ordered with a hardware option, a processor software option, and a media option. The hardware option (without a processor software option or a media 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
AEL License to use on Tier 2
AE5 License to use on Tier 3
AE6 License to use on Tier 4
AEN License to use on Tier 5
AEP License to use on Tier 6
AH1 License to use on Tier 7

Media Options (may choose one):

AA0 1/4-inch cartridge tape
AA1 1/2-inch magnetic tape (1600 bpi)
AAH Digital Audio Tape (DAT)

Software Upgrade Options (may choose one):

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

Processor Upgrades:

OGR for return credit for Tier 1
OGE for return credit for Tier 2
OC8 for return credit for Tier 3
OGS for return credit for Tier 4
OGT for return credit for Tier 5
OGU for return credit for Tier 6

HEWLETT PACKARD

HP FDDI/9000 for Series 700 Computers

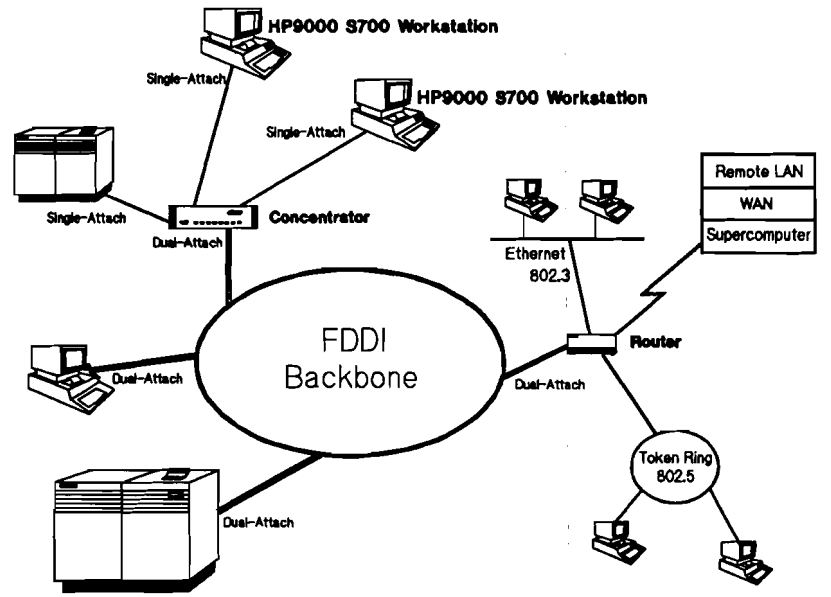
Technical Data

Part Number
J2156A

HP FDDI/9000 for Series 700 Computers provides EISA bus Series 700 computers with a Single Attach Station (SAS) connection to the ISO standard 9314 Fiber Distributed Data Interface (FDDI) network. HP FDDI/9000 for Series 700s is fully compliant with the ISO 9314 standard, providing an optical interface to the 100 Mbps FDDI network.

HP FDDI/9000 for Series 700s consists of a single EISA board and driver software. HP FDDI/9000 for Series 700s is supported on the following HP 9000 Series 700 computers: Model 720, Model 730, and Model 750.

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 700 Computers provides:

- An FDDI Single Attach Station
- A native EISA-based FDDI connection
- An adapter requiring a single EISA slot in an HP 9000 Series 700 Computer
- 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 700s 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 700 requires a concentrator to connect the Series 700 computer to the FDDI network.

Dual Attach Stations are connected to both of the rings and provide fault tolerance by allowing the rings to "wrap" in the event of a ring failure. Concentrators are used with Single Attach Stations and provide the interface to the dual ring architecture. The concentrator maintains the fault tolerant capability. HP FDDI/9000 for the Series 700 is compliant with any vendor's concentrator product meeting the ISO standard 9314.

HP FDDI/9000 for Series 700s includes the software license to use, the EISA FDDI Single Attach Station adapter, the EISA FDDI Adapter Installation manual, the Installing and Administrating FDDI/9000 Software manual, and the EISA FDDI Quick Start Installation and Configuration Guide.

Three components of the HP FDDI/9000 Series 700 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.

<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 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.

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 700 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 700 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
- EISA bus master DMA controller
  - supports EISA type C DMA cycles
- EISA bus master/slave interface
- 25 MBps EISA burst DMA rate
- FDDI MIC (keyed) connector
- Multimode fiber optic cable required
- 25 MHz on-board 68030 processor
- 128K by 16 read-only memory
- 32K on-board data buffering
- 64K by 32 zero-wait-state SRAM
- Second generation FDDI chip set

Environmental Characteristics

Class B2
Temperature: 0° to 40° Celsius
Humidity: 15% to 95% relative humidity

Installation Policy

Prior to installing HP FDDI/9000 for the Series 700, the customer is responsible for completing the following:

- Properly installing HP-UX 8.07 on the HP 9000 Series 700
- Properly installing FDDI wiring
- Properly attaching and configuring all necessary networking devices, including concentrators and cables

HP FDDI/9000 for the Series 700 is customer installable and configurable. The basic installation steps include powering down the computer, installing the EISA FDDI/9000 adapter and cables, re-installing the EISA FDDI/9000 adapter assembly, 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 8.07 is required.

Please order HP FDDI/9000 for Series 700 Computers as follows:

J2156A HP FDDI/9000 for Series 700 Computers

Option 1AW Delete software license-to-use and documentation
(Requires previous purchase of J2156A with software license-to-use)

The HP J2156A standard product includes:

J2156-60001 EISA FDDI Single Attach adapter
J2156-13601 Digital Audio Tape (DAT) media
5957-4629 License to Use
J2156-90001 EISA FDDI Adapter Installation Manual
J2156-90004 EISA FDDI Quick Start Installation and Configuration Guide
J2156-90003 Installing and Administering HP FDDI/9000 Software

If purchasing a second FDDI adapter, order J2156A with option 1AW. Previous purchase of J2156A with the software license-to-use is required to order option 1AW.

One HP FDDI/9000 Series 700 adapter is supported in the Model 720 and Model 730. Two HP FDDI/9000 Series 700 adapters are supported in a Model 750.

The HP FDDI/9000 Series 700 adapter occupies one EISA slot in a Series 700 computer. For the Model 720, the EISA upgrade kit must be purchased. The EISA upgrade kit may be purchased either as an option to the Model 720 or as a standalone product (P/N A1986A).

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 HP FDDI/9000 for the Series 700 to the concentrator. A standard FDDI MIC connector cable can be purchased from any distributor with the length to be determined by the customer.

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 has been provided, but the interconnection from a wall jack to the network adapter card has not.

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

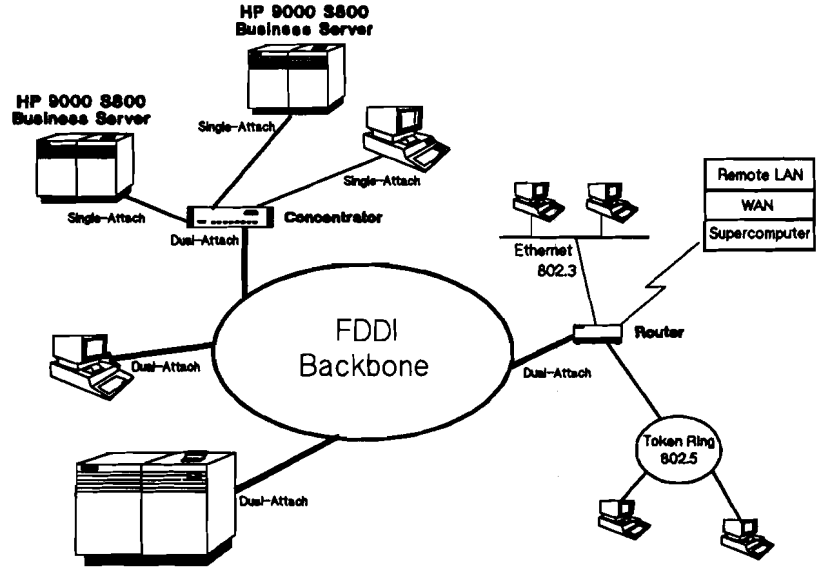
HP FDDI/9000 for Series 800 Business Servers

Technical Data

Part Number
J2157A

HP FDDI/9000 for Series 800 Business Servers provides a Single Attach Station (SAS) connection to the ISO standard 9314 Fiber Distributed Data Interface (FDDI) network for HP 9000 Series 800 Business Servers. 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:

- A 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.

Dual Attach Stations are connected to both of the rings and provide fault tolerance by allowing the rings to "wrap" in the event of a ring failure. Concentrators are used with Single Attach Stations and provide the interface to the dual ring architecture. 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 Installation and Configuration Guide, and the Installing and Administrating FDDI/9000 Software manual.

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.

<table>
<tr><td>Application</td><td colspan="2" rowspan="5"></td></tr>
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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.

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 (USA)
- 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:

J2157A HP FDDI/9000 for Series 800 Business Servers

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

Hardware Option

AL4 HP-IB FDDI Single Attach Adapter

Processor Software Options (may choose one)

AH0 Software Right-to-Use on the Model 807 and Model 817
AEL Software Right-to-Use on the Model 827 and Model 837
AE5 Software Right-to-Use on the Model 847 and Model 857
AE6 Software Right-to-Use on the Model 867 and Model 877
AEN Software Right-to-Use on the Model 887 and Model 897
AEP Software Right-to-Use on the Model 890/100 and Model 890/200
AH1 Software Right-to-Use on the Model 890/300 and Model 890/400

Media Options (may choose one)

AA0 ¼" cartridge tape (Release 8.02 only)
AA1 ½" magnetic tape (1600 bpi)
AAH Digital Audio Tape (DAT)
AA4 QIC (Quarter Inch Cartidge)

Software Upgrade Options (may choose one)

0GR Return credit for the Model 807 and Model 817
0GE Return credit for the Model 827 and Model 837
0C8 Return credit for the Model 847 and Model 857
0GS Return credit for the Model 867 and Model 877

0GT Return credit for the Model 887 and Model 897

0GU Return credit for the Model 890/100 and Model 890/200

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 AL4 includes:

28670-60001 HP-PB FDDI Single Attach adapter
5957-4629 License to Use
28670-90001 HP-PB FDDI Installation and Configuration Guide
J2156-61001 Installing and Administering HP FDDI/9000 Software (Release 8.02)
J2157-61001 Installing and Administering HP FDDI/9000 Software (Release 9.0)

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

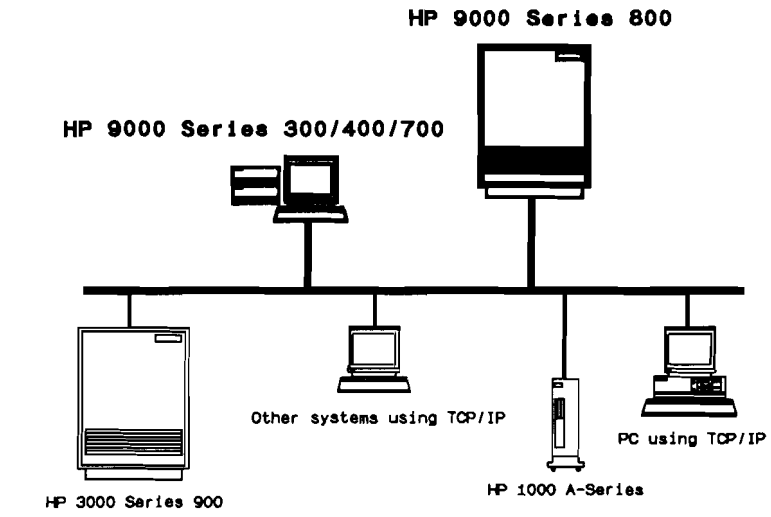
HEWLETT PACKARD

LAN/9000 Link

Technical Data

For HP 9000 Series 300/400, 700, and 800 Computers
Product Numbers
98171A, 25567A, 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 using 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 Mbits/sec burst transfer rate.
- Uses a microprocessor-driven interface controller to minimize Series 800 overhead associated with datacommunications 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 on-line 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 10BASE-T
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, 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 Attachement 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 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)

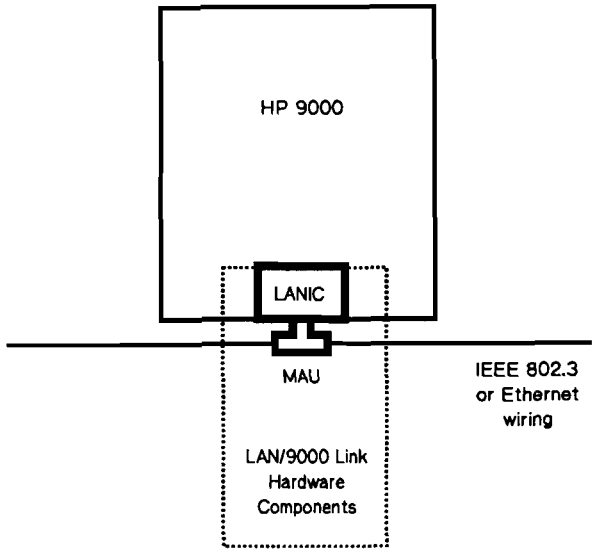
The LANIC is a microprocessor-based communications controller that plugs into the HP 9000 backplane. It handles buffering, the IEEE 802.2 and 802.3 protocols, error checking, and keeping track of network statistics. When addressed by another node on the network, the LANIC receives frames of information 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.



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 (a 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 Mbits/s

- **Evironmental Characteristics**
  - Temperature (Non-operating): -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

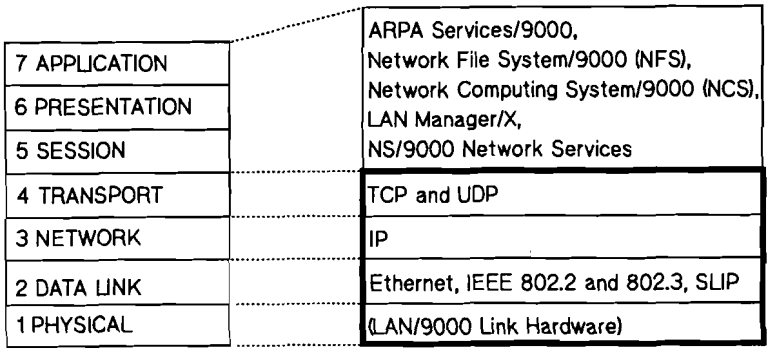
- **Electrical Specification**
  - Maximum power consumption for the interface is: 5 Volt; 15 Watts (Series 800), 4.89 Watts (Series 300)
  - The interface also powers the various MAUs, which require 12 Volts: 4.3 Watts typical

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



OSI Model

LAN/9000 Link Software Components

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/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 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 APRA 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 two application programmatic interfaces (APIs) to the network transport, Berkeley (BSD) sockets and HP's Network InterProcess 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 an interface to TCP and UDP. BSD sockets is available on HP 9000s; HP 1000s, 3000s, and PCs; and on a wide range of computers from other vendors that support the UNIX® operating system.

NetIPC is a HP proprietary interface to TCP. NetIPC supports communications to various HP systems, including HP 1000s, 3000s, and 9000s.

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/s, 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 Start-up network support service. (See related products below)

Ordering Information

The LAN/9000 Link is supported on the HP 9000 Series 300/400, 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 300/400 Hardware and Software

98171A - LAN/9000 Link for HP 9000 Series 300/400

The LAN/9000 Link for the Series 300/400 includes:

- LANIC card.
- ThinLAN Transceiver with integrated 1 meter AUI Cable.
- BNC "T" connector
- Software Right-to-Use.

All Series 300/400 systems are shipped with a single LANIC card. For HP-UX 8.0 and later releases, the software right-to-use is included with the system; the media and documentation are included with the HP-UX Run-Time product.

The LAN/9000 Link for the Series 300/400 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.

Delete Options:
(may select one option)

001 Delete LANIC and ThinMAU assembly *(software right-to-use and documentation only, for HP-UX 7.0)*
1AW Delete software right-to-use and documentation *(For additional card in the same SPU)*

Cabling Options:
(may select one option)

740 Replace ThinLAN connection with ThickLAN connection *(includes ThickMAU, AUI cable and tap)*
840 Replace ThinLAN connection with EtherTwist connection *(includes EtherTwist Transceiver and 1-meter AUI cable)*

Media/Documentation Options:
(may select one option)

Media and documentation will not be included unless a "Media/Documentation Option" is selected.

AA0 ¼-inch cartridge tape and S/W documentation *(for HP-UX 7.0)*
0B1 Software documentation *(for HP-UX 7.0)*

Series 700 Hardware

25567A – 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 documen-tation for the LAN/9000 Link, order the HP-UX documen-tation for the S/800 (HP B2437A), option 014.

J2146A – LAN/9000 Link for HP 9000 Series 8x7, 890

(For additional LANIC cards or system software upgrades)

Processor Hardware Options:
(may select one option)

20N HP-PB LANIC for Tiers AH0 and AEL (single-high)
20C HP-PB LANIC for Tiers AE5 and AE6 (single-high)
001 Delete hardware *(for software version upgrade or processor upgrade within the same processor hardware option number)*

Alternate MAUs

28685B EtherTwist MAU
30241A ThickMAU

Processor Software Options:
(may select one option)

AH0 For Tier 1 SPUs, one RTU/sublicense
AEL For Tier 2 SPUs, one RTU/sublicense
AE5 For Tier 3 SPUs, one RTU/sublicense
AE6 For Tier 4 SPUs, one RTU/sublicense

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 827 to the 867 = 20N to 20C.)

0GR Upgrade credit for option AH0
0GE Upgrade credit for option AEL
0C8 Upgrade credit for option AE5

36967A – LAN/9000 Link for HP 9000 Series 800

(For additional LANIC cards or system software upgrades. For Series 8x7 and 890 systems, see 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/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 documen-tation for the S/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, 635, 645, 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, 635, 645, 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 Software Right-to-Use on the 808 processor
AEL Software Right-to-Use on the 815/822 processors
AE5 Software Right-to-Use on the 825/635/832 processors
AE6 Software Right-to-Use on the 835/842/645 processors
AEN Software Right-to-Use on the 840/845/852 processors
AEP Software Right-to-Use on the 850/855/860/865 processors
AH1 Software Right-to-Use on the 870 processor
1AW Delete Software Right-to-Use (for an additional card in same SPU). Requires prior purchase of 36967A.

Media/Documentation Options:
(may select one option)

Media and documentation is usually required. To receive media and documentation, however, the appropriate "Media/Documentation Option" must be explicitly ordered.

AA0 Add ¼-inch cartridge tape and S/W documentation for HP-UX 7.0
AA1 Add ½-inch magnetic tape (1600 bpi) and S/W documentation for HP-UX 7.0
AAH Add Digital Audio Tape (DAT) and S/W documentation for HP-UX 7.0
0B1 Add software documentation only for HP-UX 7.0
030 Add ¼-inch cartridge tape and S/W documentation for HP-UX 8.0
031 Add ½-inch magnetic tape (1600 bpi) and S/W documentation for HP-UX 8.0
032 Add Digital Audio Tape (DAT) and S/W 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 Return credit for the 808 processor
0GE Return credit for the 815/822 processor
0C8 Return credit for the 825/832/635 processors
0GS Return credit for the 835/842/645 processors
0GT Return credit for the 840/845/852 processors
0GU Return credit for the 850/855/860/865 processors

Documentation

Documentation for the LAN/9000 Link for the Series 300/400, Series 700, and Series 800 is the same. Beginning with HP-UX 8.0, the documentation for the LAN/9000 Link for the Series 300/400 and 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. The number in brackets show the HP-UX 7.0 part numbers.

B1012-90012 *(B1012-90012) [B1012-90003]* HP 9000 Series 800 Networking Overview
98194-60532 *(98194-60527) [98194-90013]* NetIPC Programmer's Guide
98194-60531 *(98194-60525) [98194-90012]* Berkeley IPC Programmer's Guide
98194-60534 *(98194-60524) [98194-90011]* LLA Programmer's Guide

Included with B2437A option 014:

98194-60530 *(98184-90526) [98194-90016]* Installing and Administering LAN/9000 Series 800
98194-60533 *(98194-60522) [no HP-UX 7.0 manual]* Using Serial Line IP Protocols

Included with 36967A option 20C:

5959-2259 CIO LAN Interface Controller (LANIC) Installation and Reference Manual

Included with 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/
700, and 800
Product Numbers
36941A, J2159A, and 36960A**

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).

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 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 computers over the X.25/9000 Link
  - Supports NFT for HP 9000-to-HP 9000, HP 9000-to-HP 3000 communications
  - Supports layer 3 interoperability for HP 9000-to-HP 1000, 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.)
  - Implements industry-standard Defense Advanced Research Project Agency (DARPA) TCP/IP protocols
  - 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
- 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 or NetIPC via TCP
- 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. It can be configured as a DTE (Data Terminal Equipment) to run over a public or private X.25 network at speeds up to 19.2 Kbps for Series 300 and 400 DIO systems, and 64 Kbps for Series 700 and 800 systems. It can also be configured as a DCE (Data Circuit-terminating Equipment) to run over point-to-point lines (by using a modem or a modem eliminator).

The OSI Transport Services (OTS) product supports TPO.2. OTS is required for use with the X.400/800 product.

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 is accomplished through the implementation of the 1984 CCITT recommendation for X.3 and X.29

Programmatic Access

The X.25/9000 Link product also provides a message-based programmatic interface to the X.25 packet layer 3 to establish communications with remote HP or non-HP applications. The programmatic interface (through Berkeley sockets) provides this capability independent of the remote computer's protocols. It 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.

X.32 Recommendation

THe X.25/9000 Link offers support for some X.32 capabilities (procedures 1,2,5 and 6). The main interest of X.32 is related to the identification of the calling DTE.

- For security reasons
- To allow the network (PSPDN) to identify the calling DTE
- To charge the calling DTE for the communication cost
- To allow the called DTE or the PSPDN to accept or refuse the reverse charge

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
- For an X.21 physical interface cable, contact your HP Sales Representative for a list of recommended third-party products.

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)
- Qualifier bit (Q-bit) for X.25 packet level 3 applications only
- More-data bit (M-bit)
- Packet sizes: 128 or 256 bytes for Series 300 and 400: 16 to 4096 bytes for Series 700 and 800
- Window sizes: 1-7
- Maximum Virtual Circuits: 32 (128 byte packets) for Series 300 and 400; 64 (128 byte packets) for Series 800 Mid-Bus processors; 256 (128 byte packets) for Series 700 and 800 NIO processors
- Modulo 8 packet sequence numbering
- Throughput class: 3 to 11 for Series 300 and 400; 3 to 12 for Series 700 and 800
- Operates as a DTE or DCE

Supported and Recommended Products

Certified X.25 Packet Switched Networks

The following is a partial list of X.25 Networks that have certified the X.25/9000 Link product. Contact your HP Sales Representative for additional information.

HP PPN	Datex-P
Datapac	Datapak
Transpac	Pacnet II
PSS	Telenet
Tymnet	

Verified X.25 Switching Equipment

- HNS MACOM 9600 NPX
- HNS MACOM 9724 RPX
- HP PPN Model 70 Release 1
- HP PPN Model 80 Release 2

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

Interoperability

The following configurations have been tested and are currently supported:

	Level 3	NS	ARPA
HP 9000-to-SUN	X		X
HP 9000 through Cisco AGS router		X	X
HP 9000-to-HP 1000	X		
HP 9000-to-HP 3000/V	X	X	
HP 9000-to-HP 3000/XL	X	X	
HP 9000-to-Apollo			X

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 8.05 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: 720, 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, 835S, 835SE, 835SRX, 835CHX, 837, 840S, 842, 845, 847, 850S, 852, 855, 857, 860, 865, 870

Installation Policy

Customer Responsibility

The customer is responsible for the installation of the X.25/9000 Link product.

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

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

J2159A X.25/9000 Link for the HP9000 Series 700

1AT RS-232-C Cable
1AU V.35 Cable
OBO Delete all manuals
1AW Delete software. For additional cards only
OCC Revision upgrade for users not on support services

Series 800

36960A X.25/9000 Link for the Series 800

Must order **one** feature in the following options:

Processor License Options:

AH0 License to use on Tier 1
AEL License to use on Tier 2
AE5 License to use on Tier 3
AE6 License to use on Tier 4
AEN License to use on Tier 5
AEP License to use on Tier 6
AH1 License to use on Tier 7

Processor Hardware Options:

20N For 807/808/815/817/822/827/832/837/842/847/852/857/887/897/890 1, 2, 3, 4
20C For 635/645/825/835/840/845/850/855/860/865/870

Media Options:

Documentation is included when a media option is selected.

AA0 Software on ¼-inch cartridge tape
AA1 Software on ½-inch magnetic tape (1600 bpi)
AAH Software on Digital Audio Tape (DAT)
AAU CD-ROM Certificate

Interface Cable Options:

IAT 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:

0B0 Deletes all the manuals

Hardware Only, Credit Options:

1AW Deletes software on Tier 1 processor
2A1 Deletes software on Tier 2 processor
2A2 Deletes software on Tier 3 processor
2A3 Deletes software on Tier 4 processor
2A4 Deletes software on Tier 5 processor
2A5 Deletes software on Tier 6 processor
2A6 Deletes software on Tier 7 processor

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).

Processor Upgrades:
OGR for return credit for Tier 1
OGE for return credit for Tier 2
OC8 for return credit for Tier 3
OGS for return credit for Tier 4
OGT for return credit for Tier 5
OGU for return credit for Tier 6

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

HEWLETT PACKARD

ARPA Services/9000

Technical Data

For HP 9000 Computers
Product Number
B1030B for Series 800/600

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:

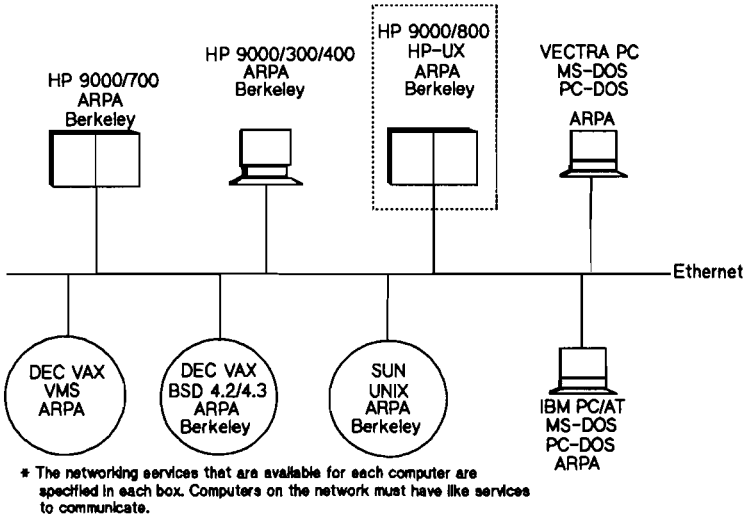
* ARPA services are de facto networking standards in the scientific and engineering communities. They define protocols for electronic mail, file transfer, and terminal access over local and wide area networks.

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 800/600, Series 700, or Series 300/400 Link or X.25 Link products. The LAN product allows connection to the IEEE 802.3/Ethernet thick or thin coax cable, or EtherTwist unshielded, twisted-pair wire.

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 800/600, 700, and 300/400 providing HP-to-HP communications. NS, ARPA, and Berkeley services can run simultaneously on the Series 800/600, 700, and 300/400.



* 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

ARPA Services

ARPA Services/9000 runs on Series 800/600, Series 700, and Series 300/400 computers connected to an Ethernet LAN or X.25 network, and 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 800/600, Series 700, and Series 300/400 products.

BSD Services and Sockets

HP 9000 Series 800/600, 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 800/600, 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 HP's 700/X Terminal to discover its IP address, subnet mask, name server, and boot file.
- **Trivial File Transfer Protocol (tftp)**
  - Allows 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 800/600, 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

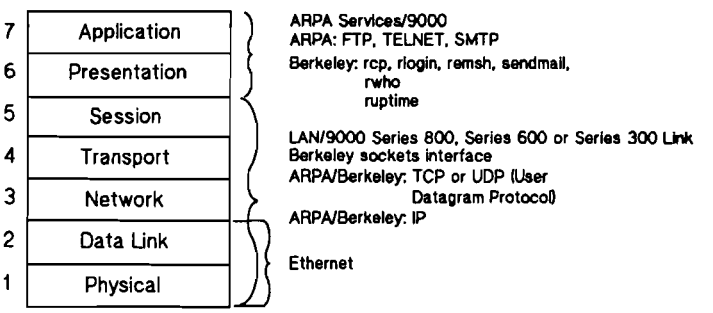
Capability	ARPA	Berkeley
File Transfer	File Transfer Protocol (FTP)	Remote copy (rcp)
Terminal Access	Telnet	Remote login (rlogin)
Electronic Mail	Simple Mail Transfer Protocol (SMTP)	Sendmail (uses SMTP)
Remote Command Execution		remote shell (remsh)
InterProcess Communication		sockets (included with LAN/9000 Link)

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 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	

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.

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 800/600, Series 700, or Series 300/400 HP-UX systems to other UNIX or non-UNIX systems using either the mailx or mail commands.
Series 800/600, Series 700, or Series 300/400 HP-UX systems running ARPA Services/9000 can send mail over RS-232 lines, Ethernet LANs, and X.25 networks.

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:

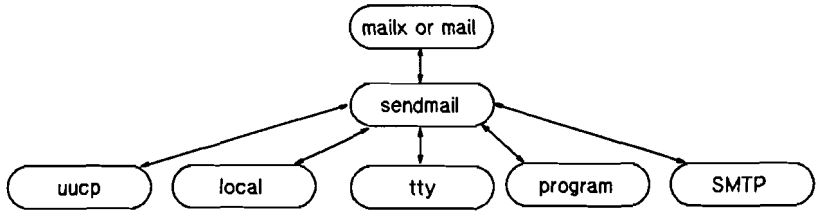
node1!node2!node3!user

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.

The Mail System



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.

* 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 800/600 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 B1014-90006).

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

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

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.

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 800/600, 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 800/600
- HP 9000 Series 700
- HP 9000 Series 300/400

Operating System

- HP-UX Version 8.0 or later for 800/600
- HP-UX Version 8.01 or later for 700
- HP-UX Version 8.0 or later for 300/400

Memory and Data Storage

- 4 bytes RAM for 300
- 8 Mbytes RAM for 800
- At least 152 Mbyte (HP 7959B) or greater capacity for 800
- Series 300 can be run diskless or with minimum 152 Mbyte or greater capacity (HP 7959B)

Documentation

Documentation for the ARPA Services/9000 for the Series 300/400, Series 700, and Series 800/600 is the same. Beginning with HP-UX 8.0, the documentation for the Series 300/400 and Series 700 will be included with the HP-UX Run-Time product. The documentation for the Series 800/600 is included with the options AA0, AA1, AAH, 0B1, 030, 031, 032, and 033.

The following manuals comprise the ARPA/9000 documentation set. The first number indicates the part number for HP-UX 8.0. The numbers in parentheses show HP-UX 7.0 part numbers.

B1012-90012 (B1012-90003)
HP 9000 Computers Networking Overview
B1014-90006 (B1014-90000)
Using ARPA Services
98194-60525 (98194-90012)
LAN/9000 Berkeley IPC Programmers Guide
B1014-90007 (B1014-90001)
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 either the Series 300/400 or Series 700 systems. For these systems, the ARPA services are included with the HP-UX Run-Time product. ARPA/9000 for Series 800 can be ordered for either HP-UX 7.0 or HP-UX 8.0. Please select the appropriate media and documentation options.

Software

ARPA Services/9000 for S/800/600

HP B1030B Options:

AHO For Tier 1 SPUs
AEL For Tier 2 SPUs
AE5 For Tier 3 SPUs
AE6 For Tier 4 SPUs
AEN For Tier 5 SPUs
AEP For Tier 6 SPUs
AH1 For Tier 7 SPUs
AAO Documentation and media on ¼-inch tape for HP-UX 7.0
AA1 Documentation and media on ½-inch tape for HP-UX 7.0
AAH Documentation and media on digital audio tape for HP-UX 7.0
OB1 Additional copies of documentation for HP-UX 7.0
030 Documentation and media on ¼-inch tape for HP-UX 8.0
031 Documentation and media on ½-inch tape for HP-UX 8.0
032 Documentation and media on digital audio tape for HP-UX 8.0
033 Additional copies of documentation for HP-UX 8.0

Upgrade options are provided for scalability. Previous purchase of ARPA/9000 is required. Please order the appropriate upgrade option if moving to a larger system.

0GR Return credit for Tier 1 SPUs
0GE Return credit for Tier 2 SPUs
0G8 Return credit for Tier 3 SPUs
0GS Return credit for Tier 4 SPUs
0GT Return credit for Tier 5 SPUs
0GJ Return credit for Tier 6 SPUs

HEWLETT PACKARD

HP FTAM

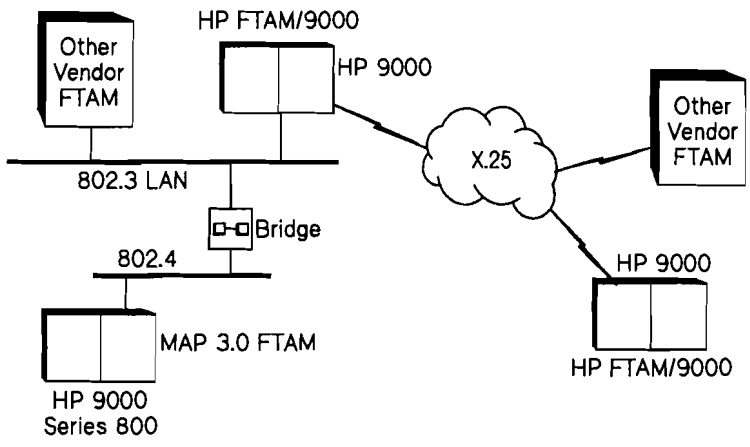
Technical Data

Product Numbers
B1032A, B1033A, B1008A

The HP FTAM/9000 is an OSI, Open Systems Interconnect, software product used for file transfer, access, and management of files in OSI networks.

HP FTAM 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-based applications. HP FTAM file services expand and improve upon the capabilities of existing file transfer protocols such as ARPA File Transfer Protocol. HP FTAM services include:

- Text and binary file transfer
- Record level file access
- File management
  - Create/delete file
  - Read/change file attributes



HP FTAM/9000 meets the basic distributed file system requirements as defined in industry and regional OSI profiles including the U.S. Government OSI Profile, GOSIP, Technical Office Protocol, MAP, TOP, and European, CEN/CENELEC, specifications.

Features

Standards: HP FTAM provides full purpose, standards compliant (ISO/IS 8571), multivendor file transfer capability.

Concurrency and Access Control: HP FTAM 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 who are familiar with FTP can use FTAM with virtually no training.

Remote file directory access: Users can access remote file directories to determine filenames, permitted actins, etc. This capability uses the NBS-9 document type.

FTAM API: Allows software developers to create applica-tions 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 API tracing, the FTAM application developer can quickly isolate application development problems and develop applications more efficiently.

Conformance

HP FTAM/9000 complies to 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)

In addition, HP FTAM is registered with NIST as being conformant to the U.S. GOSIP version 1.0 standard.

Interoperability

HP supports FTAM interoper-ability 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 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. FTAM's OSIAdmin Configura-tion interface has been developed to make product configuration simple and understandable.

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
Simple File Access	A1	ENV 41207	A/122	AFT22
Filestore Management	M1	ENV 41205	A/13	AFT3

Performance

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 documentation set for FTAM/9000, including usage and technical information, includes:

HP FTAM/9000:

- **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

Ordering Information

- HP FTAM/9000 for the Series 300/400 (P/N B1032A)
- HP FTAM/9000 for the Series 600/800 (P/N B1033A)
- HP FTAM/9000 for the Series 700 (P/N J2163A)
- HP MAP 3.0 FTAM for the Series 800 (P/N B1008A)

Required Products

For FTAM/9000:

- HP OSI Transport Services/9000 for the Series 300 (P/N 32069A)
- HP OSI Transport Services/9000 for the Series 800 (P/N 32070A)
- HP OSI Transport Services/9000 for the Series 700 (P/N J2160A)
- HP-UX version 8.0 for the Series 300, 400, 600, and 800
- HP-UX version 8.07 for the Series 700

HEWLETT PACKARD

HP LAN Manager/X for HP 9000[1]

Technical Data

Product Numbers
B1003C, B1011C

HP LAN Manager/X 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 exciting 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 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 7.X or 8.X

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.

B1003C HP LAN Manager/X for the HP 9000 Series 300/400

UA3	8 User License
UA5	16 User License
UA7	32 User License
UA9	64 User License
UAB	128 User License
UAD	256 User License
UB3	8 User Credit
UB5	16 User Credit
UB7	32 User Credit
UB9	64 User Credit
UBA	128 User Credit
021	Upgrade B1003B to B1003C, 8 User License
022	Upgrade B1003B to B1003C, 16 User License
023	Upgrade B1003B to B1003C, 32 User License
024	Upgrade B1003B to B1003C, 64 User License
025	Upgrade B1003B to B1003C, 128 User License
026	Upgrade B1003B to B1003C, 256 User License
105	LM/X 386/486 5-User Upgrade Credit
110	LM/X 386/486 Unlimited User Upgrade Credit
OB1	Additional User's Manual
AA0	Cartridge Tape and Manuals
AAH	DDS Tape and Manuals

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
105	LM/X 386/486 5 User Upgrade Credit
110	LM/X 386/486 Unlimited User Upgrade Credit
OB1	Additional User's Manual
AA0	Cartridge Tape and Manuals
AA1	1/2" 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 400 computer (DDS tape drive) and 14 PC users, order B1003B options UA5 and AAH.

- For an existing installation of HP LAN Manager/X 1.1, 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 (32 user license) on a Series 800 computer (cartridge tape drive), order B1011C options 023 and AA0.

- 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 or if you have a need for a different type of server media. For example, if you are currently running HP LAN Manager/X on a Series 400 (cartridge tape drive) and you would like to also run it on your Series 300 (cartridge tape drive) with 8 PC users, order B1003C option UA3. If you are

currently running HP LAN Manager/X on a Series 400 (cartridge tape drive) and you would like to also run it on your Series 800 (cartridge tape drive) with 8 PC users, order B1011C option UA3 and AA0.
Series 400 and 800 software cannot be interchanged.

- 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 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 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.

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/XL (Named Pipes)

D1811B HP Network Services 2.1/MS-DOS

D1812B HP ARPA Services 2.1/MS-DOS

5091-2620E
(6 Mar 92)

(1) Based on Microsoft LAN Manager/X
(2) For a list of currently supported PCs and LAN cards, contact your local HP sales representative .

HEWLETT PACKARD

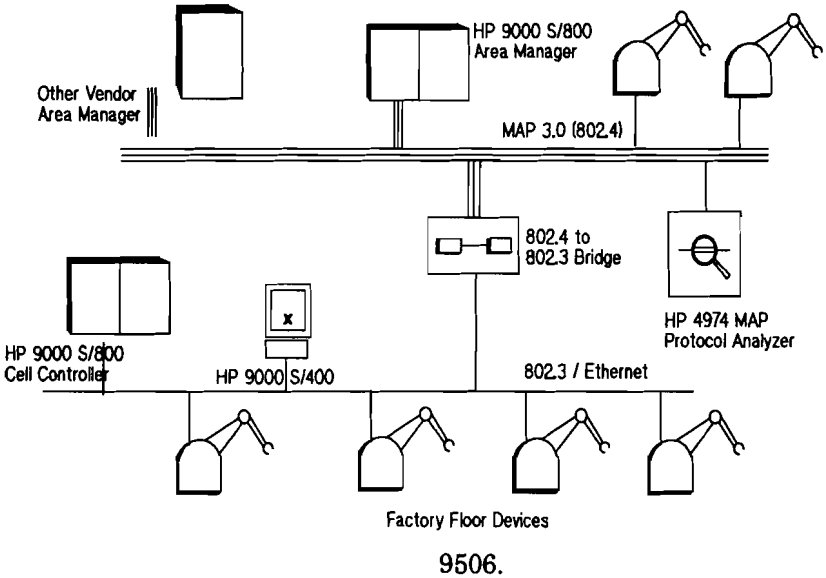
HP MMS/9000

Technical Data

Product Number
32018A, 32019A, and J2161A

HP MMS/9000 is an HP Advance Net CIM (Computer Integrated Manufacturing) product addressing the critical need for multivendor communications manufacturing. MAP 3.0 (Manufacturing Automation Protocol 3.0) is a full seven-layer communication specification based on the OSI (Open Systems Interconnection) model.

HP MMS/9000 is a layer seven service for the HP 9000. MMS (Manufacturing Message Specification) is the protocol that OSI-connected cell controllers use to direct the activities of factory floor devices (i.e. robots, PLCs, NC machines, etc.). HP MMS/9000 complies with both the draft standard ISO/DIS 9506 specified by MAP 3.0 and the international standard ISO/IS 9506.



HP MMS/9000, in combination with HP OTS/9000 and LanLink, allows HP 9000 Series 300, 400, 700, and 800 computers to connect to 802.3 or ethernet networks.

Functional Description

MMS (ISO/DIS & IS 9506) is a substantial specification containing more than 80 service calls spread over 10 categories of capability. The intent of MMS is to allow cell controllers mastery of factory floor device activities. For instance, MMS can control PLCs (Programmable Logic Controllers) 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 along 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 (MMS-I)	• Portable applications; reduced programming costs
• Investment Protection	• Customers can utilize their install communication media
• Proven Interoperability with leading MMS vendors	• Eliminates the need for customers to perform interoperability testing.

In support of the above general capabilities 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.

HP's MMS is accessed exclusively through an application programmatic interface (API). The MMS API is a "C" language interface adhering to the 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 (e.g., 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.

Configuration Information

Computer
HP 9000 Series 300, 400, 700, or 800.

Operating System
HP-UX Version 8.02 or 8.07.

Memory and Data Storage
- 16 MB RAM
- 30 MB of free disk space

Other required products:
- HP OSI Transport Services/9000
- HP LanLink/9000

Ordering Information

HP MMS/9000

32018A HP MMS/9000 for the Series 300 and 400

J2161A HP MMS/9000 for the Series 700

32019A HP MMS/9000 for the Series 800

800 Series Options:

Media Options:
AA0 software on cartridge
AA1 software on magnetic tape
AAH software on DAT
0B1 Additional Documentation

Processor:
AH0 License to use on Tier 1
AEL License to use on Tier 2
AE5 License to use on Tier 3
AE6 License to use on Tier 4
AEN License to use on Tier 5
AEP License to use on Tier 6
AH1 License to use on Tier 7

Processor Upgrades:
OGR for return credit for Tier 1
OGE for return credit for Tier 2
OC8 for return credit for Tier 3
OGS for return credit for Tier 4
OGT for return credit for Tier 5
OGU for return credit for Tier 6

Documentation

32019-60500 HP MMS/9000 Reference Manual
32019-60510 HP MMS/9000 Programmer's Guide
32019-60530 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 OpenMail

Technical Data

Information Distribution Services for HP 9000 Syste

HP NewWave Office

What is HP OpenMail software?
HP OpenMail is the information distribution service of HP NewWave Office for HP-UX. HP OpenMail electronic mail services enable users of PCs, terminals, UNIX® workstations, and the Apple Macintosh to communicate with other users on both private and public mailing systems.
HP OpenMail enables users to exchange multiple media types including HP NewWave objects.

HP OpenMail helps you to protect your existing investments in hardware and software. It also gives you and your users the flexibility and choice in which systems they exchange information with, which workstation they use, and which file types they exchange.

The benefits of HP OpenMail

HP OpenMail, built on standards, built to last
HP recognizes the importance of standards-based open systems, and is fully committed to these as a way of delivering lasting solutions that provide flexibility, choice, and multivendor integration. More importantly, they help you to protect your current investments in hardware, software, and training, and contain these costs in the future.

HP OpenMail has been designed specifically to provide the benefits of an open system. It is a true X.400-based mailing system providing a standard method for exchanging messages and documents with the growing number of mail systems supporting an X.400 gateway. X.400 makes special, system-specific, mail gateways unnecessary and therefore controls the costs of operating a multivendor environment.

X.400 is also becoming the standard method for companies to exchange mail with suppliers and customers, in addition to users on public mailing systems.

Sendmail, an established transport system in the UNIX environment, is used for the transmission of messages within the HP OpenMail network. HP OpenMail therefore leverages existing and planned investments in Sendmail software and training and removes the cost of administering a nonstandard transport system.

HP OpenMail can utilize LAN Manager/X, a full-feature network operating environment that enables HP-UX systems to be operated as shared resource services. LAN Manager/X is clearly emerging as a standard in networking. Alternatively, Berkeley Sockets can be used as the datacom service.
HP OpenMail therefore allows flexibility in the choice of client-server networking.

HP plans to incorporate other standards in the HP OpenMail produce as they emerge, further improving the flexibility, choice, connectivity, and cost savings you will achieve with open systems.

PC integration
Your organization will make best use of its personal computer resources when they are fully integrated into the communications network.

HP OpenMail helps you to maximize your PC resources by integrating with a choice of PC mailing products:
HP NewWave Mail for NewWave users or
HP AdvanceMail for non-NewWave PCs. This integration enables PC users to exchange messages and documents with other PC- and terminal-based users on the network.

PC users can process their mail at off-peak times, thereby minimizing their use of HP 9000 resources and enabling more users per system.

Choice of workstations
In addition to the ability to integrate PCs, HP OpenMail enables users of terminals and terminal emulators running on MS-DOS® PCs, Apple Macintoshes, and UNIX workstations to access communication services. This is all achieved through a consistent user interface, HP AdvanceMail.

This means your organization will make more timely and better business decisions because the maximum number of users are given access to the appropriate communication tools. It also protects existing investments in user hardware, software, and training.

Choice of media types
HP OpenMail users can distribute a variety of media types. So, whether it's NewWave objects, graphics, files, word processing documents, spreadsheets, etc., HP OpenMail will deliver them in their correct format. In addition, HP OpenMail can correctly identify documents received, enabling the users to browse, convert, or edit their documents without special intervention.

This means that users can continue to use existing application packages and thereby protect investments made in UNIX and MS-DOS software packages.

Choice of connections
Your organization will get the greatest value from a communication system when that system provides effective communications to the maximum number of users, whatever mailing systems they use.

HP OpenMail provides that value by connecting all your existing or planned mailing networks together. It is fully integrated with:

- HP's X.400/9000 Message Transfer Agent (MTA), enabling users to exchange information with other users on X.400-compatible mailing systems in multivendor environments
- HP's mailing service on MPE, HP DeskManager, enabling HP-UX and MPE users to transparently exchange information and allowing HP-UX users to have full access to those gateways supported by HP DeskManager (eg, IBM's PROFS, DISOSS, and HP Telex). This protects any investments already made in other HP communication products
- The Sendmail transport system on HP-UX, which enables HP OpenMail users to exchange information with users on UNIX Mailing systems running on HP-UX and other manufacturers' hardware
- HP OfficeFax, a facsimile gateway solution, which enables HP OpenMail users to send electronic mail messages, including both text and graphics, to any Group III facsimile machine and compatible device. Incoming faxes can be received and printed to an HP LaserJet or an HP DeskJet printer

Minimizing the cost of administration
HP OpenMail minimizes the time and cost of successful administration.

HP OpenMail can be installed by you, with no assistance from HP. The mailing server is administered either locally or from a remote site. This enables one administrator to service many nodes, reducing training and administration costs. The administration interface has two levels of help, one for each field on each screen. In certain fields, HP OpenMail presents a set of system values from which to collect. This provides ease of use and therefore cost savings in implementing the HP OpenMail network.

HP OpenMail reduces the time to establish a reliable network and ensures the productivity of early network users. Using the Test Server function in HP OpenMail, your administrator can test the mail transfer links between network nodes providing an error-free network before your network goes live.

The HP OpenMail mailing service is designed for maximum availability. If problems do occur during normal running of your HP OpenMail service, then your administrator simply describes the problem to the Computer-based Problem Solving System, which has access to an HP OpenMail knowledge base. This provides the administrator with the information required to quickly resolve problems.

Directory services
The HP OpenMail directory service enables all users simply to type the names of the recipients of their messages, whether those recipients are on HP OpenMail, HP DeskManager, X.400, UNIX Mail or any other mail system. To successfully send a message, there is no need to know any addresses. It is HP's goal to further reduce the time it takes to find a user's correct name and address and to be able to do this in a network where many different mail systems are operating. HP intends to provide this through the X.400 Distributed Directory Service specification.

Multiple languages
Users will process work more quickly and their interaction with a computer will be more productive if the computer interface operates in their native language.

HP OpenMail is designed to operate in many languages. This means you can implement the system as a worldwide communications backbone with each individual using it in their chosen language.

In addition, it is possible to implement multiple languages on the same server. This is particularly useful in those countries that are multilingual, and for foreign visitors wishing to use the local mail system in their own language.

HP OpenMail Language Support products can be added to your system at any time, giving you total flexibility.

Feature summary

Mailing service
- Host services required to integrate HP NewWave Mail and HP AdvanceMail on MS-DOS PCs (eg, upload/download of messages, document conversions)
- HP AdvanceMail user interface for terminal-based users
- HP AdvanceMail user interface for users of Macintoshes running the HP AdvanceLink for Macintosh terminal emulator
- HP AdvanceMail user interface for users of UNIX workstations running a terminal emulator
- X.400 messaging for information exchange in a multivendor environment
- Easy-to-use text editor for the creation of messages with the ability to link a full word processor, or other editing applications
- Acknowledgments (registered mail) to confirm messages have been delivered, read, or replied to

- Nondelivery notification to sender and administrator for messages that cannot be delivered; original message is also returned
- Aliases; enable alternative names to be assigned to users
- Address resolving enables users to supply names with minimum address information
- Personal and public distribution list management
- Autoforwarding of mail via public distribution lists
- User interface in local language, multiple languages per machine
- Message size and number of parts limited only by available disk space
- Browsing of AdvanceWrite, HP Word, Executive Memomaker, HP NewWave Write, and DCA documents for terminal-based users and conversions to text for HP NewWave Mail and HP AdvanceMail users on PCs
- Optional integration with the KEYpak conversion product from KeyWord for the conversion and browsing of all major word processing packages, such as WordPerfect and Microsoft® Word
- Private and Urgent mail
- Ability to attach HP-UX files
- Simple filing of messages
- Access to HP-UX commands from the user interface

Administration

- Customer-installable HP OpenMail
- Runs on any HP 9000 Series 300, 600, or 800 (except Series 310) and therefore flexible to meet the needs of different size work groups
- Simple, menu-driven interface, protecting administrator from HP-UX
- Reset Server to check new links
- Configurable maintenance times
- Space Usage and Network Statistics reports mailed to a specified user
- Message-tracing facilities for assistance in troubleshooting
- System events and errors recorded for troubleshooting
- Monitor facility mails exception reports (identifying system problems) to a specified user before problems affect user performance
- Mail queue interrogation and message resubmission
- Database scanning tool
- Component monitoring and control (local message delivery, gateways, etc.)
- Directory synchronization within HP OpenMail and HP DeskManager networks
- Context-sensitive Help system
- Computer-based Problem Solving System
- One message copy per server and per route to save disk space
- Interactive or batch modes for local or remote administration
- Administration interface in local language, multiple languages per machine
- Aliases can be set for the whole system
- Access to HP-UX commands from the administrator's interface

Connectivity

- Connection to other X.400-compatible mail systems
- Connection to Sendmail-based mailing systems on HP-UX and other UNIX operating systems
- Connection to HP DeskManager
- Connection to HP OfficeFax
- Connection to Foreign Services supported by HP DeskManager (eg, PROFS, DISOSS, HP Telex, and many others)
- Connection to third-party telex products

Security

- Access password protected
- Messages encoded for transmission over Sendmail
- Mailbox protected from unauthorized access by PC or UNIX programs
- HP AdvanceMail passwords encrypted

Standards

- X.400-based mailing, both addressing and message features
- Sendmail transport system for node-to-node transfer of messages; this uses ARPA Berkeley Services over IEEE 802.3 LANs and X.25 links, and UUCP over signal links
- X/Open-compliant for portability to other platforms
- HP-UX Operating System
- RFC 822/821 messages to UNIX mailing systems
- Conformance to a majority of the elements as specified in U.S. and UK GOSIP '84

Integration with HP products

- HP NewWave Mail and AdvanceMail for the integration of PC users and applications in the mailing environment (LAN Manager and Serial connections)
- HP's X.400/9000 MTA for connections to other X.400-compatible mailing systems
- HP DeskManager for integration of MPE and HP-UX users in mixed environments, protecting existing investments
- HP AdvanceLink for integration of MS-DOS PCs and Apple Macintoshes

Platforms

In addition to HP OpenMail on HP-UX described here, HP OpenMail is also available on SCO UNIX System V/386; see data sheet (P/N 5952-3144) for more details.

Product requirements

Hardware requirements

- HP 9000 Series 320 through Series 370, Series 808 through Series 870 or Series 635 and Series 645 (on diskless nodes you must log on to the server where HP OpenMail is installed).

Note: HP OpenMail is not available on a Series 310.

Software requirements for HP 9000 systems

- HP-UX version 7.0 or later
- ARPA Services/9000

Note: The ARPA product includes the Sendmail software used by HP OpenMail for node-to-node message transfer.

Software requirements for HP NewWave Mail

- HP NewWave Mail version A.02.00 or later
- NewWave version A.03.00 or later, and either
- HP OfficeShare version B.00.00 or later or
- DOS NS Services 2.0

Software requirements for HP AdvanceMail

Via a LAN

Depending on the server software used, different software connections can be made

- Network Services Connection:
  On the HP 9000
  - Network Services/9000

  On the PC
  - HP AdvanceMail version A.03.00 or later, and either
  - HP OfficeShare version B.00.00 or later or
  - DOS NS Services 2.0
- Sockets Connection:
  On the HP 9000, either
  - HP LAN Manager/X for the HP 9000 version 1.0 or later, or
  - ARPA Services/9000

  On the PC
  - AdvanceMail version A.04.00 or later and either
  - DOS ARPA Services 2.0 or
  - FTP PC/TCP Network Software for DOS version 2.04 or later or
  - EXCELAN the LAN WorkPlace: Network software for PC DOS version 3.3 or later
- Named Pipes Connection:
  On the HP 9000
  - HP LAN Manager/X for the HP 9000 version 1.0 or later

  On the PC
  - HP AdvanceMail version A.04.00 or later
  - HP LAN Manager for MS-DOS (included with the server software)

  Via a Serial Connection
- HP AdvanceMail version A.03.00 or later

Optional software requirements for X.400 connectivity

If you wish to exchange messages with another X.400-compatible mail system, the following is ordered separately:

- X.25 Link/9000 or LAN Link/9000
- ARPA Services/9000
- X.400/9000 Message Transfer Agent (MTA)
- OSI Transport Services/9000

Optional software requirements for an HP DeskManager gateway

- On the HP 9000
  - NS/9000
  - LAN/300 or LAN/800 link
- On the HP 3000
  - HP DeskManager version B.03.R0 or later
  - NS/3000
  - LAN Link

Optional requirements for an HP OfficeFax gateway
Please refer to the HP OfficeFax data sheet (P/N 5959-9687) for the hardware requirements, software requirements, and a list of the supported printers. No additional requirements are necessary on the HP OpenMail server.

Terminals supported
HP 239x
HP 262x
VT100, VT220, VT320 (and any full emulations of these)
HP 700/92
HP 700/94
HP 700/22/32
HP 700/44 (in VT220 mode only) any HP 2392 emulators running on a PC including:

- HP AdvanceLink for Windows, version A.01.10 or later
- HP AdvanceLink for the Macintosh, version A.01.10 or later
- HP AdvanceLink for DOS, version B.02.00 or later

Ordering Information

To order the HP OpenMail product please contact your local HP Sales Representative.

B1600A
Right-to-use core software providing support for MS-DOS PCs, terminals, Macintoshes, and UNIX workstations; connection to other HP OpenMail nodes, HP DeskManager, and to other mailing systems based on the Sendmail transport system on UNIX.

Also specify an option to indicate the server to be supported.

At least one language support product must be ordered when ordering the core product.

Also note that there is an English Language Support product, which must be ordered to enable HP OpenMail to operate in the English language.

B1602A (plus suffix)
Language Support Product. Specify product number suffix to determine which language is to be delivered. Specify an option to indicate the required media type. The exception to this structure is the English Language Support Product, which requires the ordering of B1602A without a suffix.

Provides all message catalogs, help, and system screens to run the HP OpenMail product in the specified language. Also includes one User Guide and one Administration Guide.

Check with your local HP Sales Representative for available languages.

Support products
Hewlett-Packard offers a broad range of support services, which, with over 180 service and support facilities throughout the world, can meet the special needs that exist in your organization. Hewlett-Packard has support representatives to provide local expertise and support for those needs.

Please contact your HP Sales Representative for further details.

Customer education products
A complete range of courses is offered to make your implementation of HP OpenMail a success:

- HP OpenMail Administration Training – Three-day class covering installation, system planning, configuration, monitoring, and maintenance
- HP AdvanceMail User Training – One-day class covering the use of all the basic functions of AdvanceMail
- HP AdvanceMail Trainer's Pack – A ready-to-use and fully customizable package of the materials required to run the user class yourself.

Please contact your HP Education Center or HP Sales Representative for details.

HEWLETT PACKARD

HP OSI Transport Services/9000

Technical Data

Product Numbers
32069A, J2160A, 32070A

HP OSI Transport Services/9000 (OTS/9000) networking software provides the Transport, Session, Presentation, and ACSE layers of the OSI reference model. OTS/9000 also provides OSI network layer services over the X.25/9000 or LAN/9000 Link. These layers supply the necessary foundation to run OSI services, such as MMS, FTAM, and X.400.

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 will operate in a multivendor environment. HP's OSI products conform to the OSI standards shown in Figure 1.

Features

Features include:

- Support of a broad range of GOSIPs worldwide (see Figure 2 for supported profiles)
- First OSI stack placed on the US GOSIP register of conformant systems
- Support of the OSI and TCP/IP protocols simultaneously, over the same interface card
- Support of the ES-IS protocol
- Ability to act as an Active Transport Layer Relay (MSDSG)
- Complete OSI node administration through the tool Osiadmin; 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 emerging standard interface
- XTI, the X/Open standard application interface to the ISO Transport layer
- Support of HP MMS/9000, HP FTAM/9000 and HP X.400/9000
- Tracing of data and header information at each layer (2–7) of stack
- Optional Computer-Based Training (CBT) package for the product

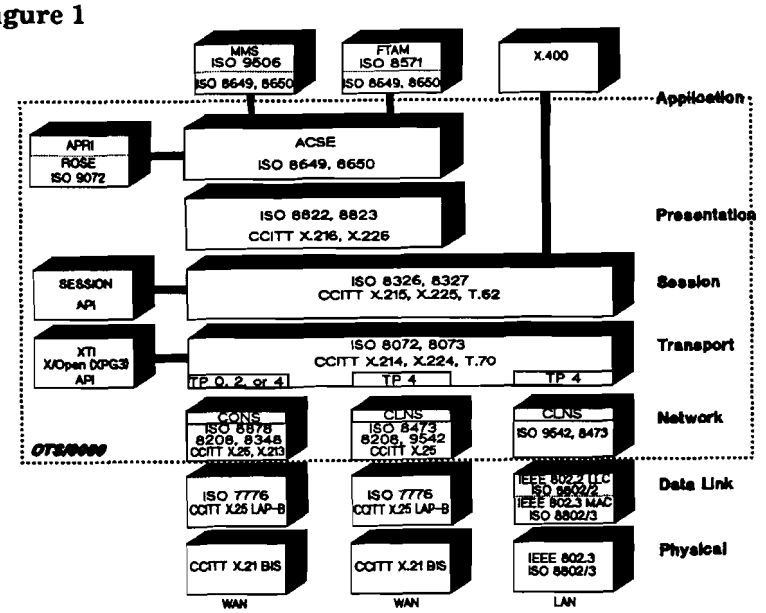
For X.25, features include:

- Support of up to 448 transport connections and switched virtual circuits
- Support of up to seven 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, features include:

- Support of up to 448 connections
- Support of one or two LAN cards
- Support of transport class 4
- Support of CLNS

Figure 1



OTS/9000 supports a total of 448 connections through the transport layer. This limit applies to connections established via APRI, Session API, XTI (the Transport API), or by a supported OSI application (X.400, FTAM, MMS).

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 up, and verify an OSI node (including interoperability with remote nodes). The features include:

- OSI Network administration consistent with HP-UX's System Administration Manager (SAM)
- 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
- Automated configuration verification for the above components
- Integrated administration for the above components (start/stop)
- 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 a 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, you 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 connection oriented transport services. HP's XTI has been developed specifically for OSI and complies with a subset of 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.

Coexistence

The X.25/9000 and LAN/9000 link products provide simultaneous support for both TCP/IP and OSI standards.

Training

Optional PC-compatible Computer-Based-Training covering installation, configuration, verification, and troubleshooting is offered with OTS/9000. The course contains general OSI information including network administration, system administration, network architecture and addressing considerations, OTS/9000 specific capabilities, and a complete example of configuring an OSI network. The course also introduces the student to support tools such as osidiag and tracing/logging as well as APIs such as XTI, Session, and APRI.

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 with ISO 8327/CCITT X.225 and T.62. OTS/9000 supports OSI Session version 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 an 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 class 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 Local Area Networks.

Multi-System Distributed System Gateway (MSDSG)

MSDSG addresses the issue of interworking 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 (ATLR). OTS/9000 provides the ATLR 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. Both the 1980 and 1984 X.25 addressing schemes are supported. 1984 NSAP addressing is supported over X.25 by taking advantage of the extended addressing facilities. Internet options include null subset, nonsegmenting subset, full subset accepting null subsets, and full subset (discarding other subsets).

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 Versio 3.0
- UK GOSIP Version 3.1
  - subprofile GOSIP CO WAN
  - subprofile GOSIP CL WAN
- US GOSIP Version 1.0 (FIPS 146)

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 and/or the LAN/9000 Link is required. Concurrent purchase of HP MMS/9000 (PN:32018A or 32019A), HP FTAM/9000 (PN:B1032A or B1033A), and/or HP X.400/9000 (PN:32031A or 32032A) is optional. If updating from OTS/9000 Version C.02.00 or earlier, the services, FTAM, X.400, and MMS must be updated as well.

Processor

- HP 9000 Series 300, 400, 700, or 800 computers which support either the X.25/9000 or LAN/9000 Link product, or both
- HP-UX Operating System Version 8.0 8.02, or 8.07
- 16 MBytes of main memory for Series 800 and 700 computers, 12 MBytes of main memory for Series 300 and 400 computers
- 30 MBytes of free disk space for Series 800 computers and 20 MBytes of free disk space for Series 300, 400, and 700 computers

Software

- HP OSI Transport Services/9000 Version C.03.00 for the Series 300 or 400 (P/N 32069A), or
- HP OSI Transport Services/9000 Version C.03.00 for the Series 700 (P/N J2160A)
- HP OSI Transport Services/9000 Version C.03.00 for the Series 800 (P/N 32070A)

Documentation

The following manuals are included with the product:

- 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

Ordering Information

For the Series 300 or 400, order P/N 32069A. For the Series 700, order P/N J2160A. You must also order software options shown below. The other option is not required.

Software Option

- UJ9 Software on DAT

Other Option

- 0B0 Deletes Manuals

For the Series 800, order PN 32070A. You must also order one of the software options and one of the processor options shown below. The other options are not required.

Software Options

- AA0 Software on cartridge tape
- AA1 Software on 1600 bpi tape
- AAH Software on DAT
- AA4 Q1C (Quarter Inch Cartridge)

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 Model 870, 890 3, 4 CPU

Other Options

- OB0 Deletes manuals
- 001 Computer Based Training(CBT)

Processor Upgrades

Return credit is given to customers upgrading within the Series 800 family. To order an upgrade, order P/N 32070A, selecting one of the software media options and one of the processor options (listed under Ordering Information), and one of the following return credit options:

- OGR for Models 807, 808, 817, 834
- OGE for Models 815, 822, 827, 837
- OC8 for Models 825, 832, 847, 857, 635
- OGS for Models 835, 842, 867, 877, 645
- OGT for Models 845, 852, 887, 897
- OGU for Models 850, 855, 860, 865, 890 1, 2 CPU

For PICS information contact your local HP Sales office.

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

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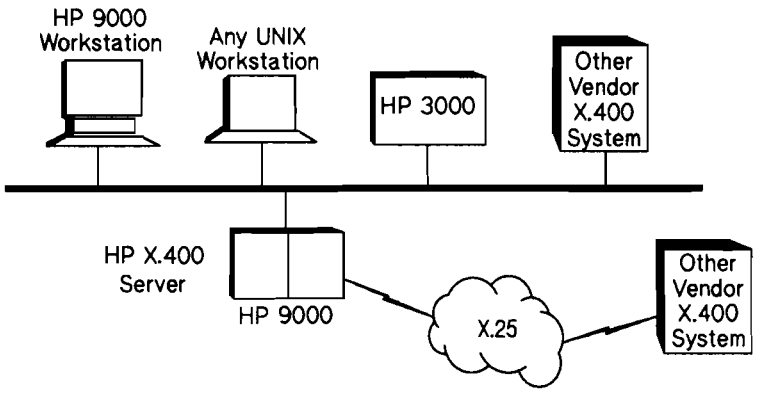
HP X.400

Technical Data

Product Numbers
32031A 32032A, 32055A, 32056A, J2162A

HP X.400 is based on the CCITT X.400 1988 standards and offers multivendor electronic messaging for HP 9000 and HP 3000 computers. With HP X.400, users of HP OpenMail, HP Desk, and UNIX® Mail 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 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 provides a native X.400 electronic mail system. Together, HP X.400 and HP OpenMail/UX 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. HP OpenMail also enables HP Desk users to exchange information with other users on X.400 networks.

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 high-level API:
HP's X.400 API allows application developers to create their own X.400 applications for both HP-UX and MPE operating systems. EDI, FAX, Telex and other store-and-foreward applications can be built on top of X.400. HP also supports the X.400 X/OPEN APIs for selected developers.

X.400 Network Management:
HP X.400 nodes can be configured and managed from remote nodes within the network. Network administrator tools can automatically warn the network administrator if remote X.400 nodes are encountering potential error conditions. HP X.400 also includes logging facilities for billing and troubleshooting.

Binary File Support:
HP X.400 allows OpenMail and HP Desk users 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."

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.

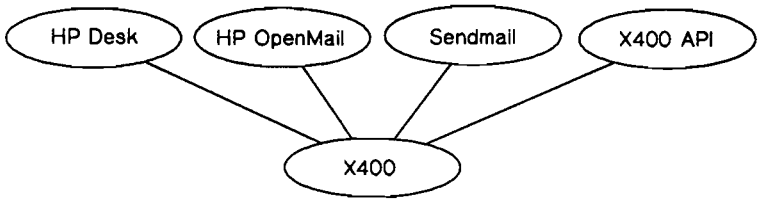
PC to X.400 Access:
Users of HP AdvanceMail and NewWave Mail for the PC can also create X.400 messages. AdvanceMail and NewWave Mail provide remote user agent capabilities. Users can compose messages on their PCs and later transfer them to HP OpenMail or HP Desk for distribution within the X.400, OpenMail, HP Desk, and UNIX environments.

X.25 and 802.3 with Transport Classes 0, 2, and 4:
HP X.400 runs over OTS/9000, HP's Session and Transport layers, on top of X.25 or LAN. 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.

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-foreward applications with the X.400 high-level API. Electronic Mail Gateways.

HP Desk to X.400 Gateway:
HP X.400 when used in conjunction with HP X.400/HPDesk (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.

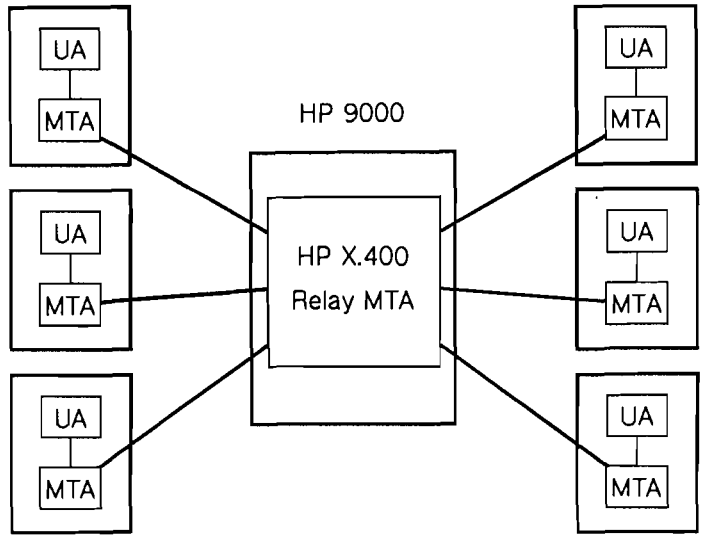


HP Desk to X.400 gateway requires two components: An HP X.400 server and the HP X.400/HP Desk Gateway software. An HP X.400 server consists of any HP 9000 with 802.3 and/or X.25 links along with the HP X.400 software and OSI Transport Services software.

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 Gateway 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 a 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 Mail (MailX or Elm). 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 can also run directly on top of X.400. This allows 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.

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 supports interoperability with the following X.400 vendors: AT&T, CDC, Data General, Digital, IBM, NCR, Nixdorf, Olivetti, Prime, Retix, Siemens, SoftSwitch, Sun Microsystems, Touch, Wang, and Xerox.

HP has certified 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.

X.400 Application Programmatic Interface (API)

A simple X.400 API allows application developers to create X.400 store-and-forward applications. Applications such as FAX and TELEX to X.400 gateways along with EDI applications are easily integrated with X.400 using six basic programmatic calls:

X4_BEGIN_SEND ()
X4_PUT_ATTRIBUTE()
X4_SEND () X4_RECEIVE ()
X4_GET_ATTRIBUTE ()
X4_END_RECEIVE ()

HP also offers the X.400 X/OPEN API for select customers.

X.400 Performance

SPU	S/807	S/827	S/837	S/857	S/870
Number of Messages per hour	1200	2300	5000	8000	12000

Performance

Performance for HP X.400 is measured in messages per hour over a LAN. A message is 1K byte long with one recipient. A single X.400 node can route X.400 messages at the above maximum rates.

Documentation

For detailed usage and technical information, please consult the following Hewlett-Packard manuals:

32055-90001
HP X.400/HP Desk Node Administrator's Guide
32055-90002 Using HP DeskManager Connected to HP X.400
32034-90005 Installing and Administering HP X.400
32043-90006 Managing HP X.400
32034-90007 Using HP X.400 with Elm and MailX
32034-90008 HP X.400 High-Level API

Installation and Support Policy

The HP X.400 software and the X.400 server bundle are customer installable and configurable. Installation and configuration can also be performed by HP through the purchase of consulting services.

Interoperability testing can be purchased from HP on a time-and-materials basis. 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.

HP X.400 version C.03.00 requires HP-UX Version 8.0. A 132 Mb (or larger) disk drive is also required.
HP X.400/HP Desk requires MPE V Version V delta 8 or MPE XL Version 2.0 (or later), NS services, and the LAN Link product for the HP 3000. It also requires Version B.03.B0 (or later) of HPDesk.

The X.400 server may be any HP 9000 system running HP-UX Version 8.0 (or later).

Ordering Information

HP X.400 includes email gateways for Sendmail and OpenMail. HP X.400 also includes the HP X.400 API. The HP X.400/HP Desk Gateway must be purchased separately.

HP X.400 for the Series 300/400 (HP 32031A)

HP X.400 for the Series 600/800 (HP 32032A)

HP X.400 for the Series 700 (HP J2162A)

Required Products

HP OSI Transport Services/9000 for the Series 300/400 (HP 32069A)

HP OSI Transport Services/9000 for the Series 600/800 (HP 32070A)

ARPA Services/9000 is also required for use of X.400 with Sendmail.

Software is available on magnetic tape, DAT, and cartridge tape.

HP X.400 requires concurrent or prior purchase of HP X.25 Link/9000 or HP LAN Link/9000.

HP Desk to X.400 Gateway to connect HP Desk to X.400 requires the purchase of at least one copy of the HP X.400/HP Desk Gateway for MPE.

32055A HP X.400/HPDesk for MPE XL

Options:
320 For Series 925 or 925LX
330 For Series 935
340 For Series 950 or 955

32056A HP X.400/HP Desk for MPE V

Options:
310 For use on MICRO 3000
320 For Series 39-58
330 For Series 6x-70

The following is a suggested minimum configuration for creating an X.400 server for HP Desk:

Model 807 server (HP A1751A)
HP-UX on DDS (Opt. AAH)
16 MB memory (Opt. 501)
328 MB disk drive (Opt. 001)
ThinLAN, ARPA, NFS I/F (Opt. 1F7)
X.25 RS232 Link (Opt. 030)

HP X.400 (HP 32032A)
DDS tape (Opt. AAH)
For use on 807 (Opt. AH0)

HP OSI transport (HP 32070A)
DDS tape (Opt. AAH)
For use on 807 (Opt. AH0)

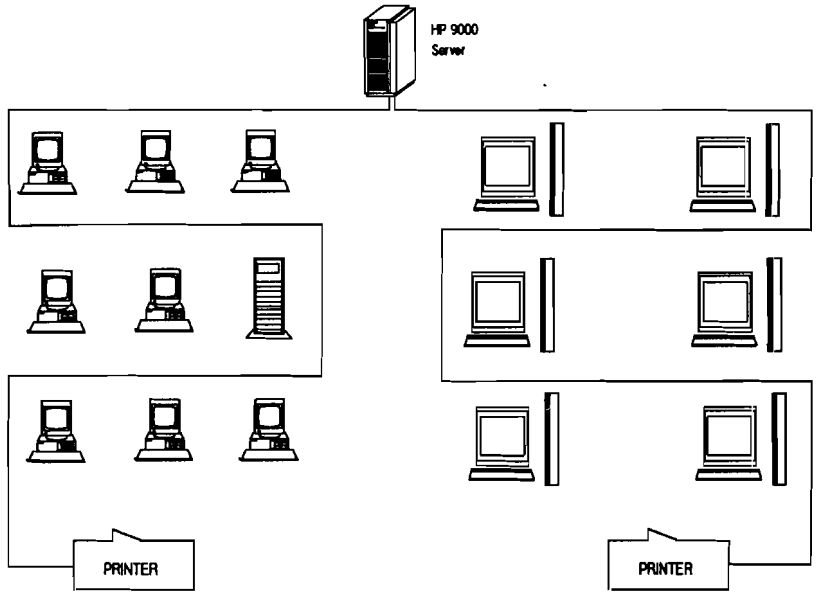
HEWLETT PACKARD

NetWare® for the HP 9000 Series 700

Technical Data

Product Number
J2239A

NetWare 3.01B 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 workstations. 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 application . 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 (API)s.
- 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 nine supported HP 9000 spooled printers can be associated with a NetWare server print queue. 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 ARPA Services 2.1 Connectivity

Access to existing HP 9000 applications from a NetWare client is very important. HP ARPA 2.1/MS-DOS for NetWare provides this capability and is ordered separately, Product Number D1823A. HP ARPA Services 2.1/MS-DOS 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 ARPA Services 2.1/MS-DOS 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 Advance-Link or WRQ® Reflection®. NVT allows NetWare clients to access host applications and services.

Network Capacity

NetWare for the HP 9000 will support up to 64 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, at least 16 MB of RAM, and 20 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 complete 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.

The next release of NetWare, version 1.11, will be a new and separate product. In the next release, an upgrade credit for version 3.01B will be offered.

Ordering Information

NetWare 3.01B for the HP 9000 will not be ported to HP-UX 9.0. NetWare 3.01B will be discontinued once NetWare 3.11 is released.

The next release of NetWare, Version 3.11, will be a new and separate product. In the next release, an upgrade credit for Version 3.01B will be offered.

J2239A NetWare 3.01B for HP 9000 700S

AAH	Software on Digital Audio Tape (DAT)
AAU	CD Certificate for CD ROM
UA2	4 clients supported
UA3	8 clients supported
UA5	16 clients supported
UA7	32 clients supported
UA9	64 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

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.

Documentation

The following documentation is provided with NetWare for the HP 9000:

J2240A-61001 NetWare for the HP 9000 Installation Manual.
J2240A-61002 NetWare for the HP 9000 System Administration.
J2240A-61003 NetWare for the HP 9000 User Basics for DOS Workstations.
J2240A-61004 NetWare for the HP 9000 Utilities Reference.
J2240A-61005 NetWare for the HP 9000 Concepts.
J2240A-61006 NetWare for the HP 9000 Error Messages.
J2240A-61007 NetWare for the HP 9000 Machine Dependencies and Installation Guide and Host Administration Supplements.

HEWLETT PACKARD

NetWare® for the HP 9000 Series 800

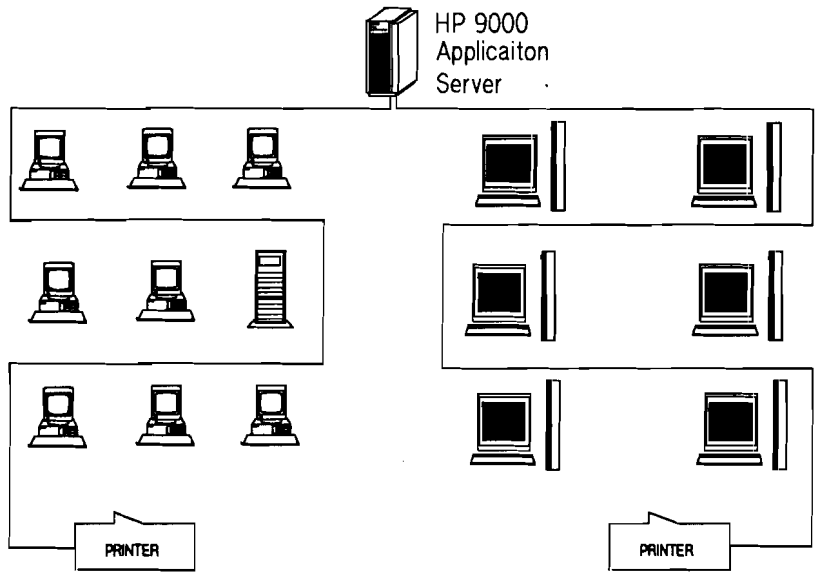
Technical Data

Product Number
J2240A

NetWare 3.01B 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, high speed network operating system that enables HP 9000 systems to operate as a file and resource server to desktop workstations. 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 application . 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 (API)s.
- 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

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 nine supported HP 9000 spooled printers can be associated with a NetWare server print queue. 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 ARPA Services 2.1 Connectivity

Access to existing HP 9000 applications from a NetWare client is very important. HP ARPA 2.1/MS-DOS for NetWare provides this capability and is ordered separately, Product Number D1823A. HP ARPA Services 2.1/MS-DOS 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 ARPA Services 2.1/MS-DOS 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 Advance-Link 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.

NetWare for the HP 9000 requires the installation and operation of Lan Link, HP-UX version 8.02 and at least 16MB of RAM and 20MB 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 complete 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.

The next release of NetWare, version 1.11, will be a new and separate product. In the next release, an upgrade credit for version 3.01B will be offered.

Ordering Information

NetWare 3.01B for the HP 9000 will not be ported to HP-UX 9.0. NetWare 3.01B will be discontinued once NetWare 3.11 is released.

The next release of NetWare, Version 3.11, will be a new and separate product. In the next release, an upgrade credit for Version 3.01B will be offered.

AA4 QIC Cartridge tape
AA0 Software on 1/4-inch cartridge tape
AA1 Software on 1/2-inch 1600 bpi tape
AAH Software on Digital Audio Tape (DAT)
AAU CD Certificate for CD ROM
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.

Documentation

The following documentation is provided with NetWare for the HP 9000:

J2240A-61001 NetWare for the HP 9000 Installation Manual.
J2240A-61002 NetWare for the HP 9000 System Administration.
J2240A-61003 NetWare for the HP 9000 User Basics for DOS Workstations.
J2240A-61004 NetWare for the HP 9000 Utilities Reference.
J2240A-61005 NetWare for the HP 9000 Concepts.
J2240A-61006 NetWare for the HP 9000 Error Messages.
J2240A-61007 NetWare for the HP 9000 Machine Dependencies and Installation Guide and Host Administration Supplements.

HEWLETT PACKARD

HP X.500 Distributed Directory

Technical Data

Product Numbers
J2152A, J2153A

HP X.500 Distributed Directory is a full X.500 directory based on the 1988 CCITT X.500 standard. 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.500 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, which simplify and speed application development.

Messaging Backbone Foundation:
HP X.500 works together with HP X.400 to form the foundation for a multi-vendor 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 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

interoper-ability of the network at various layers of the OSI stack, isolating problems quickly and easily.

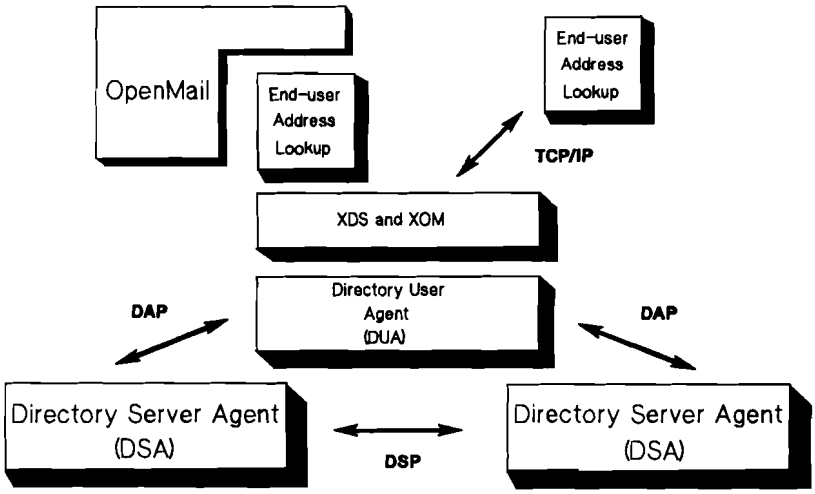
Complete DUA and DSA:
HP X.500 includes a complete multi-threaded Directory User Agent (DUA) and Directory Server Agent (DSA). The X.500 Directory Information Base (DIB) is built on a database that has been optimized for X.500 performance. HP X.500 contains full support for Directory Access Protocol (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.

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

P/N J2152A
HP X.500 Distributed Directory/9000 for the HP Series 800 (Product contains DSA server and DUA client).

P/N J2153A
HP X.500 DUA/9000 for the HP Series 800 (DUA client only).

Required Products

HP X.500 Distributed Directory products (J2152A and J2153A) also require the use of:

- 32070A HP OSI Transport/9000 for the HP Series 800
- HP X.25 or HP LAN link products.

HEWLETT PACKARD

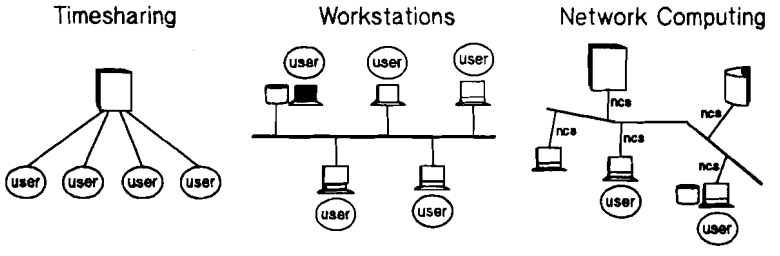
Network Computing System 1.5.1 (NCS)

Technical Data

Product Numbers
B1020A, B1022A, B2674A, LA400BAD and LA400BBD

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



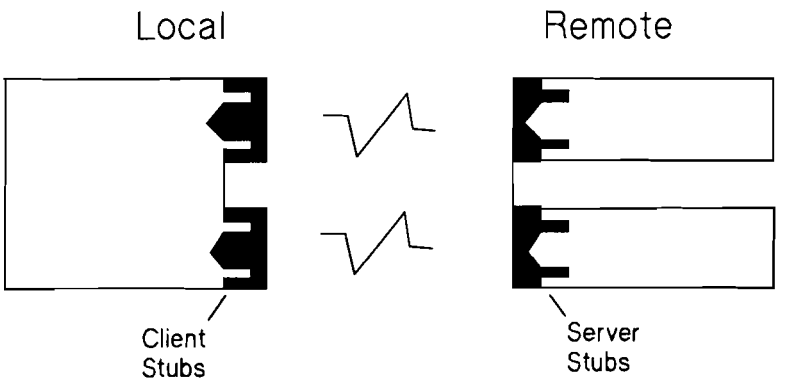
The Network Computing system establishes a new generation of computing by letting single users, even single applications run multiple computers at once.

NCS was accepted by the Open Software Foundation (OSF) as their remote procedure call (RPC) mechanism. NCS will be incorporated into the Distributed Computing Environment (DCE) and will be 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.



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.

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.

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 implementa-tion 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 indepen-dence. 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.

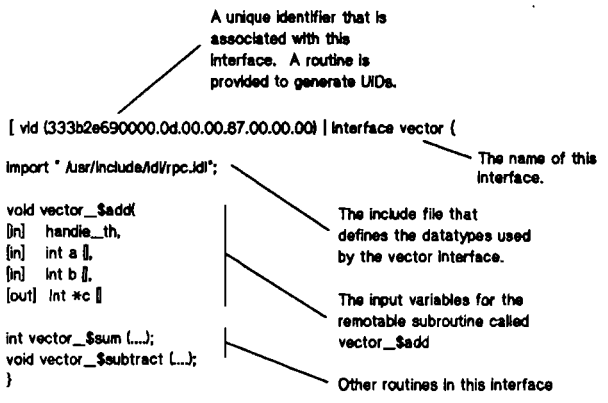
An Object-oriented Approach.

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.

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.

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.

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.

NCS Version 2 is available for DOMAIN/OS and OSF/1 TR systems.

Configuration and Prerequisites

For HP 9000:

- HP 9000
  Series 300,400,600,700,800
  - Minimum 8 Megabytes memory
  - LAN/9000 Link
  - HP-UX Version 8.0 or later
- For Domain:
  - Domain workstation
  - Domain/OS SR10.1 or later
- **Note:** NCS/NCK is included with HP-UX Version 8.0 and later.

Ordering Information

B1020A NCS/NIDC 1.5.1
Series 300 and 400

B1020A Options
AAO ¼-inch tape
OB1 Documentation
AAU CDROM certificate (for software)

B1022A NCS/NIDC 1.5.1
Series 600 and 800

B1022A Options
AAO ¼-inch tape
AA1 ½-inch tape
AAH DAT tape
OB1 Documentation
AHO -> AH1 license to use

B2674A NCS/NIDC 1.5.1
Series 700

B2674A Options
AAU CDROM certificate
AAH DAT 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

- Network Computing Architecture **P/N D-1201B**
- Network Computing System Reference Manual **P/N D-10200-C**
- Network Computing System Tutorial **P/N D-18355-C**
- Managing NCS Software **P/N 11895-E**

HEWLETT PACKARD

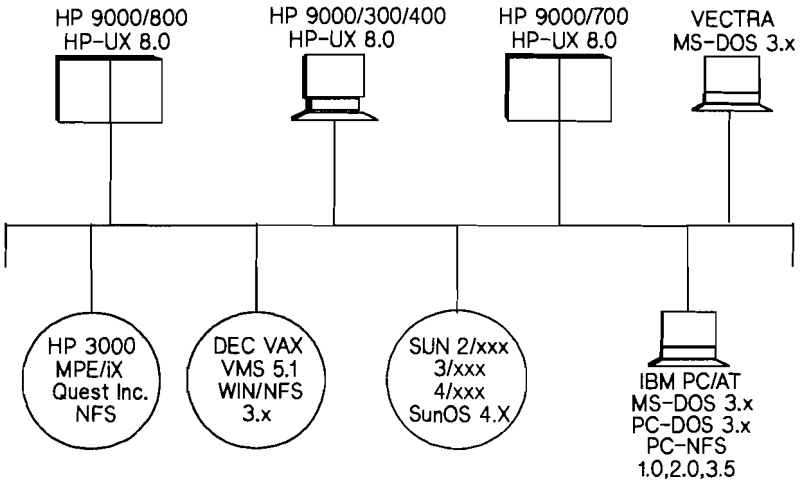
HP Network File System Services/9000

Technical Data

For HP Series 800/600/700/ 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

adminstrator 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/300/400/600/700/800 requires the HP/UX 8.0 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 Mbytes of internal system memory for acceptable performance, and allocating 3 Mbytes 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 Mbytes of internal memory is recommended for acceptable performance. 4.5 Mbytes 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 8.0 for all 300/400/600/700/800 systems. The approprate HP/UX Product numbers for systems follow:

- B2438A: HP/UX 8.0 for 300/400/600/800
- B2459A: HP/UX 8.02 for 8x7 systems
- B2461A: HP/UX 8.06 for 8x7 MP systems
- B2352A: HP/UX 8.07 2-user license for series 700
- B2353A: HP/UX 8.07 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
WIN/TCP 3.0	VAX	VMS 4.7	The Wollongong
WIN/NFS 1.1	7xx-8xxx	Group	
PC NFS 1.0, 2.0, 3.5	HP Vectra IBM PC	MS DOS 3.x PC DOS 3.x	Sun Microsystems Inc.
Sun NFS	Sun 2/xxx, Sun 3/xxx, Sun 4/xxx	Sun OS Rel. 4.0	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, as is the following documentation:

- B1013-90010 Programming and Protocols for NFS Services
- B1013-90009 Installing and Administering NFS Services
- B1012-90012 HP 9000 Computers Networking Overview

HEWLETT PACKARD

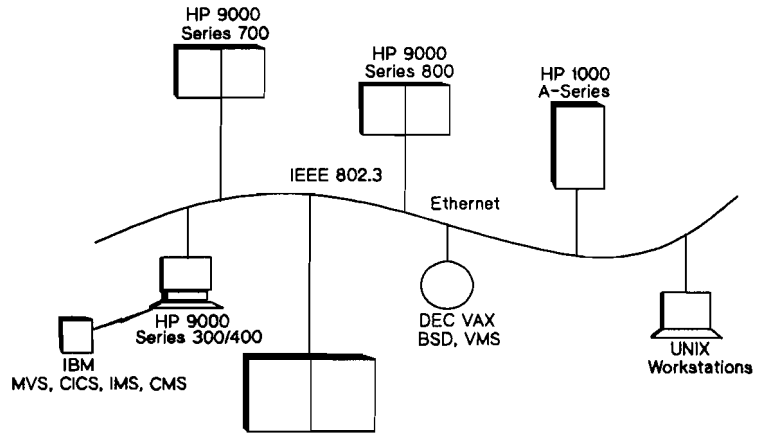
NS/9000 for Series 300/400, Series 700, and Series 800/600

Technical Data

Product Numbers
B1012B for Series 300/400
B1029B for Series 800/600
J2140A 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 layer approach following the International Standards Organization's Open Systems Interconnection (ISO/OSI) Model. NS/9000 supports communication between the HP 9000 Series 800, 700, 600, 400, and 300; 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 800/600, Series 700, Series 300/400 Link product, or the X.25 Link product. The Token Ring and FDDI links are not supported with NS/9000.

Figure 1



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, 600, 700, 400, and 300; HP 1000 A-Series, and the HP 3000 computers.
  - Virtual Terminal to HP 3000 (VT3K) – provides virtual terminal capability from Series 300/400, Series 700s, and Series 800/600s 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 or Series 600.
- Industry Standards-based protocols: NS/9000 runs on the LAN/9000 Series 800 or Series 300 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). (NS/9000 is not ARPA compatible.)

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 800/600, Series 700, and Series 300/400 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 300, 400, 600, 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.

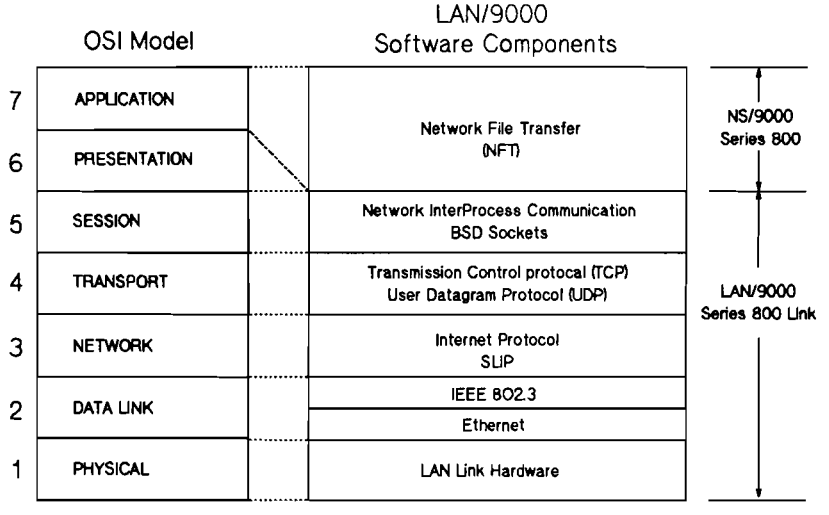
Translate File Attributes:
File attributes are translated transparently and on demand when files are copied between different systems. This means that when an HP-UX file is copied to an HP 1000 A-Series computer, the file attributes will be translated into RTE-A file format.

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_f
ile\pc_fab#delta:gama#des
t_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 300/400, Series 700, and Series 800/600 systems to log into HP 3000 systems running MPE/V and MPE/XL. 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 300 and types:

vt3k host3000

where host3000 is either an MPE/V or MPE/XL 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 800/600, Series 700, and Series 300/400 Links alone enable Series 800/600, Series 700, and Series 300/400 computers to communicate with other HP 9000 computers using NetIPC and 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 800/600, 700, and 300/400 computers over the LAN requires that the remote systems be equipped with a LAN/9000 Series 800/600, 700, or 300/400 Link and either NS/9000 or ARPA Services/9000 software. Specific requirements for intersystems communication with LAN/9000 Series 800/600, 700, and 300/400 Links and NS/9000 between HP 9000 and non-HP 9000 processors are described in table 2.

Table 1

Model #	LAN/9000 Link Product	Network Services 9000	ARPA Services 9000
Series 800/600	36967A	B1029B	B1030B (included with all 8x7 systems)
Series 300/400	98171A	B1012B	Included with HP-UX OS
Series 700	25567A	J2140A	Included with HP-UX OS

Table 2: **HP 9000 NS and LAN Links**

Computer System	LAN Link	Software
HP 9000 Series 800/600	LAN/9000 Series 800 (36967A) (choose appropriate options)	NS/9000 Series 800/600 (B1029B)
HP 9000 Series 300 Model 320	LAN/9000 Series 300 Model 320 (98171A)	NS Services/ 300 (B1012B)
HP 9000 Series 300 Models 340, 345, 360, 370, 375	Built-in LAN interface Additional LAN interfaces require 98171A	NS Services/ 300 (B1012B)
HP 9000 Series 400	Built-in LAN interface Additional LAN interfaces require 98171A	NS Services/ 400 (B1012B)
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 800/600, 700, and 300/400 software is compatible with:

- NS/1000 (91790A) NFT and TELNET* Services
- NS/3000 NFT and VT Services

* TELNET service requires the ARPA Service/800/600 or ARPA Services/300/400/700 product also.

System Environment

Series 800/600 computers running NS/9000 must be running the HP-UX operating system version 8.0 or later. Series 700 and Series 300/400 computers running NS/9000 must be running the HP-UX operating system version 8.0 or later. A minimal configuration for NS/9000 Series 800/600 functional operation is 8 Mbytes of memory, which includes the memory requirements for the HP-UX operating system, and at least one disk drive. A minimal configuration for NS/9000 Series 300/400 functional operation is 4 Mbytes of memory, which includes the memory requirements for the HP-UX operating system. Eight or more megabytes are recommended. Series 300s can run NS/9000 in diskless configurations or with a disk drive.

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 800/600, 700, 300/400 customer must assume the following responsibilities with the purchase of NS/9000.

1. LAN/9000 Series 800/600, Series 700, or Series 300/400 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 TeamLine Software Support or ResponseLine Software Support 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

B1029B NS/9000 for Series 800/600 options

AHO For Tier 1 SPUs
AEL For Tier 2 SPUs
AE5 For Tier 3 SPUs
AE6 For Tier 4 SPUs
AEN For Tier 5 SPUs
AEP For Tier 6 SPUs
AH1 For Tier 7 SPUs
030 Documentation and media on ¼-inch tape for HP-UX 8.0
031 Documentation and media on ½-inch tape for HP-UX 8.0
032 Documentation and media on digital audio tape for HP-UX 8.0
033 Additional copies of documentation for HP-UX 8.0

Order the appropriate upgrade option if moving to a larger system:

0CA Return credit for the 500 processor
0GR Return credit for option AH0
0GE Return credit for option AEL
0G8 Return credit for option AE5
0GS Return credit for option AE6
0GT Return credit for option AEN
0GJ Return credit for option AEP

B1012B NS/300/400 License to Use

0AK Additional software license to use
AA0 Documentation and media on ¼-inch tape for HP-UX 8.0
0BI Additional copies of documentation for HP-UX 8.0

J2140A NS/700 License to Use

AAU Documentation and media on CD ROM for HP-UX 8.0
0BI Additional copies of documentation for HP-UX 8.0
AAH Documentation and media on DDS cartridge for HP-UX 8.0
0AK Additional software license-to-use

Hardware
Consult LAN/9000 Link Data Sheet

HEWLETT PACKARD

HP 9000 RJE Emulator

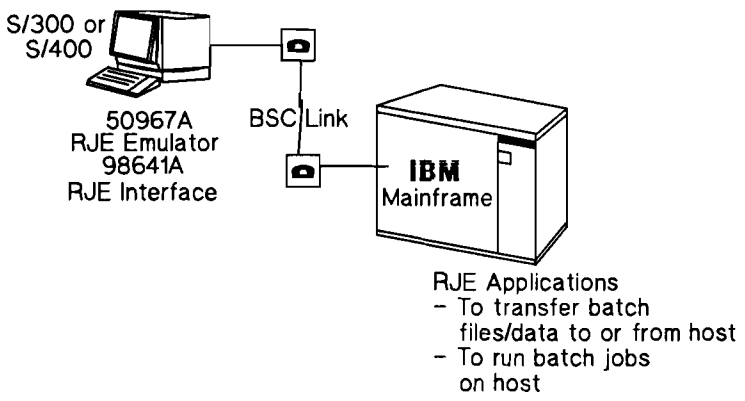
Technical Data

For Series 300 & 400 Computer Systems Product Number 50967A

The HP 9000 RJE Emulator allows Series 300 and Series 400 HP-UX workstations to emulate an IBM 2780 Data Transmission Terminal or an IBM 3780 Data Communications Terminal.

The RJE Emulator gives you access to the files, peripherals, databases, and computational power of your host computer system and lets you keep the flexibility, speed, power, and ease of your HP 9000.

You can have host computer system access at your convenience – without waiting for an available terminal.



RJE Features

- On-line access to IBM databases, peripherals, computational power, and applications software.
- Binary Synchronous Communications with EBCDIC transmission codes.
- Data transmission at speeds up to 56,000 bps.
- Transparent mode transmission.
- Queueing of files for later transmission.
- Text and binary file transfer. These files may contain text, program source, program object code, data, or a mixture of these objects.
- Comprehensive and precise accounting and error recording.
- Programmable time-out values.
- Print formatting utility to change IBM printer codes to HP printer codes.
- Trace utility to aid in tracking down communications protocol problems.
- RS-232 and V.35 connections.

The HP 9000 RJE commands are not 100% compatible with their UNIX® operating system counterparts. Some of the infrequently used options are not implemented.

The following features are not supported:

- Multileaving RJE and console support
- Multipoint transmission
- 6-bit transcode
- Bell messages
- Hardwired connections

Configuration Information

Workstation and Operating System

Series 300 and Series 400 workstations (including 310, 320, 330, 332, 340, 350, 360, 370, 375, 4xx) running the latest release of HP-UX.

Peripherals

The RJE Emulator will work with all printers and data storage devices supported by the Series 300 or 400 workstations.

Hosts

- IBM MVS/JES2
- IBM MVS/JES3
- IBM DOS/POWER
- IBM VM/RSCS
- HP 1000 RTE/RJE
- HP 3000 MPE/RJE

Modems

For RS-232 Connections:

- Bell System Type 201C for 2400 bps transmission
- Bell System Type 208A for 4800 bps transmission
- Bell System Type 208B for 4800 bps transmission
- Bell System Type 209A for 9600 bps transmission
- Bell System Type 2024A for 2400 bps transmission
- Bell System Type 2048A for 4800 bps transmission
- Bell System Type 2096A for 9600 bps transmission

For V.35 Connection

- Bell System Type DDS (Digital Data Service) for 56,000 bps transmission

Ordering Information

98641A Series 300 RJE Interface (includes 5-meter DTE [male]cable) (RS-232). 98641A **Opt. 001** for V.35

50967A RJE Emulator Software on ¼-inch tape

Note: This product is applicable to both single- and multiuser configurations. A right-to-reproduce product is not available.

Documentation

50966-90000 RJE User's Manual for HP 9000 Computers

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

HP-UX LU 6.2 API

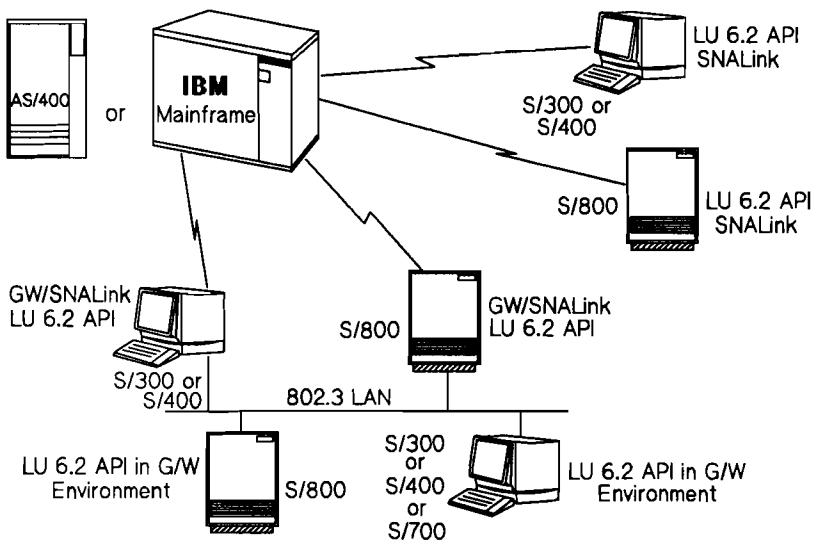
Technical Data

For HP 9000 Series 300, 400, 700, and 800 Computer Systems
Product Numbers
98162A, 98164A, and J2142A

The HP-UX LU 6.2 API (Application Programming Interface) product provides a mapped conversation programmatic interface for developing applications for program-to-program communication in hierarchical or peer-to-peer environments. The product is a C library that is linked into the user's application trans-action program (TP) to gain access to the IBM system. Combined with the HP-UX SNALink product, HP-UX LU 6.2 API gives HP customers the ability to develop applications that are distributed between an HP 9000 computer and an IBM system.

On the HP 9000, the application is written using the HP-UX LU 6.2 API verbs. The verbs implement the base function set plus a number of option sets of the LU 6.2 architected interface 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 the IBM system. The application TP on the HP 9000 must be implemented in C.

The HP-UX LU 6.2 API product can be run in either a standalone or a gateway (client/server) environment. The standalone environment allows access to IBM systems from a single HP-UX computer that has its own HP-UX SNALink. The gateway envi-ronment permits access to IBM systems from multiple HP-UX systems on a LAN. Client systems generally use a single HP 9000 system with a Gateway/SNALink as a gateway (server) to access the IBM systems.



Features

HP-UX LU 6.2 API provides:

- **Mapped Conversation and Type-Independent Verbs:** Allow HP 9000 programmers to implement program-to-program communication in an SNA network.
- **Peer-to-Peer or Hierarchical Environments:** Systems running LU 6.2 can communicate with peer systems directly by taking advantage of SNALink's Node Type 2.1, or systems can communicate with an IBM mainframe using Node Type 2.0.
- **Multiple Sessions/Parallel Sessions:** Up to 64 dependent LUs and up to 64 independent LUs are supported for a maximum of 128 LUs. The 64 dependent LUs allow one session per LU in a hierarchical environment. The 64 independent LUs allow 256 parallel sessions per LU in a peer-to-peer environment. HP will support 1000 maximum simultaneous sessions. Each session allows for a separate communication task or for adding additional bandwidth to a single communication task.
- **LEN Node in APPN:** A system running LU 6.2 API application can act as a Low Entry Network (LEN) node in an IBM Advance Peer-to-Peer Network (APPN) environment.
- **Support for Remote Attach:** Enables a remote LU 6.2 application to request an HP 9000 LU 6.2 application to start running and begin communication with it.
- **SNA Services Compatibility:** The HP-UX LU 6.2 API is completely compatible with other HP 9000 SNA services: HP-UX SNA3270, HP-UX SNA3770, and HP-UX SNA3179G (Series 300 only). These products may all be running simultaneously over the same SNALink to the SNA network. SNALink is a hardware and software product that manages the physical link to the IBM host and implements protocols in the lower four levels of the SNA stack.
- **Tracing Facility:** 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.
- **Support for C Language:** Application programs on the HP 9000 are written in C Language.
- **Change Number of Sessions (CNOS):** LU 6.2 applications can dynamically change sessions limits while running in a peer-to-peer environment.
- **Support for Boundary Node:** Two HP-UX Systems can communicate using LU 6.2 by routing through an IBM mainframe using the Boundary Node Function. HP systems cannot communicate directly using LU 6.2 (primary SDLC is not supported).
- **Support for multiple HP platforms:** LU 6.2 and SNALink can run on a standalone HP 9000 S/800, S/400, and S/300. LU 6.2 can also run as a client on HP 9000 S/800, S/700, S/400, and S/300 where G/W SNALink is running on a server system (S/800, S/400 or S/300).

Functional Description

HP-UX LU 6.2 API provides a set of mapped conversation and type-independent verbs for application programmers to use for program-to-program communications. Communication can take place between an HP 9000 application program and either a CICS application program running on an IBM host 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.

In addition to the HP-UX LU 6.2 API 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 (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 for request-to-send received
- Receive immediate
- Get conversation attributes

HP-UX LU 6.2 API verbs are supported in the C programming language only and are summarized in the facing table.

Customer Installation Responsibility

The products are customer installable. User installation aids, such as automated installation procedure and an IBM host generation guide, are provided to simplify the process. 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.

HP-UX LU 6.2 API Verb Summary

Verb	Function
mc_allocate	Establishes a mapped 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 mapped conversation between TPs.
mc_get_attributes	Returns information pertaining to a mapped conversation.
mc_flush	Flushes the LU's send buffer.
mc_post_on_receipt	Causes the LU to post the conversation when information is available for the local TP to receive.
mc_prepare_to_receive	Changes the conversation from send to receive state in preparation for receiving data.
mc_receive_and_wait	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.
mc_receive_immediate	Receives any information available on the mapped conversation without waiting.
mc_request_to_send	Notifies the remote TP that the local TP is requesting to send data for the mapped 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	Tests the conversation for the receipt of information.
lu62_wait	Waits for the receipt of information on one or more conversations.
get_allocate	Receives the request from a remote TP to start a conversation and then establishes the conversation.
getlu	Acquires ownership of an SNA LU-LU session for a local TP.
freelu	Frees an LU-LU session that was acquired by, or allocated for, a TP.
tp_start	Starts the TP, establishes an IPC connection to a named SNALink server, and optionally enables a trace.
tp_end	Ends the TP, stops an IPC connection to a named SNALink server, and optionally closes a trace.
asc2ebc	Converts ASCII data to EBCDIC.
ebc2asc	Converts EBCDIC data to ASCII.
lu62version	Returns version string for LU 6.2 library.
activiate_session	Activates a specific LU-LU session.
deactivate_session	Immediately deactivates a specific LU-LU session.
change_session_limit	Changes session limits, activiates or deactivates parallel sessions.
initialize_session_limit	Initializes session limit, activates parallel sessions.
reset_session_limit	Resets session limit to zero.

Product Requirements

Environment	LU 6.2 API Workstation Standalone	LU 6.2 API Workstation Gateway	LU 6.2 API Multiuser Standalone	LU 6.2 API Multiuser Standalone	LU 6.2 API Multiuser Gateway
Models	310, 320, 330, 332, 340, 350, 360, 370, 375, 4xx	310, 318, 319, 320, 330, 332, 340, 350, 360, 370, 375, 4xx, 7xx	705, 710, 720 730, 750	808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845 850, 852, 855, 860, 865, 870	808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865, 870
Operating System	Latest Operating System	Latest Operating System	Latest Operating System	Latest Operating System	Latest Operating System
SNALink	SNALink 36592A	GW/SNALink 36593A or 98173A	Not Available	SNALink 98174A or 98174A	GW/SNALink 36593A
Disk Space (HP-UX LU 6.2 Library Only)	387K	387K	387K	512K	512K
Memory	137K	137K	137K	167K	167K
LAN	Not Required	LAN/9000 S/300 Link	LAN/9000 S/700 Link	Not Required	LAN/9000 S/800 Link
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment, MVS or MVS/XA operating systems, ACF/VTAM and ACF/NCP, CICS (version 1.7 or later)				
IBM Midrange	Examples of systems supported are AS/400, S/36, S/38, or IBM systems that can be supported in IBM's APPN environment. IBM system links must support Node Type 2.1. IBM systems must be running the latest operating system version.				

Note: If the HP-UX LU 6.2 API is to function in a standalone configuration, the standalone version of the HP-UX SNALink is required. Similarly, the gateway version of the SNALink is required for proper function of HP-UX LU 6.2 API in the gateway configuration.

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 LU 6.2 API includes right-to-use license and software.

98162A HP-UX LU 6.2 API for Series 300/400

J2142A HP-UX LU 6.2 API for Series 700

For Series 800, customer must choose 98164A, a media option and a processor option.

98164A HP-UX LU 6.2 API for Series 800

Media Options (98164A only)
AA0 1/4-inch Linus Cartridge
AA1 1600BPI Magnetic Tape
AAH DAT
AA4 QIC Cartridge

Series 800 processor options (98164A only)
AHO Model 807/808/817 version
AEL Model 815/822/827/837 version
AE5 Model 825/832/847/857/635 version
AE6 Model 835/842/867/877 645 version
AEN Model 840/845/852 version
AEP Model 850/855/860/865 version
AH1 Model 870 version

HP-UX LU 6.2 API requires previous installation of HP-UX SNALink (36592A, 98173A) or HP-UX Gateway/SNALink (36593A, 98174A).

HP-UX LU 6.2 API must be ordered for each HP-UX computer that is to communicate with the IBM mainframe through a gateway machine.

Upgrade options are available on all the SNALink products. Please consult the HP 9000 price guides for details.

Note: Ordering information for HP 36592A, 36593A, 98173A, and 98174A HP-UX SNALinks may be found in the data sheet for HP-UX SNALink and HP-UX Gateway/SNALink.

Documentation

- **98162-61001** HP-UX LU 6.2 API Application Programmer's Reference Manual
- **98162-61002** HP-UX LU 6.2 API Administrator's Guide
- **36592-61003** HP-UX SNA/9000 Manual Reference Pages (generally referred to as "Man Pages")

The following documentation is available to help IBM host site personnel to configure ("gen") the mainframe for HP-to-IBM communications:

- **30291-61005** HP SNA Products: IBM Host System Program-mer's 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 Sales Representative, or refer to the HP data sheets for specific support services.

HEWLETT PACKARD

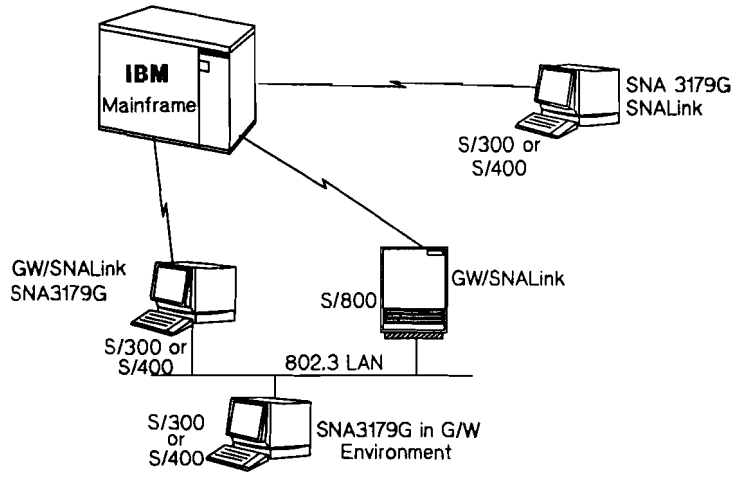
HP-UX SNA3179G

Technical Data

For HP 9000 Series 300 and Computer Systems
Product Number
B1001A

The HP-UX SNA3179G software product enables the HP 9000 Series 300 or 400 running the HP-UX operating system, and the X Windows System, to emulate an IBM 3179G/3192G color graphics display station. SNA3179G allows interactive communications between an HP 9000 Series 300 and an IBM System/370 or compatible mainframe using SNA communications and 3270 data stream.

The HP-UX SNA3179G can be run in two environments—standalone and gateway. The standalone configuration provides IBM mainframe access for a single HP-UX machine that has its own HP-UX SNALink. The gateway configuration permits access to the IBM mainframe from multiple HP-UX computers on a LAN. These computers generally use a single HP 9000 computer with a Gateway/SNALink as a gateway to access the IBM mainframe. The SNA3179G product requires HP-UX SNALink for a standalone configuration. For the gateway configuration, the SNA3179G product requires LAN-based access to a system running HP-UX Gateway/SNALink. The SNALink provides the major features of an IBM 3274 cluster control unit and the lower four levels of SNA. Physical Unit Type 2 (PU2) is emulated, Logical Unit Types 1, 2, 3, and 6.2 (LU1, LU2, LU3, LU6.2) are supported. When used with HP-UX SNALink or Gateway/SNALink, SNA3179G allows access to the Graphical Data Display Manager (GDDM) and 3270 applications on the mainframe, such as TSO and CMS.



Features

The HP 9000 Series 300 or 400 with SNA3179G 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 SNA3179G product supports the following features:

- High-quality color vector graphics
- Seven Color plus black background
- Bit-mapped display with 24 and 32 line support
- Program symbol support: PSA, PSB, and ISS
- Alphanumeric/APL keyboard
- HP-UX X.11 Window system support allows the user to create, move, shuffle, iconify, or refresh windows; the window manager allows the execution of several HP-UX 3179G appli-cations in a multitasking mode; the graphics, color, and special effects of the IBM 3179G applications are maintained while executing SNA3179G in the X Window System
- For information about limited support on X-terminals, contact your HP Sales Representative
- Two window sizes:
  - 512 × 720 pixels
  - 672 × 960 pixels (height × width)
- Efficient screen handling routines provide a very responsive and low-overhead user interface.
- Powerful commands to monitor and control the operation of the product; a very useful help facility is also provided.

Product Requirements

Environment	SNA3179G Series 300,400	SNA3179G Series 300,400
Models	320,330,332,340, 350,360,370,375,4xx	319,320,330,332,340, 345,350,360,370,375,4xx
Operating System	Latest operating system	Latest operating system
SNALink	HP-UX SNALink 36592A	HP-UX GW/SNALink 36593A or 98174A
Memory	The HP 9000 Series 300 must have a least 8 MB of memory	
Disk Space	750K	750K
LAN	Not required	LAN/9000 S/300 Link
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment ACF/VTAM and ACF/NCP GDDM, SAS/GRAPH, TSO or CMS	

Monitors and Controllers	Monitors					
Display Controllers	98751A	98752A	98782A	98784A	98785A	98789A
98547A			X			
98549A	X		X		X	
98550A				X		X
98720A		X				
98730A		X				X

Functional Specifications

When SNALink and SNA3179G are used together, the SNALink emulates an IBM 3274 model 51C cluster controller, and SNA3179G emulates a 3179G Model G1 or G2 display.

Local screen print is available with SNA3179G through the functionality of X Windows. All printers supported by X Windows are supported by SNA3179G.

SNA3179G allows communica-tions 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 or 3725 communications controller running ACF/NCP.

Features Not Supported
PCFile transfer capability is not included with SNA3179G. For file transfer, either SNA3270 or SNA3770 can be used in conjunction with SNA3179G in a separate X Window.

Other unsupported features are listed in the HP-UX SNA3179G reference manual.

Customer Installation Responsibility

The product is customer installable. User installation aids such as an automated installation procedure and an IBM host generation guide are provided to simplify the process.

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.

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

B1001A HP-UX SNA3179G right-to-use license and software
B1001A Opt. AA0
1/4-inch Linus Cartridge

Note: A copy of the gateway service must be ordered for each HP-UX systemwhich is to communicate with the IBM mainframe through the gateway.

Documentation

B1001-90000 HP-UX SNA3179G and Gateway/ SNA3179G Reference Manual

The following documentation is available to help IBM host site personnel to configure ("gen") the IBM mainframe for HP-to-IBM communications:

30291-65005
HPSNA Products: IBM Host System Programmer's Guide

Support Products

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HEWLETT PACKARD

HP-UX SNA3270

Technical Data

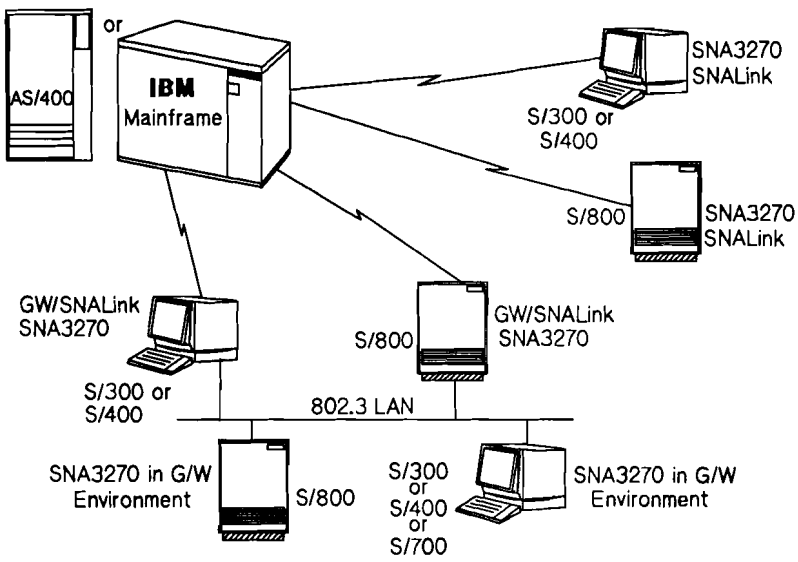
For HP 9000 Series 300, 400, 700, and 800 Computer Systems
Product Numbers
36978A, 36979A, J2144A, J2145A, 36980A, 36981A

HP-UX SNA3270 allows interactive communications between an HP 9000 Series 300, 400, 700, or 800 and an IBM System/370-compatible mainframe using SNA3270 protocols, handling 8-bit and/or 16-bit data streams.
HP terminals, monitors, and printers on the HP 9000 running SNA3270 emulate the functions of IBM 3278 terminals and 3287 printers.

SNA3270 provides additional functionality beyond emulation to include features such as file transfer and multiple sessions.

The HP-UX SNA3270 is available in two configurations: standalone and gateway. The standalone configuration provides IBM mainframe access for a single HP-UX computer that has its own HP-UX SNALink. The gateway configuration permits access to the IBM mainframe from multiple HP-UX computers on a LAN. These computers generally use a single HP 9000 computer with a Gateway/SNALink as a gateway to access the IBM mainframe.

The SNA3270 products require HP-UX SNALink for a standalone configuration. For the gateway configuration, the SNA3270 products require LAN-based access to a system running HP-UX Gateway/SNALink. The SNALink provides the major features of an IBM 3274 cluster control unit and the lower four levels of SNA. Physical Unit Type 2 (PU2) is emulated, Logical Unit Types 1, 2, 3, and 6.2 (LU1, LU2, LU3, LU6.2) are supported. When used with HP-UX SNALink or Gateway/SNALink, SNA3270 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 (bit-mapped display, serial interface, multiplexer) or through PCs running AdvanceLink's terminal emulator. Terminal access can also be through workstation's X-Windows environments by running a terminal emulator such as HPTerm.
- PC3270 file transfer enables interactive file transfers of 8-bit data streams on the HP 9000 to IBM systems running TSO, CICS, or CMS.
- In addition to English (8-bit) data streams, HP-UX SNA3270 provides Native Language Support (NLS), which handles IBM's Double Byte (16-bit) Character String (DBCS) data. Supported Asian languages include Japanese Kanji, Korean Hangul, and Taiwanese Traditional Chinese.
- Multiple session 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.
- Efficient screen handling routines provide a very responsive and low-overhead user interface.
- Powerful commands to monitor and control the operation of the product.
- 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.

Functional Specifications

When used with HP-UX SNALink or Gateway/SNALink, SNA3270 emulates a 3274 model 51C cluster controller and 3278 Model 2 displays or 3278 Model printers (up to 32 for standalone SNALink, or 64 for Gateway/SNALink). Some of the functionality of SNA3270 is:

- All printers and terminals supported by the HP 9000 Series 300, 400, 700, and 800 running HP-UX are supported by SNA3270.
- Emulates the PC3270 file transfer capability that communicates with the IBM-supported file transfer application on the host.
- Local screen print, screen logging to disk, 3287 printer output redirection to printer, file, or user program.

Features Not Supported

For the 3278 Model 2 display: programmed symbols, alt cursor, test key, keyclick, extended attributes, encryption.

For the 3287 Model 1 printer: PA1, PA2, cancel print.

Customer Installation Responsibility

The product is customer installable. User installation aids such as an automated installation procedure and an IBM host generation guide are provided to simplify the process. 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.

Product Requirements

Environment	SNA3270 Models 300, 400	GW/SNA3270 Models 300, 400	GW/SNA3270 Model 700	SNA3270 Model 800	GW/SNA3270 Model 800
Models	310, 320, 330 332, 340, 350, 360, 370, 375, 4xx	310, 318, 319, 320, 330, 332, 340, 350, 360, 370, 375, 4xx	705, 710, 720, 730 750	808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845 850, 852, 855, 860, 865, 870	808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865, 870
Operating System			Latest Operating System		
SNALink	HP-UX SNALink 36592A	HP-UX GW/ SNALink 36593A	Not Available	HP-UX SNALink 98173A	HP-UX GW/ SNALink 98174A
Disk Space		500K			
NS LAN	Not needed	LAN/9000 S/300 Link	LAN/9000 S/700 Link	Not needed	LAN/9000 S/800 Link
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment, ACF/VTAM and ACF/NCP TSO, CMS, or CICS				
IBM Mini	AS/400				

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

Product Description

HP-UX SNA3270 includes right-to-use license and software.

For Series 800, customer must choose 36980A or 36981A, a media option, and a processor option.

To purchase the English language version, customer must choose 36978A (for S/300, S/400), J2144A (for S/700), or 36980A (for S/800) and a media option.

To purchase one of three Asian language versions, customer must choose 36979A (for S/300, S400) or 36981A (for S/800), a language option, and a media option.

36978A HP-UX SNA3270 for Series 300, 400—English language version
36979A HP-UX SNA3270 for Series 300, 400—Asian language versions
J2144A HP-UX SNA3270 for Series 700—English language version
J2145A HP-UX SNA3270 for Series 700—Asian language versions
36980A HP-UX SNA3270 for Series 800—English language version
36981A HP-UX SNA3270 for Series 800—Asian language versions

Language options (36979A, J2145A, 36981A only):

ABJ Japanese language version
AB1 Korean language version
AB0 Traditional Chinese language version

Media options for Series 800s (36980A, 36981A only):

AA0 1/4-inch Linus Cartridge
AA1 1600 bpi Magnetic Tape
AAH Digital Audio Tape (DAT)
AA4 QIC Cartridge Tape
Series 800 processor options (36980A, 36981A only)
AHO Model 807/808/817 version
AEL Model 815/822/827/837 version
AE5 Model 825/832/847/857/635 version
AE6 Model 835/842/867/877/645 version
AEN Model 840/845/852 version
AEP Model 850/855/860/865 version
AH1 Model 870 version

HP-UX SNA3270 requires previous installation of HP-UX SNALink (36592A, 98173AA) or HP-UX Gateway/SNALink (36593A, 98174A).

The software which the customer orders contains both the standalone and gateway configuration software. During installation, the customer chooses which configuration is required. HP-UX SNA3270 must be ordered for each HP-UX computer that is to communicate with the IBM mainframe through a gateway computer.

Upgrade options are available for all the SNALink products. Please consult the HP 9000 price guides for details.

Documentation

36590-61001 HP-UX SNA3270 and Gateway/SNA3270 Reference Manual
36592-61003 HP-UX SNA/9000 Reference Pages (generally referred to as "Man Pages")
36592-90004 Japanese HP-UX SNA3270 and Gateway/3270 Reference Manual (only for Opt.ABJ)

The following documentation is available to help IBM host site personnel to configure ("gen") the mainframe to HP-to-IBM communications:

30291-65005 HP SNA Products: IBM Host System Program-mer's 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 Sales Representative, or refer to the HP data sheets for specific support services.

HEWLETT PACKARD

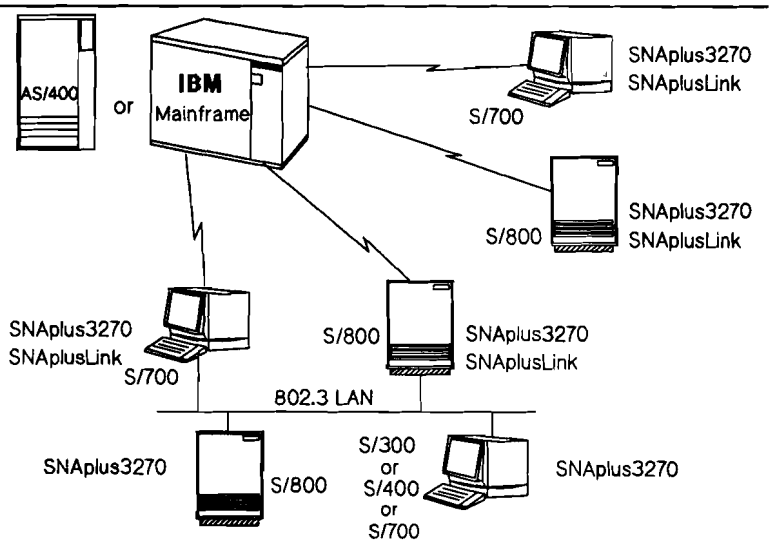
HP-UX SNAplus3270

Technical Data

For HP 9000 Series 300, 400, 700, and 800 Computer Systems
Product Numbers
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 SNA3270 protocols, handling 8-bit data streams. HP terminals, monitors, and printers on the HP 9000 running HP-UX SNAplus3270 emulate the functions of IBM 3278 terminals and 3287 printers. HP-UX SNAplus3270 provides additional functionality beyond emulation to include features such as file transfer, application programming inter-face, and multiple sessions.

The HP-UX SNAplus3270 can be configured as either standalone or client/server (gateway). The standalone configuration provides access to IBM mainframes or peer systems for a single HP-UX computer that has its own HP-UX SNAplusLink. The client/server configuration permits access to the IBM system from multiple HP-UX computers on a LAN. These systems generally use a single HP 9000 computer with SNAplusLink as a gateway to access the IBM system.



For the gateway configuration, the SNAplus3270 products require LAN-based access to a system running HP-UX SNAplusLink. 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 (PU2) is 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, HP-UX 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. Terminal access can also be through workstation's X-Windows environments by running a terminal emulator such as HPTerm.
- PC3270 file transfer enables interactive file transfers of 8-bit data streams on the HP 9000 to IBM systems running TSO, CICS, or CMS.
- Multiple session and hot key capability through windows environments enable 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.
- Efficient screen handling routines provide a very responsive and low-overhead user interface.
- Powerful commands are provided to monitor and control the operation of the product.
- 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.
- 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.

Functional Specifications

When used with HP-UX SNAplusLink, SNAplus3270 emulates a 3174 or 3274 cluster controller and 3278 Model 2, 3, 4 and 5 displays or 3278 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.
- Local screen print, screen logging to disk, 3287 printer output redirection to printer, file, or user program.
- Support for highlight attributes: normal, intense, blinking, reverse video, and underline.
- IND$FILE for file transfer to CICS, VM/CMS or MVS/TSO.
- 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, 16 bit addressing; encryption.

For the 3287 Model 1 printer: PA1, PA2.

Product Requirements

Environment	SNAplus3270 Series 300, 400	SNAplus3270 Series 700,	SNAplus3270 Series 800
Models	320, 330, 332 340, 345, 350, 360, 370, 375 4xx	705, 710, 720, 730, 750	8x7, 808, 815, 822, 825, 832, 835, 835SE, 840 842, 845, 850, 852, 855, 860, 865, 870
Operating System		Latest Operating System (excluding 8.05, 8.06)	
SNAplusLink		SNAplusLink J2226A	SNAplusLink J2220A
Disk Space	3 Mbytes	6.9 Mbytes	4.6 Mbytes
Memory Space	1.6 Mbytes	1.6 Mbytes	1.6 Mbytes
NS LAN	LAN/9000 S/300/400 Link	LAN/9000 S/700 Link	LAN/9000 S/800 Link
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment, ACF/VTAM and ACF/NCP TSO, CMS, or CICS		
IBM Mini	AS/400		

Customer Installation Responsibility

The product should be customer installable if the customer has a high level of expertise and follows the User Interface Guide. However, it is strongly recommended that the customer purchase installation and Network Startup services for additional installation assistance from HP. For additional information, contact your Hewlett-Packard Sales Representative.

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

Product Description

HP-UX SNAplus3270 includes right-to-use license and software media.

J2233A HP-UX SNAplus3270 for Series 300, 400

J2233A Media Options for Series 300s

AA0 1/4-inch Linus Cartridge
AAU CD ROM
0B0 Delete Manuals

J2227A HP-UX for Series 700

J2227A Media Options for Series 700s

AAH Digital Audio Tape (DAT)
AAU CD ROM
0B0 Delete Manuals

For Series 800, customer must choose J2221A, a media option, and a processor option.

J2221A HP-UX SNAplus3270 for Series 800

J2221A Media Options for Series 800s

AA0 1/4-inch Linus Cartridge
AA1 1600 bpi Magnetic Tape
AAH Digital Audio Tape (DAT)
AA4 QIC Cartridge Tape
0B0 Delete Manuals

J2221A Series 800 Processor Options

AHO Model 805/808/817 version
AEL Model 815/822/827/837 version
AE5 Model 825/832/847/857/635 version
AE6 Model 835/842/867/877/645 version
AEN Model 840/845/852 version
AEP Model 850/855/860/865 version
AH1 Model 870 version

HP-UX SNAplus3270 requires previous installation of HP-UX SNAplusLink (J2220A, J2226A) on the standalone or server system.

The software that the customer orders contains both the standalone and client/server configuration software. During installation, the customer chooses which configuration is required. HP-UX SNAplus3270 must be ordered for each HP-UX computer that is to communicate with the IBM mainframe through a server computer.

Upgrade options are available for all the SNAplusLink products. Please consult the HP 9000 price guides for details.

Note: Ordering information for HP J2220A and J2226A may be found in the data sheet for HP-UX SNAplusLink.

Documentation

- **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
- **J2221-61001 Opt. 0BD** SNAP-IX HLLAPI Programmer's Guide

The following documentation is available to help IBM host site personnel to configure ("gen") the mainframe for HP-to-IBM communications:

- **30291-61005** HP SNA Products: IBM Host System Programmer's 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 Sales Representative, or refer to the HP data sheets for specific support services.

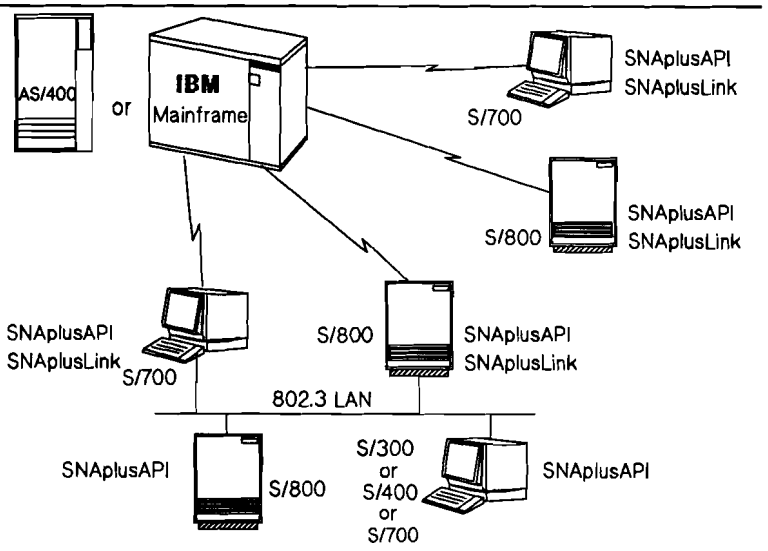
HEWLETT PACKARD

HP-UX SNAplusAPI

Technical Data

For HP 9000 Series 300, 400, 700, and 800 Computer Systems
Product Numbers
J2235A, J2229A, J2223A

The HP-UX SNAplusAPI (Application Programming Interface) product provides a basic and mapped conversation programmatic interface for developing applications for program-to-program communication in hierarchical or peer-to-peer environments. The product is a C library that is linked into the user's application transaction program (TP) to gain access to the IBM system. 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 machine and an IBM System.



On the HP 9000, the application is written using the HP-UX SNAplusAPI verbs. The verbs implement the base function set plus a number of option sets of the LU 6.2 architected interface 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 the IBM system. The application TP on the HP 9000 must be implemented in C.

The HP-UX SNAplusAPI product can be configured as either standalone or client/server (gateway). The standalone environment allows access to IBM systems from a single HP-UX computer that has its own HP-UX SNAplusLink. The gateway environment permits access to the IBM systems from multiple HP-UX systems on a LAN. Client systems generally use a single HP 9000 system with SNAplusLink as a server (gateway) to access the IBM systems.

Features

- **Basic Conversation and Mapped Conversation Verbs:** Allow HP 9000 programmers to implement program-to-program communication in an SNA network.
- **Peer-to-Peer or Hierarchical Environments:** Systems running SNAplusAPI can comunicate 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.
- **Multiple Sessions:** Up to 254 LU-LU sessions per SNAplusLink can run simultaneously, each session responsible for a separate communication task or for adding additional bandwidth to a single communication task. Each TP can handle up to 64 LU-LU sessions.
- **LEN Node in APPN:** A system running SNAplusAPI application can act as a Low Entry Network (LEN) node in an IBM Advance Peer-to-Peer Network (APPN) environment.
- **Support for Remote Attach:** Enables a remote LU 6.2 application to request an HP 9000 LU 6.2 application to start running and begin communication with it.
- **SNA Services Compatibility:** SNAplusAPI is completely compatible with SNAplus3270. These products may run simultaneously over the same SNAplusLink to the SNA network. SNAplusLink is a hardware and software product that manages the physical link to the IBM host and imple-ments protocols in the lower four levels of the SNA stack.
- **Tracing Facility:** 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.
- **Support for C Language:** Application programs on the HP 9000 are written in C Language.
- **Support for Boundary Node:** Two HP-UX systems can communicate using LU 6.2 by routing through an IBM mainframe using the Boundary Node Function. HP systems cannot communicate directly using SNAplusAPI (primary SDLC is not supported).
- **Support for Multiple HP Platforms:** SNAplusAPI and SNAplusLink can run on a standalone HP 9000 Series 800 or 700. SNAplusAPI can also run as a client on HP 9000 Series 800, 700, 400, and 300 where SNAplusLink is running on a server system (Series 800 or 700).

Functional Description

HP-UX SNAplusAPI provides a set of basic and mapped conversation and type-independent verbs for application programmers to use for program-to-program communication. 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.

In addition to the HP-UX SNAplusAPI 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
- 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

HP-UX SNAplusAPI verbs are supported in the C programming language only and are summarized in the following table:

Customer Installation Responsibility

The product should be customer installable if the customer has a high level of expertise and follows the User Interface Guide. However, it is strongly recommended that the customer purchase installation and Network Startup services for additional installation assistance from HP. For additional information, contact your Hewlett-Packard Sales Representative.

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.

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_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.

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

Product Requirements

Environment	SNAplusAPI Series 300/400	SNAplusAPI Series 700	SNAplusAPI Series 800
Models	320, 330, 332, 340, 345, 350, 360, 370, 375, 4xx	705, 710, 720, 730, 750	8x7, 808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865, 870
Operating System		Latest Operating System (excluding 8.05, 8.06)	
SNAplusLink	None	SNAplusLink J2226A	SNAplusLink J2220A
Disk Space	3 Mbytes	5.9 Mbytes	3.8 Mbytes
Memory Space	800 Kbytes	800 Kbytes	800 Kbytes
LAN	LAN/9000 S/300/400 Link	LAN/9000 S/700 Link	LAN/9000 S/800 Link
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment, MVS or MVS/XA operating systems, ACF/VTAM and ACF/NCP, CICS (version 1.7 or later)		
IBM Midrange	Examples of systems supported are AS/400, S/36, S/38 or IBM systems that can be supported in IBM's APPN environment. IBM system links must support Node Type 2.1. IBM systems must be running the latest operating system version.		

Ordering Information

HP-UX SNAplusAPI includes right-to-use license and software.

J2235A HP-UX SNAplusAPI for Series 300, 400

J2235A Media Option
AA0 1/4-inch Linus Cartridge
AAU CD ROM
0B0 Delete Manuals

J2229A HP-UX SNAplusAPI for Series 700

J2229A Media Option
AAH DAT
AAU CD ROM
0B0 Delete Manuals

For Series 800, customer must choose J2223A, a media option and a processor option.

J2223A HP-UX SNAplusAPI for Series 800

J2223A Media Options
AA0 1/4-inch Linus Cartridge
AA1 1600BPI Magnetic Tape
AAH DAT
AA4 QIC Cartridge Tape
0B0 Delete Manuals

J2233A Series 800 Processor Options
AH0 Model 807/808/817 version
AEL Model 815/822/827/837 version
AE5 Model 825/832/847/857/635 version
AE6 Model 835/842/867/877/645 version
AEN Model 840/845/852 version
AEP Model 850/855/860/865 version
AH1 Model 870 version

HP-UX SNAplusAPI requires previous installation of HP-UX SNAplusLink (J2220A or J2226A) either on the standalone or on the server system.

The software that the customer orders contains both the standalone and client/server configuration software. During installation, the customer chooses which configuration is required. HP-UX SNAplusAPI must be ordered for each HP-UX computer that is to communicate with the IBM mainframe through a gateway machine.

Upgrade options are available on all the SNAplusLink products. Please consult the HP 9000 price guides for details.

Note: Ordering information for HP J2220A and J2226A may be found in the data sheet for HP-UX SNAplusLink.

Documentation

- **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

The following documentation is available to help IBM host site personnel to configure ("gen") the mainframe for HP-to-IBM communications:

- **30291-61005** HP SNA Products: IBM Host System Programmer's 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 Sales Representative, or refer to the HP data sheets for specific support services.

HEWLETT PACKARD

HP-UX SNA3770

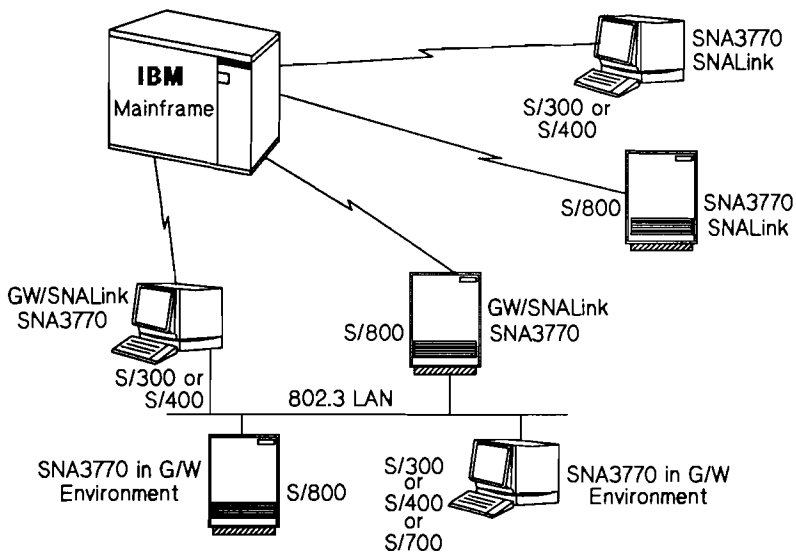
Technical Data

For HP 9000 Series 300, 400 700, and 800 Computer Syst
Product Numbers
36976A, J2143A, 36977A

HP-UX SNA3770 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 SNA3770 emulates a standard subset of capabilities of the IBM 3777 Model 1 RJE Communications Terminal.

The HP-UX SNA3770 product is available in two configurations: standalone and gateway. The standalone configuration provides IBM mainframe access for a single HP-UX computer which has its own HP-UX SNALink. The gateway configuration permits access to the IBM mainframe from multiple HP-UX computers on a LAN. These systems generally use a single HP 9000 computer with a Gateway/SNALink as a gateway to access the IBM mainframe.

The SNA3770 products require HP-UX SNALink for a standalone configuration. For the gateway configuration, the SNA3770 products require LAN-based access to a system running HP-UX Gateway/SNALink. The SNALink pro-vides the major features of an IBM 3274 cluster control unit and the lower four levels of SNA. Physical Unit Type 2 (PU2) is emulated, Logical Unit Types 1, 2, 3, and 6.2 (LU1, LU2, LU3, LU6.2) are supported.



Features

- Emulates a subset of capabili-ties of the IBM 3777 Model 1 Communications Terminal with a console, printer, card punch, and exchange device.
- Communications with job entry subsystems such as JES2 and JES2/NJE, JES3, VSE/Power.

- Up to 6 LUs are supported per remote.
- Jobs can be submitted through a script file, and output can be directed to the same or another user program.
- Output can be routed to a file or as a standard input to a program, based on the destination selected by the user when the job is submitted to the host (post-processor support).
- Immediate or time-deferred job submission.
- Priority or normal job submission.
- Host console commands can be sent and host console data can be received interleaved with file transmission or receipt.
- Notification of job status via mail or message to the user's terminal.
- The 3770 process runs in the background. Users use a simple SEND command to initiate a transmission. The background process will accept data from the host without user intervention.
- Efficient screen handling routines provide a very responsive and low-overhead user interface.
- Security—access can be restricted to a group of users.

Functional Specifications

When used with HP-UX SNALink or Gateway/SNALink, SNA3770 emulates a subset of capabilities of the IBM 3777 Model 1 communica-tions terminal. All printers and terminals supported by the HP 9000 Series 300 and 800 running HP-UX are supported by SNA3770.

SNA3770 runs with IBM's JES2, JES3, or JES2/NJE, which operate under MVS, MVS/SP, MVS/ESA, or MVS/XA operating systems. SNA3770 can also run with IBM's VSE/POWER, which operates under the VSE operating system.

The SNA3770 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 inter-actively. The HP 9000 will concurrently process user applications and data communications with an IBM mainframe.

SNA3770 runs in the back-ground. As a result, jobs may be queued or status 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.

Post-processor support allows the user to send host, printer, and punch output to a variety of destinations. At the time of submittal, users have the flexibility of routing host output to a disk file or a user program.

Using SNA3770 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.

SNA3770 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.

SNA3770 can be used to access or update databases. SNA3770 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 SNA3770 and SNA3270 sharing an SNALink, users have the capability of both batch and interactive communications. This allows programmers to do develop-ment work using SNA3270 and then run larger batch jobs with SNA3770.

Transparent mode suppresses translation from ASCII to EBCDIC for floating point, packed decimal, or other binary data such as graphics data files.

Features Not Supported

- RSCS (Remote Spooling Communications Subsystem)

List of User Commands

Command	Function
sna3770	Starts the background processor to transmit queued files to the host.
stat3770	Provides information on the status of files submitted to the SNA3770 subsystem or the status of the SNA3770 subsystem itself.
send3770	Queues a file for transmission.
cons3770	Sends a console command to the IBM host.

Customer Installation Responsibility

The product is customer installable. User installation aids such as an automated installation procedure and an IBM host generation guide are provided to simplify the process. 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.

Product Requirements

Environment	SNA3770 Models 300, 400	GW/SNA3770 Models 300, 400	GW/SNA3770 Model 700	SNA3770 Model 800	GW/SNA3770 Model 800
Models	310, 320, 330, 332, 340, 350, 360, 370, 375, 4xx	310, 318, 319, 320, 330, 332, 340, 350, 360, 370, 375, 4xx	705, 710 720, 730, 750	808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865, 870	808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865, 870
Operating System		Latest Operating System			
SNALink	HP-UX SNALink 36592A	HP-UX GW/ SNALink 36593A	Not Available 98173A	HP-UX SNALink 98174A	HP-UX GW/ SNALink
Disk Space		500K			
NS LAN	Not needed S/300 Link	LAN/9000 S/700 Link	LAN/9000	Not needed S/800 Link	LAN/9000
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment, MVS, MVS/XA, MVS/SP, MVS/ESA, or DOS/VSE operating systems, JES2, JSE3, JES2/NJE or VSE/POWER, ACF/VTAM and ACF/NCP.				

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 SNA3770 includes right-to-use license and software.

36976A HP-UX SNA3770 for Series 300 or Series 400
Opt. AA0 1/4-inch Linus Cartridge

J2143A HP-UX SNA3770 for Series 700
AAH DAT
AAU CD-ROM

For Series 800, customer must choose 36977A, a media option, and a processor option.

36977A HP-UX SNA3770 for Series 800

Media options (36977A only):

AA0 1/4-inch Linus Cartridge
AA1 1600 bpi Magnetic Tape
AAH Digital Audio Tape (DAT)
AA4 QIC Cartridge Tape

Series 800 processor options (36977A only):

AHO Model 807/808/817 version
AEL Model 815/822/827/837 version
AE5 Model 825/832/847/857/635 version
AE6 Model 835/842/867/877/645 version
AEN Model 840/845/852 version
AEP Model 850/855/860/865 version
AH1 Model 870 version

Requires previous installation of HP-UX SNALink (36592A, 98173A) or HP-UX Gateway/ SNALink (36593A, 98174A).

The software which the customer orders contains both the standalone and gateway configuration software. During installation, the customer chooses which configuration is required. HP-UX SNA3770 must be ordered for each HP-UX system that is to communicate with the IBM mainframe through a gateway computer.

Documentation

98184-61001 HP-UX SNA3770 and Gateway/SNA3770 Reference Manual

36592-61003 HP-UX SNA/9000 and Reference Pages (generally referred to as "Man Pages")

The following documentation is available to help IBM host site personnel to configure ("gen") the mainframe for HP-to-IBM communications:

30291-61005 HP SNA Products: IBM Host System Program-mer's 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 Sales Representative, or refer to the HP data sheets for specific support services.

HEWLETT PACKARD

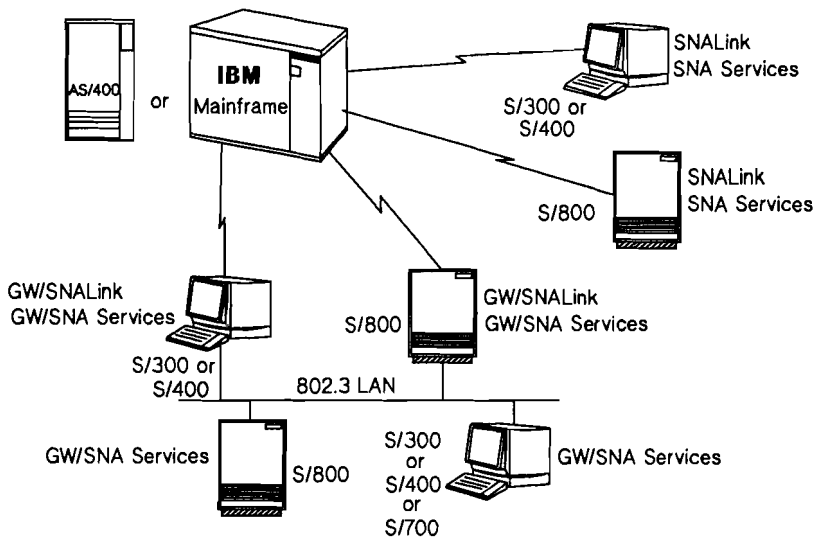
HP-UX SNALink and HP-UX Gateway/SNALink

Technical Data

For HP 9000 Series 300, 400 and 800 Computer Systems
Product Numbers
36592A, 36593A, 98173A, 98

HP-UX SNALink and HP-UX Gateway/SNALink provide communications between an HP 9000 Series 300, 400, or 800 and an IBM mainframe or an IBM peer system such as the AS/400. The SNALink manages the SDLC line to the host/peer system 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 1, 2, 3, and 6.2 (LU1, LU2, LU3, LU 6.2) are supported as well.



The HP-UX SNALink is available in two environments: standalone and client/server (gateway). The standalone environment provides access to IBM mainframes or IBM peer systems for a single HP-UX computer that has its own HP-UX SNALink. Running in the client/server (gateway) environment permits access to the IBM systems from multiple HP-UX computers on a LAN. These systems generally use a single HP 9000 computer with a Gateway/SNALink as a gate-way to access the IBM system.

The HP-UX SNALink products are used in conjunction with a service product (for example HP-UX SNA3270, SNA3770, SNA3179G, or LU 6.2 API. Please refer to the services data sheets for more information). A copy of a service product must reside at each HP-UX client that is to communicate with the IBM system through the server system.

Features

- SNALink allows the HP 9000 to emulate the major features of a 3274 cluster controller using SNA protocols.
- SNALink supports multiple Logical Session Units (LUs) as terminals and printers concurrently. An entry level link is available on the workstations. The number of configurable LUs per link varies by processor type and the environment in which you are running:
  - **Standalone/Entry level**
    Series 300, 400: 2 LUs
    Series 800: 32 LUs
  - **Standalone/High Performance**
    Series 300, 400: 32 LUsSeries 800: 32 LUs
  - **Gateway**
    Series 300, 400: 64 LUsSeries 800: 64 LUs
- The SNALink products use powerful commands to monitor and control the operation of the product.
- SNALink and G/W SNALink support Node Type 2.0 (T2.0) and Node Type 2.1 (T2.1). T2.0 allows connectivity to IBM System/370 or compatible mainframes. T2.1 allows connectivity to peer systems such as the AS/400.
- SNALink allows concurrent support of T2.0 and T2.1 when connected to a mainframe in a boundary node configuration. The HP system can simultaneously communicate peer-to-peer to the IBM mainframe through LU 6.2 and also communicate interactively to the mainframe through SNA3270 over the same link.
- The microprocessor-based SNA interface card offloads communications line activity, resulting in zero CPU overhead on the HP-UX processor when data is not being transmitted or received.
- The HP-UX Gateway/SNALink supports HP 9000 Series 300, 400, 700, and 800 as client systems running SNA Services and communicating with the server processor over a LAN.
- An HP 9000 Series 300, 400, or 800 with HP-UX Gateway/SNALink functions as a non-dedicated gateway. Depending on the customer's specific application requirements, Gateway/SNALink easily operates on a S/300, S/400, or S/800 while running other HP-UX applications.
- BSD Sockets is the de facto industry-standard interface between the SNALink and the SNA Service products in a client/server environment.
- The SNALink and Gateway/SNALink products support line speeds up to 64 Kbps over switched or leased lines.

Functional Specifications

When used with HP-UX SNA3270, SNA3770, LU 6.2 API, or SNA3179G (for S/300 and S/400 only), the SNALink and service emulate a 3274 model 51C cluster controller and from 2 to 64 SNA LUs, depending on the model processor and configuration type.

All printers and terminals supported by the HP 9000 Series 300, 400, or 800 running HP-UX are supported by HP-UX SNALink and Gateway/SNALink.

SNALink 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 37X5 communications controller running ACF/NCP. SNALink also allows communication with IBM midrange systems as peers such as the AS/400, S/36, or S/38.

Up to seven SNALink products may be supported in a single Series 300, 400, or 800 system (depending on the number of card slots available). This allows links to multiple IBM systems.

The SNALink supports synchronous modem speeds up to 64Kbps as described below. SNALink 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 SNALink are:

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
Datatel DCP3080

Message encoding: Supports NRZ (Non Return to Zero). NRZI (Non Return to Zero Inverted) is supported on Series 800 systems only.

Customer Installation Responsibility

The products are customer installable. User installation aids, such as automated installation procedure and an IBM host generation guide, are provided to simplify the process. 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.

Product Requirements

Environment	SNALink S/300, S400	Gateway/ SNALink S/300, S/400	SNALink S/800	Gateway/ SNALink S/800
Models	310, 320, 330, 332, 340, 350, 360, 370, 375, 4xx	310, 318, 319, 320, 330, 332, 340, 350, 360, 370, 375, 4xx	8X7, 808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865, 870	8X7, 808, 815, 822, 825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865 870
Operating System	Latest Operating System			
Services Supported	SNA3270 SNA3770 SNA3179G LU 6.2 API	SNA3270 SNA3770 SNA3179G LU 6.2 API	SNA3270 SNA3770 LU 6.2 API	SNA3270 SNA3770 LU 6.2 API
Disk Space	1000K	1000K	1500K	1500K
Memory	700K	700K	1000K	1000K
LAN Config. Requirements	None	LAN 300 Link	None	LAN 800 Link
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment, ACF/VTAM and ACF/NCP			
IBM Midrange	Examples of systems supported are AS/400, S/36, S/38, or IBM system that can be supported in IBM's APPN environment. IBM system links must support Node Type 2.1. IBM systems must be running the latest operating system version.			

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

Product Description

HP-UX SNALink and HP-UX Gateway/SNALink include right-to-use license and software, interface card, and cable. Requires modem. The SNALink products for the Series 300 and 400 are only available in 1/4-inch cartridge tape. For the Series 800, a choice of 1/4-inch cartridge tape, 1600 BPI magnetic tape, or DAT tape is available.

For Series 800, choose 98173A or 98174A, a media option, and a processor option. Models 807, 808, 815, 817, 822, 827, 832, 837, 842, 847, 852, 857, 867, and 877 also require option 005 (for the Precision Bus PSI).

36592A HP-UX SNALink Series 300, 400
Options:
0A0 Single-User, 2 LUs RS-232 Interface (19.2 Kbps)
001 Single-User, 2 LUs V.35 Interface (64 Kbps)
0A1 Multiuser, 32 LUs RS-232 Interface (19.2 Kbps)
002 Multiuser, 32 LUs V.35 Interface (64 Kbps)

36593A HP-UX GW/SNALink Series 300, 400
Options:
003 RS-232 Interface (19.2 Kbps)
004 V.35 Interface (64 Kbps)

98173A HP-UX SNALink Series 800

98174A HP-UX GW/SNALink Series 800

Media options (98173A and 98174A only):
98173A Opt. AA0
Multiuser 32 LUs, 1/4-inch cartridge tape
98173A Opt. AA1
Multiuser 32 LUs, 1600 BPI magnetic tape
98173A Opt. AAH
Digital Audio Tape (DAT)
98173A Opt. 005
Precision Bus PSI Card (807, 808, 817, 815, 822, 827, 832, 837, 842, 847, 852, 857 ,and 860 only)
98174A Opt. AA0
Multiuser 64 LUs, 1/4-inch cartridge tape
98174A Opt. AA1
Multiuser 50 LUs, 1600 BPI magnetic tape
98174A Opt. AAH
Digital Audio Tape
98174A Opt. 005
Precision Bus PSI Card (807, 808, 817, 815, 822, 827, 832, 837, 842, 847, 852, 857, and 860 only)

Series 800 processor options (98173A and 98174A only):
AHO Model 807/808/817 version
AEL Model 815/822/827/837 version
AE5 Model 825/832/847/857/635 version
AE6 Model 835/842/645 version
AEN Model 840/845/852 version
AEP Model 850/855/860/865 version
AH1 Model 870 version

98173A Opt. 1AU for V.35 Interface (64 Kbps)

98174A Opt. 1AU for V.35 Interface (64 Kbps)

Upgrade options are available for all the SNALink products. Please consult the HP 9000 price guides for details.

Documentation

- **36592-61002** HP-UX SNALink and Gateway/SNALink Manager's Reference Manual
- **36592-61003** HP-UX SNA/9000 Manual Reference Pages (generally referred to as "Man Pages")

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.

Customers with hardware support agreements must add the appropriate level of coverage for the link product to their support agreements.

HEWLETT PACKARD

HP-UX SNAplusLink

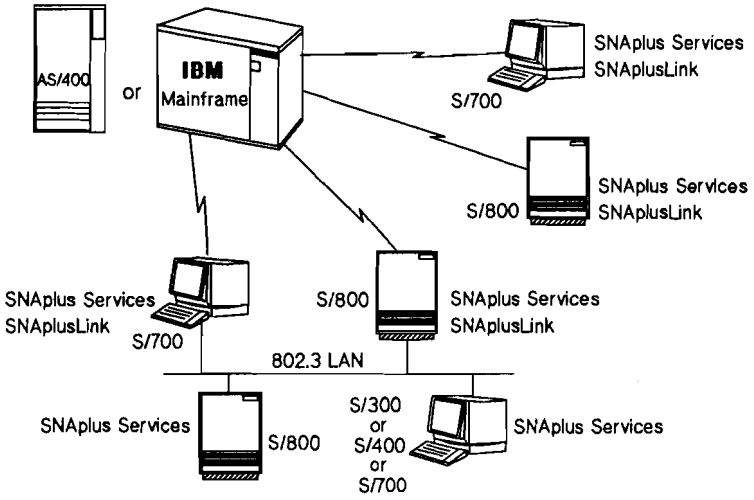
Technical Data

For HP 9000 Series 700 and
Computer Systems
Product Numbers
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 SNAplusLink manages the SDLC line to the host and emulates the major features of an IBM 3174 and 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 as well.

The HP-UX SNAplusLink can be configured as either standalone or as a client/server (gateway). The standalone environment provides access to IBM mainframes or IBM peer systems for a single HP-UX computer that has its own HP-UX SNAplusLink. Running in the client/server environment permits access to the IBM systems from multiple HP-UX computers on a LAN. These systems generally use a single HP 9000 computer with HP-UX SNAplusLink as a gateway to the IBM system.

The HP-UX SNAplusLink product is used in conjunction with a service product (for example, HP-UX SNAplus3270 or HP-UX SNAplusAPI. Please refer to the services data sheets for more information.) A copy of a service product must reside at each HP-UX computer that 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.
- The SNAplusLink provides powerful commands to monitor and control the operation of the product.
- The SNAplusLink supports Node Type 2.0 (T2.0) and Node Type 2.1 (T2.1). T2.0 allows connectivitiy to IBM System/370 or compatible mainframes. T2.1 allows connectivity to peer systems such as the AS/400.
- The SNAplusLink allows concurrent support of T2.0 and T2.1 when connected to a mainframe in a boundary node configuration.
- The HP system can simultaneously communicate peer-to-peer to the IBM system through LU 6.2 and also communicate interactively to the mainframe through SNAplus3270 over the same link.
- The SNAplusLink running on the HP 9000 Series 700 and 800 acts as a server for SNAplus clients running SNAplus3270 and SNAplusAPI on an HP 9000 Series 300, 400, 700 or 800.
- An HP 9000 Series 700 or 800 with SNAplusLink can function as a nondedicated gateway. Depending on the customer's specific application requirements, SNAplusLink easily operates on a S/700 or S/800 while running other HP-UX applications.
- BSD Sockets is the de facto industry-standard interface used between the SNAplusLink and the SNA Service products in a client/server environment.
- The SNAplusLink product supports line speeds up to 64 Kbps over switched or leased lines.

Functional Specifications

- When used with HP-UX SNAplus3270 or HP-UX SNAplusAPI, the SNAplusLink and service emulate a 3174 or 3274 cluster controller with up to 254 SNA sessions.
- 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 four SNAplusLink cards may be supported in a single Series 700 depending on the number of card slots available. This allows links to multiple IBM systems. One card is support on the Series 800 (Release 1 only).
- NetView alarms and alerts are sent to the NetView console on the Series 700. NetView alarms and alerts will be supported on the Series 800 in Release 2.
- The SNAplusLink supports synchronous modem speeds up to 64Kbps as described below. SNAplusLink 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. The following modems are supported for SNAplusLink:

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
Datatel DCP3080
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,	8X7, 808,815, 822,825, 832, 835, 835SE, 840, 842, 845, 850, 852, 855, 860, 865, 870
Operating System	Latest Operating System (excluding 8.05, 8.06)	
Services Supported	SNAplus3270 SNAplusAPI	SNAplus3270 SNAplusAPI
Disk Space	7.2 Mbytes	5.2 Mbytes
Memory Space	2.1 Mbytes	2.1 Mbytes
LAN	LAN 9000 S/700 Link	LAN 9000 S/800 Link
IBM Host	IBM System/370 or compatible mainframe (Series 30xx or 43xx) in an SNA environment, ACF/VTAM and ACF/NCP	
IBM Midrange	Examples of systems supported are AS/400, S/36, S/38, or IBM systems that can be supported in IBM's APPN environment. IBM systems must be running the latest operating system version.	

Customer Installation Responsibility

The product should be customer installable if the customer has a high level of expertise and follows the User Interface Guide. However, it is strongly recommended that the customer purchase installation and Network Startup services for additional installation assistance from HP. For additional information, contact your Hewlett-Packard Sales Representative.

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

Product Description
HP-UX SNAplusLink includes right-to-use license and software, interface card, and cable. Requires modem.

J2226A HP-UX SNAplusLink Series 700 includes EISA card (25565-60001) and RS232-C cable (28606-63006)

J2226A Media Options
AAH Digital Audio Tape (DAT)

J2226A Hardware Options
1AU V.35 Cable (64 Kbps) (28606-63008)
AHN Right to Use License and Software
0BD HP-UX SNAplus Migration Guide (J2220-61000)
0B0 Delete Manuals

For Series 800, choose J2220A, a media option, hardware option, and a processor option.

J2220A Media Options

AH0 1/4-inch cartridge tape
AA1 1600 BPI magnetic tape
AAH Digital Audio Tape (DAT)
AA4 QIC Cartridge Tape

J2220A Hardware Options

004 Central Bus PSI Card (30263-60003) (825, 835, 840, 845, 850, 855, 860, 865, 635, and 645) and RS-232-C cable (28606-63006)
005 Precision Bus PSI Card (28606-60001) (807, 808, 815, 817, 822, 827, 832, 837, 842, 847, 852, 857, 867, and 877) and RS-232-C cable (28606-63006)
1AU V.35 Cable (64 Kbps) (28606-63008)
0BD HP-UX SNAplus Migration Guide (J2220-61000)
0B0 Delete Manuals

J2220A Series 800 Processor Options

AH0 Model 807/808/817 version
AEL Model 815/822/827/837 version
AE5 Model 825/832/847/857/635 version
AE6 Model 835/842/645/867/877 version
AEN Model 840/845/852 version
AEP Model 850/855/860/865 version
AH1 Model 870 version

Documentation

- **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

The following documentation is available to help IBM host site personnel to configure ("gen") the mainframe for HP-to-IBM communications:

- **30291-61005** HP SNA Products: IBM Host System Programmer's 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 Sales 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.

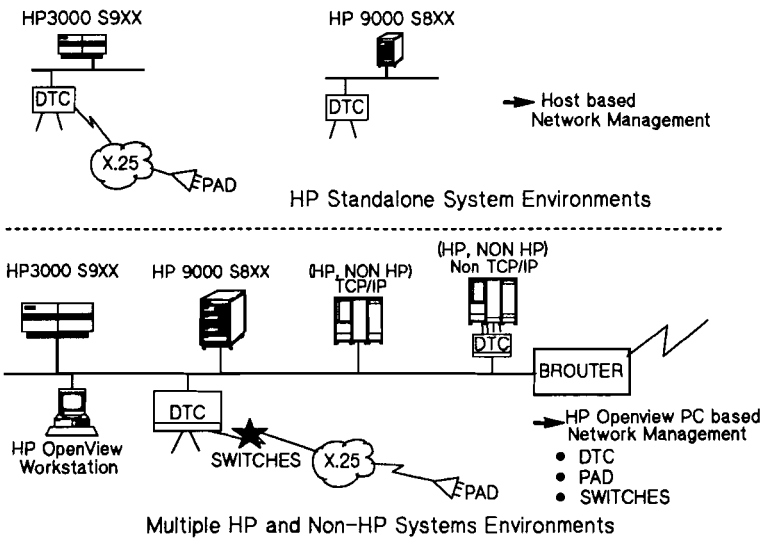
HEWLETT PACKARD

Datacommunications and Terminal Controller (DTC) Family

Technical Data

Product Numbers
2340A, 2343A/C/D, 2345A, 2348A, 2346A/B/C/D/E/F/G, J2120A, D2355A

The Datacommmunications and Terminal Controller (DTC) is HP's strategic platform for terminal and data communications access in networked multivendor system environments (HP and other vendors' systems). The DTC is a modular and flexible LAN-based controller that provides asynchronous connectivity and PAD support for local and remote terminals* and printers. The DTC provides location-independent enduser access to HP and non-HP systems, implementing both an optimized protocol for on line transaction processing applications and the industry-standard TELNET-TCP/IP protocol.



This data sheet concentrates on the terminal and printer connectivity features of the DTC. The DTC also implements Telnet Access and X.25 system-to-system networking for the HP 3000 Series 900. For more details, refer to the "ARPA Services/iX", "DTC/X.25 iX Network Link", and "SNA/X.25 Link/iX" data sheets in the HP AdvanceNet Specification Guide (P/N 5091-1303A).

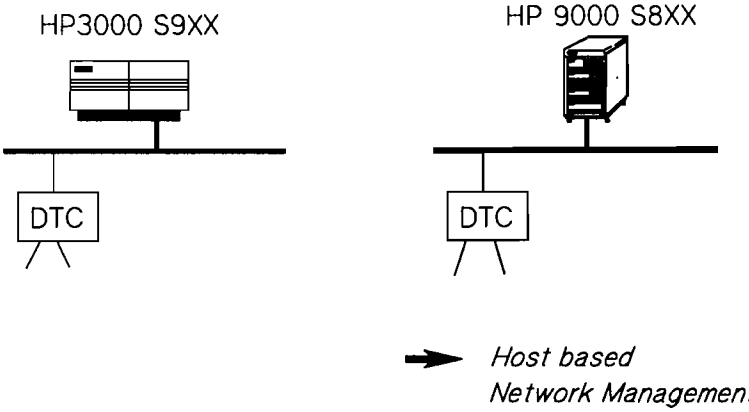
The DTC solution consists of a scalable family of multivendor terminal servers, and a scalable family of network management products:

- The DTC16 provides up to 16 asynchronous connections, plus an optional X.25 link supporting up to 32 virtual circuits at speeds of up to 19.2 Kbps.

* PCs with appropriate terminal emulation software are supported as terminals.

- The DTC48 provides up to 48 asynchronous connections; reducing the asynchronous connectivity allows up to three X.25 links, each supporting up to 256 virtual circuits at speeds of up to 64 kbps, or one Telnet Access card with 40 Telnet connections to HP 3000 Series 900 systems.
- Host-based management software provides a simple, low-end solution for local asynchronous connectivity in HP standalone environments (HP OpenView DTC Entry-level Manager/UX for HP 9000 Series 800 systems and NMMGR and TermDSM utilities for HP 3000 Series 900). Host-based X.25 management is available to provide an entry-level solution for remote X.25 connectivity to a single HP 3000 Series 900.
- HP OpenView (PC-based) management software provides extended connectivity and powerful network management features for more complex multisystem environments, or when X.25 or Telnet Access via the DTC is desired (HP OpenView DTC Manager). The HP OpenView platform provides an easy-to-use graphical user interface and the possibility of integrating management software for other network elements on the same PC.

Local Single System Access



The structure of this data sheet is as follows:

- Functional Description
  - End-User access
  - Product requirements overview
- Support Policy
- Support Services
- Supported Configurations
- Physical And Environmental Specifications
- Ordering Information
- Documentation

Functional Description

End-user Access

Local, Single-system access
For local terminal and printer connections to a single HP 3000 Series 900 or HP 9000 Series 800 system, the DTC can operate under host-based management. This means that the DTC is configured, downloaded, and managed by the system. PC-based management may also be used in this configuration to take advantage of the more sophisticated management tools.

Features and Benefits (Single system access)

Applicable to both HP system platforms:	
• User access limited to one system	– Security, simplicity
• User access from central or distributed locations	– Wiring flexibility – Identical wiring solutions for terminals and PCs on a LAN
• Programmatic access to devices from the system	– Customizable applications
• Support of terminals, PCs, printers, plotters, and modems	– Extensive connectivity options
HP 3000 Series 900 specific:	
• Powerfail recovery*	– High system availability
• Typeahead facility	– Ease-of-use, gain in productivity
• Device type managed by the system**	– Easy maintenance of DTC-connected devices without affecting users
• Terminal and printer types can be modified using the Workstation Configurator Utility (previously available on MPE/V systems)	– Easy migration from MPE/V systems
• Field-mode support	– Optimized access to de facto standard databases
HP 9000 Series 800 specific:	
• Support of DTC devices by HP OpenSpool/UX	– Greater flexibility in device utilization
• Host initiated access to DTC ports via device files	– Applications designed to access multiplexers can be ported to networks and gain network benefits
• DTC port identification	– Provides DTC device identity checking, thus allowing security checks and printing of documents on appropriate DTC printer
DTC Management functions:	
Configuration management features:	*Configuration management benefits:*
• Default DTC configuration available • Copy and paste functions • DTC configuration and control centralized on system (via a console connected to the system locally or remotely) • DTC software updates centralized	– Reduces costs associated with managing network configurations

Features and Benefits (Single system access continued)

Fault management features:	*Fault management benefits:*
• Up-to-date online status of DTCs • Configurable event logging	– Maximize network uptime
DTC Management tool:	
• ASCII user interface, with same "look and feel" as the PC-based management software	– Reduces operator retraining costs in the event of migration to PC-based management
• Online help facility	– Reduces training costs

* Powerfail recovery is supported for character-mode applications. Block-mode applications may not recover if the powerfail has affected the terminal configuration. Modem and printer connections are aborted to ensure system security and data integrity.

** The HP 3000 Series 900 recognizes a device as a terminal or printer depending on the classification during configuration. The terminal types are 10, 18, and 24. The printer types are 18, 21, 22, and 26.

Multiple System Access
For access to multiple HP and non-HP systems, the DTC is configured, downloaded from and managed by the PC-based HP OpenView DTC Manager. Systems can be accessed either through:

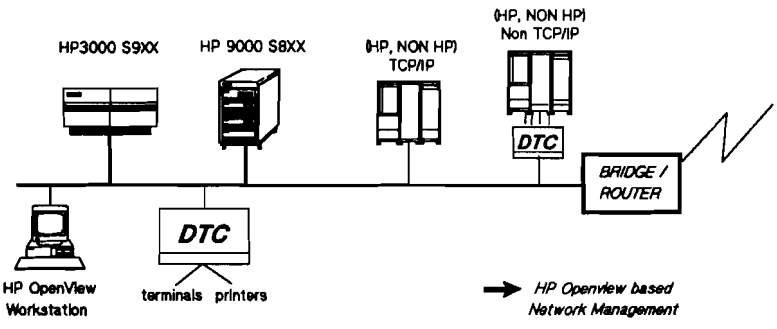
- Direct access, via system LAN links
- Extended switching access, via system asynchronous ports

Direct access is available for the HP 3000 Series 900, HP 9000 Series 300/400/700 and 800, HP1000, and for other non-HP systems with Telnet/TCP/IP.

The extended switching (or back-to-back) configuration provides access to systems via asynchronous connections (RS-232) between the DTC and the system. Terminal users on a given DTC can access systems asynchronously connected to the same DTC (local switching) or to another DTC (extended switching).

Note: For direct access to Telnet/TCP/IP hosts, DTC48s (HP 2345A) with a date code less than 3110 must be upgraded with the DTC48 Upgrade Kit (HP 2348A). The DTC16 does not require any upgrade kit.

Multiple System Access



Features and Benefits (Multiple system access)

Applicable to all system platforms:	
• Multivendor connectivity	– Endusers can access HP and non-HP systems from their DTC-connected terminal – Access to non TCP-IP hosts possible through extended switching configuration – Easy migration from MPE/V
• Routable TCP/IP implementation guarantees access through IP routers to:	– Telnet systems (HP 9000, non-HP) – HP 3000 Series 900 via ARPA Services/iX – Non TCP/IP systems via the extended switching capability in the DTC – Consistent access to systems whether on same or different LAN segments
• Multisession capability configurable per port	– Increased enduser productivity
• Symbolic system addressing using ARPA DNS	– Increased network flexibility and friendliness
• Device/printer sharing between multiple HP systems	– Avoid peripherals duplication
• Automatic connection establishment to a predefined host configurable per DTC port	– Ease of use for the end user
• Enable/disable switching on a DTC port basis	– Increased security via access limitations for the endusers
• User access from either a central site or distributed locations	– Wiring flexibility – Identical wiring solutions for terminals and PCs on a LAN
• Programmatic access to devices from HP systems	– Customizable applications
• Easy-to-use, self-explanatory DTC user interface	– User-friendliness, simplicity for the enduser

Features and Benefits (Multiple system access continued)

DTC Management functions:

Configuration management features	*Configuration management benefits*
• Default DTC configuration available • Copy and paste functions • DTC configuration and control centralized on PC (locally, or remotely via a "slave" remote PC over modem lines, 2335s or IP routers) • DTC update centralized in one point, eliminating the need to go to each DTC place for update • Check of integrity of the DTC IP address • Symbolic system addressing (DNS or NS format), IP Routers addressing	– Reduces costs associated with managing network configuration
• Dynamic configuration of most DTC parameters*	– Add users to systems without impacting system availability – Easy maintenance of LAN-connected systems without affecting users

Fault management:

• Up-to-date online status for each DTC • Configurable event logging • Automatic alarm report displayed on the network map, in case of critical or catastrophic events • PC activates ping requests from a specified DTC to any IP node to verify the connection path • Configurable backup gateway and DNS IP addresses	– Maximize network uptime

Performance management:

• Configurable information re-transmission timers and packet lengths	– Optimize traffic over extended LANs

Security management:

• Password access to HP OpenView DTC Manager functions • Configuration of terminal switching and multisession capability per DTC user port	– Limit information access to selected users

Features and Benefits (Multiple system access continued)

DTC Management tool:	
• Seamless integration of HP DTC, switches, PADs, hubs, bridges, and networked HP 3000 management under HP OpenView	– Singlesource for network components, facilitating support and reducing costs and overheads
• Easy-to-use, intuitive graphical interface, based on HP OpenView Windows, with extensive online help	– Reduces training costs, increases operator productivity
• Simple and quick transfer of DTC control from one PC to another on the same LAN, without affecting the DTC users (eg, when PC requires maintenance)	– Increase network uptime
• Powerfail recovery facility on HP OpenView DTC Manager, transparent to managed DTCs	– Increase network uptime

* Certain parameters may need reconfiguration on HP 3000 Series 900 hosts. Refer to the manuals "Configuring Systems for Terminals, Printers and other Serial devices" (P/N 32022-90004), and "Using the Node Management Services Utilities" (P/N 36922-90008) for more details.

Local DTC users acess to remote multivendor systems (HP or non-HP) through X.25 networks

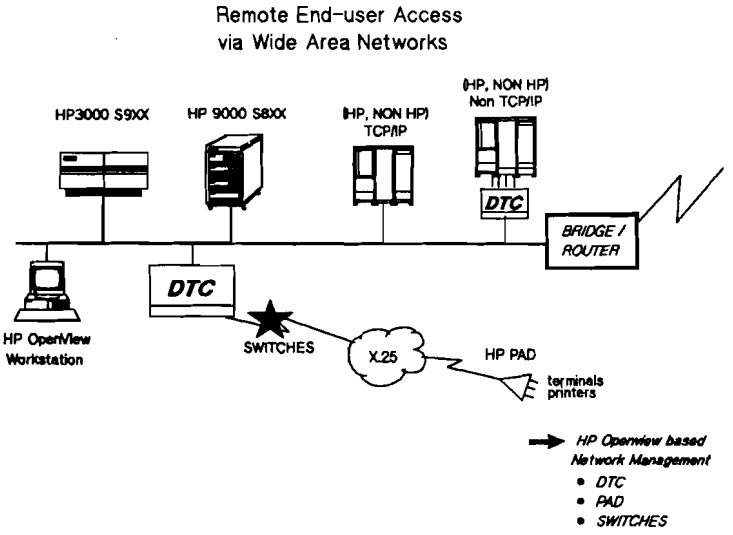
The DTC allows endusers to connect to remote systems via an HP 2335A Stat Mux/X.25 PAD. Access to wide area network is provided by connecting one or more ports of the DTC to the asynchronous (RS-232) ports of the HP 2335A. This functionality is provided through the use of the "extended switching" feature (through the "back-to-back" configuration described above. On the other hand, any Telnet/TCP/IP system or workstation connected to the LAN is also provided with an outgoing access to the X.25 network through the use of the configuration described above.

Remote End-User Access via Wide Area Networks (X.25)

Where X.25 access is required to a single HP 3000 Series 900 system, the DTC can be configured, downloaded from, and managed by the host through the use of the Host-Based/iX X.25 management software (available with the FOS). Where X.25 access is required to multiple systems or a non-HP 3000 Series 900 single system, the DTC is configured, downloaded from, and managed by the PC-based HP OpenView DTC Manager. Typical networks include PADs, X.25 switches, hubs, and bridges, and the network operator can take full advantage of the PC management station to manage the above devices concurrently, with the integration of HP OpenView DTC Manager with the other HP OpenView applications in the PC.

A terminal, PC, or printer connected to a public or private X.25 PAD can access any HP or non-HP system via the X.25 Network Access card in the DTC. Systems can be accessed directly, such as HP 3000 Series 900 via its optimized OLTP protocol, or the HP 9000, HP 1000 systems, and other ARPA systems via the Telnet TCP/IP protocol. Other non-TCP/IP systems can be accessed via a back-to-back configuration between a DTC and the system multiplexer.

Note: For remote access to systems other than HP 3000 Series 900, DTC48s (HP 2345A) with date code less than 3110 must be upgraded with the DTC48 Upgrade Kit (HP 2348A). The DTC16 does not require any upgrade kit.



Applicable to all system platforms:

- The DTC provides location-independent access for its endusers; as such most of its features are similar to the ones described in "local multiple system access" with the following limitations:
  - Remote PAD printers are only supported for direct access to systems on the LAN (ie, not in a back-to-back configuration)
  - Only character-mode (no type-ahead) and VPlus Block-mode applications are supported with PAD functionality
  - Multisession is not available
  - X.25 connection characteristics cannot be reconfigured online.

Features and Benefits (Remote End-User Access)

Additional features:	
• X.25 tracing facility	
• Support of switched virtual circuits	
• Standard CCITT 1980 and 1984 versions of X.25 and compliance with CCITT 1980 and 1984 versions of X.3/X.28/X.29 protocols • Compliance with Defense Data Network (DDN) specifications	– Multivendor interoperatability through adherence to standards
• Reduced CPU overhead due to X.25 and PAD protocol processing on the DTC • Optimized number of X.29 Set packets and X.3 parameters change based on application requirements. • Selectable Padsup profiles (PC-based only).	– High performance
• Up to 256 virtual circuits per card with the DTC48, up to 32 virtual circuits per card with the DTC16 • Multiple hosts can be accessed through one X.25 card in a DTC (PC-based only).	– Cost-effective scalable solution for multiple systems
• Restrict the access of an X.3/X.28.X.29 PAD terminal to a predefined list of hosts, based on the calling X.25 address • Closed User Group CCITT 1980 • Configurable security on all DTC X.25 connections	– Security
• X.25/PAD Support autorestart	– High system availability

Note: Character mode applications support Videopad. (Videopad has been tested in France only, through Minitel (code: 3613). For other countries, please contact your HP representative.)

For more information about X.25 connectivity, please refer to the "X.25 iX Network Link" data sheet.

DTC Specifications End-User Access

Hardware platform	DTC16	DTC48
Number of slots	3 (slot 3 dedicated to X.25)	6 (slot 0 must be Async)
Asynchronous connectivity		
Max number of cards	2	6
RS-232 Modem	6 ports – 25 pins	6 ports – 25 pins
RS-232 Direct	8 ports – 25 pins	8 ports – 3 pins
RS-422 Direct	Not available	8 ports – 5 pins
Data transfer rates 300,1200,2400, 4800,9600 and 19200 bps		
Speed sensing	yes	yes
Parity sensing	yes	yes
Maximum number of sessions/port	5	5
Maximum number of sessions/DTC	48	128
LAN connectivity		
ThinLAN	yes	yes
ThickLAN	yes	yes
EtherTwist (AUI + EtherTwist MAU required)	yes	yes
Broadband	Ext. adapter required	Ext. adapter required
FDDI	Ext. adapter required	Ext. adapter required
X.25 PAD connectivity		
Max number of cards	1	3
Number of VCs/card	32	256
Interfaces/speed	RS-232/19.2 kbps	RS-232/19.2 kbps V.35/64 kbps V.36/64 kbps RS-422/64 kbps
PAD supported	128,256	128,256
Packet length	512 bytes	512 bytes
Telnet Access Card (required for Telnet services on HP 3000 Series 900)		
Max number of cards	N/A	1
Max sessions/card	N/A	40
Access to systems via their names	via DNS (Domain Name Server) addressing via NS addressing via IP addressing	via DNS (Domain Name Server) addressing via NS addressing via IP addressing

Note: It is not possible to mix X.25 Network Access cards and Telnet Access Cards in one DTC.
A dedicated server (HP 2344A) is also available for endusers requiring more Telnet sessions on the HP 3000 Series 900 (80 sessions max).

Network Management	HP OpenView Entry Level DTC Manager/UX	NMMGR and TermDSM utilities (HBX25 if needed)	HP OpenView DTC Manager
Platform	HP-UX systems	MPD/iX systems	PCs
Connectivity	Local access to managing system only	Local & remote (PAD) access to multiple systems	
User interface	ASCII (follows SAM guidelines)	ASCII (VPlus)	Graphical (OpenView and MS-Windows)
Integration of HP DTCs, Switches, PADs, hubs, bridges and networked HP 3000 management	n/a	n/a	yes
Powerfail recovery	n/a	n/a	yes
Remote Access thru PAD 233X modems* or IP routers	yes	yes	yes
Backup/restore function (for configuration, event, trace, upload databases) through standard system backup/restore process	yes	yes	yes
Centralized support of multiple DTC versions (with one local version and multiple remote versions)	n/a	n/a	yes
* Contact your local Response Center for list of recommended modems			
DTC Functions:			
Support of DTC16 & DTC48	yes	yes	yes
Access to HP 3000 S900	n/a	yes	yes
Access to HP 9000 S800	yes	n/a	yes
Access to HP 9000 S300,S400,S700	n/a	n/a	yes
Access to non-HP systems via extended switching	n/a	n/a	yes
Access to multiple systems	n/a	n/a	yes
DTC/X.25 support for HP 3000 S900	n/a	yes	yes
Maximum number of DTCs	150	24	150
Maximum number of X.25 cards	n/a	n/a	60
Configuration management:			
Configuration			
Serial ports	yes	yes	yes*
X.25 levels 2 and 3	n/a	yes	yes
X.25 system switching	n/a	no	yes*
X.25 PAD access & security	n/a	yes	yes*
DTC nodename, LAN address, and IP address	yes	yes	yes
User welcome message	n/a	n/a	yes*
Inactivity timer	n/a	n/a	yes*
Retransmission timers	n/a	n/a	yes
Management packet length	n/a	n/a	yes
Domain Name Server (DNS) addressing for DTC traffic	n/a	n/a	yes*
IP router addressing for DTC traffic.	n/a	n/a	yes*
Copy/Paste function	yes	n/a	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	no	yes
Centralized support of multiple DTC versions* (with one local version and multiple remote versions)	n/a	n/a	yes
* Indicates parameters can be modified online			

Table (continued)

Network Management	HP OpenView Entry Level DTC Manager/UX	NMMGR and TermDSM utilities	HP OpenView DTC Manager
Fault Management:			
Reset DTC, ports, and serial cards	yes	yes	yes
Reset LDEV	n/a	yes	yes
Reset systems connections (when DTC/card/port reset)	n/a	yes	yes
Reset X.25 card and X.25 LCI	n/a	yes	yes
Upload DTC and ports data	yes	yes	yes
Upload X.25	n/a	yes	yes
Upload LDEV	n/a	yes	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	n/a	n/a	yes
X.25 tracing & logging	n/a	yes	yes
Show connections	n/a	n/a	yes
X.25 site management	n/a	no	yes
IP address checking (Extended ping)	n/a	n/a	yes
Printing:			
DTC configuration (card and port)	yes	yes	yes
Status	yes	n/a	yes
Event log	yes	n/a	yes
Trace	n/a	n/a	yes
Telnet Access to HP 3000 Series 900 (for detailed information on this functionality, please refer to the "ARPA Services/iX" data sheet)			
Telnet Access Card Management:			
Telnet Access configuration	n/a	n/a	yes
Start/Stop on card	n/a	n/a	yes
TAC autorestart	n/a	n/a	yes
Upload	n/a	n/a	yes
Reset	n/a	n/a	yes
Show status	n/a	n/a	yes
Typical DTC download time (after selftest):			
DTC with three serial cards less than 1 minute			
DTC with three X.25 cards less than 2 minutes			

DTC Product Overview*

Service	DTC16	DTC48	Net.Mgt.
Local End-User Access Single system			
Single HP 3000 Series 900	2340A + async cards + LAN options	2345A + async cards + LAN options	included in MPE/iX FOS tape (NMMGR, TermDSM)
Single HP 9000 Series 800	2340A + async cards + LAN options	2345A + async cards + LAN options	J2120A
Local End-User Access Multiple systems			
HP 3000 Series 900 + Access to non-TCP/IP hosts ("back-to-back")	2340A + async cards + LAN options	2345A + async cards + LAN options	D2355A Rel 6.0 or later
HP 3000 Series 900 + Access to non-TCP/IP hosts ("back-to-back") + HP 9000 access + Multivendor connect.	2340A + async cards + LAN options	2345A + async cards + LAN options + DTC48 Upgrade Kit (HP 2348A) if DTC48 date code less than 3110	D2355A Rel 10.5 or later
Remote End-user access (single and multiple)			
HP 3000 Series 900	2340A + async cards (minimum 1 in slot 0) + LAN options + X.25 card	2345A + async cards + LAN options + X.25 card	D2355A Rel 6.0 or later included in MPE.iX FOS (single system access only)
HP 3000 Series 900 + HP 9000 + Multivendor + Access to non-TCP/IP hosts ("back-to-back")	2340A + async cards (minimum 1 in slot 0) + LAN options + X.25 card	2345A + async cards + LAN options + X.25 card + DTC48 Upgrade Kit (HP 2348A) if DTC48 date code less than 3110	D2355A Rel 10.5 or later
System-to-HP 3000 Series 900			
X.25 communications + Prog. Access	2340A + async cards (minimum 1 in slot 0) + LAN options + X.25 card	2345A + async cards + LAN options + X.25 card	D2355A Rel 6.0 or later included in MPE/iX FOS (single system access only)
TELNET Services for HP 3000 Series 900		2345A + async cards + LAN options + 2347A + DTC48 Upgrade Kit (HP 2348A) if DTC48 date code less than 3110	D2355A Rel 10.5 or later

Note: 2344A also provides TELNET Services for HP 3000 Series 900. Please refer to the ARPA/iX data sheet.

* Other software products may be required on the corresponding systems.

Support Policy and Installation Responsibilities

DTC

Hewlett-Packard will install the HP 2345A (DTC48) and/or HP 2340A (DTC16) and any add-on cards. Hewlett-Packard will verify the DTC operation by running the self-test, configuring an asynchronous port and establishing a system connection. Before HP installs the DTC the customer should install all cabling leading to the DTC (asynchronous, synchronous, or LAN). The customer should get all the necessary system software installed, configured, and running prior to the DTC installation.

HP D2355A OpenView DTC Manager

Hewlett-Packard will provide first-time installation and verification of the HP D2355A OpenView DTC Manager. It is a customer responsibility to ensure that the HP OpenView Windows Workstation (HP 32054B) or equivalent (see below) is set up ready for this installation. It is also a customer responsibility to install updates to the HP OpenView DTC Manager.

Note that if HP 32054B is ordered with option 201, the HP OpenView DTC Manager software comes already installed.

Hewlett-Packard will configure each DTC on the customer network using the default for the asynchronous devices and then successfully download each DTC.

The following PCs are supported for HP OpenView DTC Manager installations: HP Vectra ES/12, 286/12, QS, and RS Series PCs; IBM PS/2 model 55 and model 50: and COMPAQ DeskPro 386/20. Installation and configuration of these PCs, ready for HP OpenView DTC Manager installation, is the customer's responsibility. HP can perform these services along with the DTC product installation billable to the customer at HP time-and-materials rates.

Note: Device-specific configuration when migrating from host-based to PC-based DTC management is not a part of the HP installation /configuration responsibilities.

HP OpenView DTC Entry-level Manager/UX

HP OpenView DTC Entry-level Manager/UX (J2120A) is customer installable. It is also a customer responsibility to install updates to HP OpenView DTC Entry-level Manager/UX.

HP 3000 Series 900 DTC Management

Host-based DTC management on HP 3000 Series 900 systems is part of the fundamental operating system, and is installed and supported as such.

Support Services

DTC managed by the HP D2355A 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 access in up to 50 DTCs managed by the HP OpenView DTC Manager.

The support services available for the HP OpenView DTC Manager are as follows:
H2024A + T00 #0L7
OpenView Teamline Support
H2025A + H00 #0L7
OpenView ResponseLine Support
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, OpenView Windows, 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. Make sure you specify D2355A

in order to receive support on that product.

Note: ResponseLine and TeamLine services require a modem for remote support.

Remote Support

Since release 6.0, any asynchronous modem should work with the remote support of the HP OpenView DTC Manager. Refer to your response center to get a list of recommended modems in your country.

The following modems have been successfully tested with the DTC centralized management facility (the modems tested were all Hayes 100% compatible; this does not however, exclude non-Hayes modems):

- HP 92205A/B
- Hayes Smartmodem (1200/2400)
- Multitech 224
- Siemens 2425B DX

To connect the workstation to the modem (at each site), use an HP 24542M 3 meter HP Vectra PC-to-modem cable.

The HP 2335A family (HP PAD) can also be used as an alternative to a modem connection, by connecting the customer workstation to the Response Center via X.25.

For release 12.0, HP has enhanced remote access to the HP OpenView workstation to include IP routers. Provided your DTC Manager workstation is connected to the same internet as the remote workstation, connection is possible via the TCP/IP protocol stack. Note that special configurations of the network layer must be done to acheive connections across gateways.

DTC managed by the HP OpenView DTC Entry-level Manager/UX

HP offers a number of support services. With the purchase of these support services, customers are entitled to free updates of HP OpenView DTC Entry-level Manager/UX software.

The HP OpenView DTC Entry-level Manager/UX is supported under the HP 9000 support services including TeamLine, ResponseLine, and BasicLine.

Additional support services are available from HP; for more information, please contact your local HP Sales Representative.

Non-HP system access support services

The DTC conforms to the multivendor standards listed elsewhere in this data sheet. Other vendors' implementation of these standards may differ from that of HP; to ensure successful operation, HP also offers a comprehensive program of testing and support services as follows.

Non-HP systems that have already been tested with the DTC are listed in the relevant section for each supported configuration.

For HP Field and Response Center support for such configurations, you must also order one or more of the following HP support services:

- **HP NetStartup**
  For starting up and ensuring the smooth operation of your network; includes implementation scheduling and coordination assistance, network configuration and verification, and network documentation.
- **HP NetAssure**
  For fault isolation and help with problem resolution anywhere on your network.

Your HP Sales representative can advise you on the appropriate choice.

The list of non-HP systems tested with the DTC is constantly growing. Your HP Sales Representative can also determine for you if your configuration has been tested. If it has not been tested, HP can test it for you to verify correct interoperability and optimize network design. In this case, you must order the following service:

- **HP Consultline**
  A pre-sales service testing configurations and qualifying them for support, using the HP DTC test package.

Supported Configurations

HP 3000 Series 900 Systems Access

The DTC is supported on the currently supported versions of MPE/iX (starting with Release 2.1), the HP 3000 Series 900 operating system. Not all devices supported by the DTC are supported by HP 3000 Series 900 systems. Consult system and application documentation for details of supported devices to ensure compatibility. Refer to the HP 3000 Computer System Configuration Guide (P/N 5954-9354) for more information.

HP 9000 System Access

The DTC supports all HP applications and supports all asynchronous devices supported by the Telnet link on the system. The DTC is supported on the currently supported versions of HP-UX (starting with release 7.0), the operating system of HP 9000 systems.

Refer to the HP 9000 Series 800 Systems – Configuration Guide (P/N 5952-4835) and to the HP 9000 Workstations – Configuration Guide (P/N 5954-8594) for detailed information in addition to the list of HP devices supported by the DTC.

Extended switching (back-to-back configuration)

For system security reasons, HP recommends that modem signals be used between the DTC and the asynchronous multiplexer on the system, as well as between the DTC and the attached terminal, printer, or multiplexer.

Refer to the corresponding HP systems asynchronous multiplexers data sheet for an up-to-date list of supported devices and applications in addition to the list of HP devices supported by the DTC.

The DTC has been tested and is supported with the following 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:
  - Channel I/O Asynchronous 6-channel Multiplexer (P/N 98196A)
  - HP-PB Asynchronous 8-channel Multiplexer (P/N 40299A/B)
  - Channel I/O Asynchronous 16-channel Multiplexer (P/N 98190A)
  - HP-UX, release 7.0 or later

The DTC is supported on the currently supported operating system versions of the above HP systems.

The DTC has been tested with the following non-HP system. Refer to the non-HP system access support section for details of support services provided by HP for such configurations.

- 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

The list of tested systems is constantly growing. Refer to your HP Sales Representative to get an up-to-date list of tested configurations. If your configuration is not included in this list, HP will be able to test it for you. Refer to the non-HP system access support section for more details.

Note: For extended switching (back-to-back configuration) over routers, one Telnet Access card or Telnet Express is needed on the LAN segment of the DTC connected to the system. Refer to the "ARPA Services/iX" data sheet for more information on the Telnet Access card or Telnet Express

Note: A DTC and an HP TS8 can be placed in a "back-to-back" configuration. Terminal users benefit from the features of the terminal server to which they are connected.

Telnet system access

The DTC's Telnet system access is based on the following standards:

- Telnet: MIL-STD 1782, RFC 854, 855, 856, 857, 859, 860, 1123
- TCP: MIL-STD 1778, 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

The DTC has been tested and is supported with the following HP systems:

- HP 3000 Series 900 with HP ARPA Telnet Access release 10.5 or later, or HP ARPA Telnet Express release 10.5 or later.
- HP 9000 Series 300/400/700 and 800 with HP-UX Release 7.0 or later, and ARPA services.

The following systems are currently under test. Refer to your HP Sales Representative to get the latest status on these configurations:

- HP 1000 Series with HP RTE and ARPA services
- HP Apollo Series with DOMAIN and ARPA services
- HP 9000 Series 700 with HP-UX Release 8.0 or later, and ARPA services.

The DTC has been tested with the following non-HP systems. Refer to the non-HP system access support section for details of support services provided by HP for such configurations.

- DEC VAX System with VMS Release 5.4 and NS VAX 2.1
- DEC VAX System with VMS Release 5.4 and WIN/VX 5.1
- SUN SparcServer with SUN-OS release 4.1

The list of tested systems is constantly growing, refer to your HP Sales Representative to get an up-to-date list of tested configurations. If your configuration is not included in this list, HP will be able to test it for you. Refer to the non-HP system access support section for more details.

End-user access via modems

The DTC supports a wide range of asynchronous modems based on the V.22bis standard. The DTC has been tested with the following modems. Refer to your HP Sales Representative to get an up-to-date list of modems supported in your country.

Modem Type

- HP 37212A
- HP 35016A
- HP 35141A
- BELL 212A
- Hayes Smartmodem 1200 or HP 92205A
- Hayes Smartmodem 2400 or HP 92205B
- Racal-Milgo MPS 1222
- AJ 1212 AD1
- HP 92205J
- Multitech V32 MT932EF
- Alcatel MD9633 T110

Note: Hardware handshake is not supported.

End-user Access with statistical multiplexers

The DTC has been tested with the following HP statistical multiplexer:

- HP 2335A X.25 Multiplexer
- HP 2334A Plus X.25 Multiplexer, version 4.0 or later

Supported LAN Devices

HP supports the following LAN devices for transfer of data across LAN:

- HP 92223A HP Repeater
- HP 28645A HP ThinLAN Hub
- HP 92256E HP Surge Protector
- HP 28648B HP 10:10 LAN bridge
- HP 28673A HP 10:10 LAN bridge
- HP 28674A HP Remote bridge
- HP 28681A HP 10:10 Lan Bridge LB
- HP 28682A HP Fiber Optic Hub Plus
- HP 28684A HP EtherTwist Hub
- HP 28688A HP EtherTwist Hub Plus
- HP 28691A HP EtherTwist Hub/8
- HP 27270A HP Router
- HP 27285 Router ER

Note: The DTC does not support transfer via level 2 bridges losing more than 1% of large (1500-byte) packets. The DTC may experience problems in such a configuration during downloads, uploads, and X.25 system-to-system communications.

Note: 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

You will need to purchase HP NetAssure support services to gain Field and Response Center support for this configuration.

DTC Supported asynchronous devices

The DTC has been tested with the following asynchronous devices. This list might be restricted by the system the DTC accesses.

Terminals

HP 2622A,23A,24B,25A,27A (HP 3000 only);
HP 2392A,93A,94A,97A;
HP 700/92,93,94,96,97,98;
HP 700/22,32,41,43,44,60;
HP 3081A, 3082A/B

Notes: The specified firmware is necessary for the following terminals:
- 2622A: ROM 3199 or later
- 2623A: ROM 3223 or later
- 2624B: ROM 3139 or later
- 2627A: ROM 1818-3487 or later.

Xon/Xoff flowcontrol is used between the DTC and terminals.

The 2622A, 2623A, 2624B, and 2627A are not supported with a modem connection.

Asian Terminals (HP 3000 only)

- C1010C AB2 Simplified Chinese HP700/92A keyboard
- C1010J ABJ Japanese HP700/92A keyboard
- C1010 AB0 Traditional chinese HP700/90 keyboard

Personal computers, using HP AdvanceLink 2392 terminal emulation

(supported packages: AdvanceLink/DOS, AdvanceLink/Windows and Reflection/WRQ)

- HP 150A/B/II
- HP Portable Plus
- HP Vectra
- HP Vectra CS/ES/RS/QS
- HP Vectra Portable CS
- IBM PS/2 Model 30,50,60,80
- COMPAQ DeskPro

Note: Non-HP Personal Computers have been successfully tested to work with the DTC. The devices themselves are not supported by Hewlett-Packard.

Printers and Plotters

- HP 7550A Plotter
- HP 2225D ThinkJet
- HP 2932A,33A,34A Impact printer
- HP 2562C,63A/B/C,64B/C Line impact Dot matrix
- HP 2235C Rugged Writer
- HP 2684D/P, 2686A/D Laser
- HP 33440A/F,47A/F,49A,59A
- HP 33471A

Asian printers (HP 3000 only)

- C2354A Guyacan Light line printer
- C2356A Guyacan Line printer
- C1200A Dot matrix
- C1602A Paintjet color

Notes: Xon/Xoff flowcontrol is used between the DTC and printers. Modem connections are not supported with the HP laser printers due to modem handshake used. Printer status request and modem connection can be used with the DTC. Refer to the corresponding printer data sheet to know if it can be used in your configuration.

Data switches and PBXs

The following data switches and PBXs have been tested with the DTC. You will need to purchase HP NetAssure support services to gain Field and Response Center support for this configuration.

Data switches:
- MICOM INSTANET 6000 Series 40
- EQUINOX DS15
- GANDALF PACX 2000

PBXs (US only):
- AT&T System 85
- NTI Meridian SL-1

HP D2355A OpenView DTC Manager

HP OpenView DTC Manager is supported on all Hewlett-Packard 286/386 PCs, IBM PS/2-55 and model 50, and Compaq DeskPro 386/20 PCs.

HP OpenView DTC manager release 12.0 is supported with the following software:
- HP OpenView Windows version 4.0
- MS-DOS® versions 3.3, 4.01 or 5.0
- Microsoft® Windows version 3.0a
- HP ARPA/DOS services 2.1 version B.02.00

For a complete software matrix refer to the "Using HP OpenView DTC Manager" manual.

Application Integration

Since release 12.0, the HP OpenView DTC Manager

uses MS Windows 3.0a protected modes which enables us to run many HP OpenView applications concurrently on the same HP OpenView workstation. DTC Manager has been tested running the following applications concurrently:

- DTC Manager with HP OpenView Switch/PAD Manager (J21017A)
- DTC Manager with HP OpenView Hub Manager (28653C)
- DTC Manager with HP OpenView Bridge Manager (28686C)
- DTC Manager with HP OpenView System Manager (36936A)

Running the above applications concurrently is only supported on a 386-based PC, and it should be noted that the PC memory should be increased by approximately 2 Mbytes per application.
Note that HP OpenView DTC Manager and Switch/PAD Manager integration is supported on 286-based PCs.

Various permutations of applications have been tested; for a complete list of tested configurations and notes on how to install them, you can order the following HP documentation:
D1825-90093

HP AdvanceLink for Windows (part of the bundle HP 32054B) may be used to access an HP 3000 Series 900 system console port from the HP OpenView Windows Workstation, using a serial link connected to the console port. Running functions of AdvanceLink for Windows may affect the operation of DTC Manager; please refer to "Using HP OpenView DTC Manager" for further information.

Note: We recommend the purchase of an additional serial connection to run "AdvanceLink for Windows" on the HP OpenView Windows Workstation.

HP OpenView DTC Entry-Level Manager/UX

HP OpenView DTC Entry-Level Manager/UX software runs on HP 9000 Series 800 computer systems with HP-UX Release 7.0 or later, and ARPA Services/9000.

HP 3000 Series 900 Management

HP 3000 Series 900 DTC management software is part of the MPE/iX Fundamental Operating System for these systems. Information required about this product should be obtained from the relevant sources.

Cables

The table below lists the cables recommended to connect the DTC with the following devices:

Devices / DTC Connectors	DTC16 and DTC48 RS232 25 pins (modem or direct)	DTC48 only RS232 3 pins	DTC48 only RS422 5 pins
Terminals and Personal Computers			
HP 2392A/93A/94A/97A HP 700/22/32/43/45/92/94/96/98 HP 150X HP Vectra with HP24541B/ptB (25 pins) HP 3081A, 3082A/B	40234A	40242X	40242P
HP 2622A/23A/24B/27A	*13222M/N	13222X	13222P
HP 2625A,24B (port2)	40234A	40242X	n/a
Portable +	92221M	n/a	n/a
HP Vectra (9 pins) 24540B/ptA 24541B/ptA	24542M	n/a	n/a
Printers and Plotters			
HP 7550A	17355D	30152A	n/a
HP 2227A,28A,76A,77A HP 2235C HP 2562A,63A/B/C,64A/B/C, HP 2932A,33A,34A	40234A	40242X	n/a
HP 2684D/P,86A/D HP 33440A/F,47A/F,49A,59A	40234A	40242X	40242P
	* M for European mode N for US modem		
Modem	30062B	n/a	n/a
Extended switching access through "back-to-back" configurations			
HP 2334/2335A X.25 multiplexer			
- terminal	40221A	n/a	n/a
- printer	40220A	n/a	n/a
HP2342A HP TS8	30062B	n/a	n/a
HP 3000 ATP, ATPM (25-pin) HP 9000 40299A, 98642A	40233A	40230A	n/a
HP 3000 ATP, ATPM (3-pin)	40230A	40232A	n/a

Racking information

- HP Direct offers three EIA 19-inch standard cabinets, described in the table below. One DTC rack-mount kit is required to rack a DTC. For the DTC48, order rack-mount kit A1052A. For the DTC16 order 35199E. These rack-mount kits are designed for HP 19-inch racks only.

Ordering Information

Ordering the DTC16 product

To order the DTC16 product, please use the following rules:

- First digit: indicates the number of ports
  - 6: 6 RS-232-C modem ports,
  - 8: 8 RS-232-C direct ports.

The last two digits indicate:

- 40: ThickLAN configuration, MAU is provided
- 41: AUI provided, this option needs to be ordered when connection to EtherTwist is required. (Note: EtherTwist MAU needs to be ordered separately)
- 42: ThinLAN configuration, BNC-T connector provided
- 50: Additional ports, no LAN connection provided
  - Example: #642 will provide 6 modem connect ports as well as a ThinLAN BNC-T access port.
  - Example: #850 will provide 8 additional direct connect ports

Rack Cabinets

Order no.	Description	No. of DTCs DTC48	DTC16
46298A	EIA 19-inch cabinet 720mm	2	3
46298B	EIA 19-inch cabinet 1000mm	3	4
46298C	EIA 19-inch cabinet 1600mm	5*	8

Rack Cabinet Doors and Filler Panels

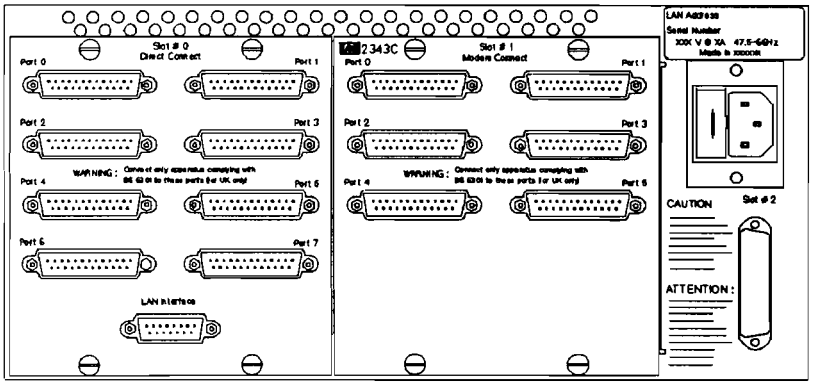
46298E	Front Door for 720mm rack
46298F	Front Door for 1000mm rack
46298G	Front Door for 1600mm rack
46298H	Rear Door for 720mm rack
46298J	Rear Door for 1000mm rack
46298K	Rear Door for 1600mm rack*
40101A	Filler panel, 1¾-inch
40102A	Filler panel, 3½-inch
40103A	Filler panel, 5¼-inch
40104A	Filler panel, 7-inch
40105A	Filler panel, 8¾-inch
40106A	Filler panel, 10½-inch

* To ensure adequate cooling, it is recommended that a rear door not be used if five DTC48s are racked in one cabinet.

Physical and Environmental Specifications

	DTC16	DTC48
Height	152mm (5.98 in)	222mm (8.9 in)
Depth	467mm (18.39 in)	440mm (17.6 in)
Width	325mm (12.8 in)	425mm (17.0 in)
Weight	8.8kg (19.4 lbs)	16kg (35 lbs.) min
	14kg (30.8 lbs)	22kg (48.5 lbs) max

DTC16 Backplane



The following table summarizes what you need to order when you want specific configurations:

Access	ThinLAN Configuration	AUI (no MAU) Configuration (1)	ThickLAN Configuration
6 modem ports(2)	2340A, #642	2340A, #641	2340A, #640
8 direct ports	2340A, #842	2340A, #841	2340A, #840
12 modem ports	2340A, #642, and #650	2340A, #641, and #650	2340A, #640, and #650
6 modem + 8 direct	2340A, #642, and #850	2340A, #641, and #850	2340A, #640, and #850
16 direct	2340A, #842, AND #850	2340A, #841, and #850	2340A, #840, and #850
X.25	add #310 to the DTC16 configuration (HP 2343D when ordered after initial DTC16 purchase)		
8 additional direct	order HP 2343A (when ordered after initial DTC16 purchase)		
6 additional modem	order HP 2343C (When ordered after initial DTC16 purchase)		

1. To connect to EtherTwist, order in addition the EtherTwist MAU (P/N HP 28685)
2. At least one asynchronous card is mandatory

015 Set for 220V operation (required for Europe and some Asia/Pacific countries)

310 X.25 Network Access card for the DTC16.

For every DTC16, one of the following LAN options 640, 641, 642, 840, 841 or 842 must be ordered.

640 Configure DTC16 for ThickLAN and provides six RS-232-C 25-pin modem connections. (Thick MAU and 6m AUI cable provided)

641 Configure DTC16 for AUI use and provides six RS-232-C 25-pin modem connections. (No MAU provided)

642 Configure DTC16 for ThinLAN and provides six RS-232-C 25-pin modem connections. (BNC-T connector provided)

840 Configure DTC16 for ThickLAN and provides eight RS-232-C 25-pin direct connections. (Thick MAU and 6m AUI cable provided)

841 Configure DTC16 for AUI use and provides eight RS-232-C 25-pin direct connections. (No MAU provided)

842 Configure DTC16 for ThinLAN and provides eight RS-232-C 25-pin direct connections. (BNC-T connector provided)

One add-on option may be ordered.

650 Provides six additional RS-232-C 25-pin modem connections.

850 Provides eight additional RS-232-C 25-pin direct connections.

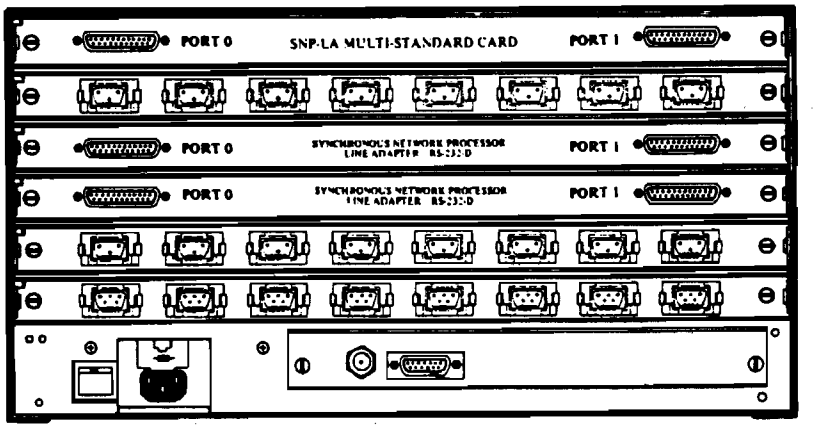
HP Field Installed add-on Asynchronous connector cards are available:

HP 2343A: Add-on DTC16 Asynchronous Connector card. Provides eight additional RS-232-C 25-pin direct Connections

HP 2343C: Add-on DTC16 Asynchronous Connector card. Provides six additional RS-232-C 25-pin modem connections.

HP 2343D: Add-on X.25 Network Access card for DTC16. Consult the "X.25 iX Network Link" data sheet for detailed ordering information.

DTC48 Backplane



015 Set for 220V operation (Required for Europe and most Asia/Pacific countries)

For every DTC48, one of the following LAN options 240, 241, 242 must be ordered:

240 Configure DTC48 for ThickLAN operation. Thick MAU and 6m AUI cable provided.

Ordering the DTC48 product

To order the DTC48 product, please use the following rules:

- First digit = 2 indicates a LAN connection. The last two digits (40, 41, 42) then indicate the LAN connection type (ThickLAN, AUI, ThinLAN respectively).
- First digit = 3 indicates an SNP (X.25) card. The last two digits (10, 20, 30, 35) then indicate the SNP interface type (RS-232, V.35, V.36, RS-422 respectively).
- First digit = 6 or 8 indicates the number of asynchronous ports. The last two digits (25, 03 and 05) then indicate the number of pins.

The following table summarizes what you need to order when you want specific configurations:

Access	ThinLAN Configuration	AUI (no MAU) Configuration (1)	ThickLAN Configuration
Order	2345A,#242	2345A,#241	2345A, #240
and from 1 to 6 of the following asynchronous cards:			
8 direct ports	2345A, #803	2345A, #803	2345A, #803
6 modem ports	2345A, #625	2345A, #625	2345A, #625
8 RS-422 ports	2345A, #805	2345A, #805	2345A, #805
X.25	add #310 (RS-232), #320 (V.35), #330 (V.36) or #335 (RS-422) to the DTC48 configuration (HP2346D/E/F/G when ordered after initial DTC48 purchase)		
8 additional direct	order HP 2346A (when ordered after initial DTC48 purchase)		
8 additional RS-422	order HP 2346B (when ordered after initial DTC48 purchase)		
6 additional modem	order HP 2346C (when ordered after initial DTC48 purchase)		

1. To connect to EtherTwist, order in addition the EtherTwist MAU (P/N HP 28685)
2. At least one asynchronous card is mandatory

241 Configure DTC48 for AUI operation. No MAU or AUI cable provided. To connect the DTC48 to an EtherTwist network, order the HP EtherTwist MAU (P/N 28685A).

242 Configure DTC48 for ThinLAN operation. BNC-T connector provided. For new ThinLAN installations, a ThinLAN terminator pair (P/N 92227P) must be ordered.

Up to three X.25 Network Access Cards may be ordered.

310 X.25 Network Access card for the DTC48, RS-232 interface

320 X.25 Network Access card for the DTC48, V.35 interface

330 X.25 Network Access card for the DTC48, V.36 interface

335 X.25 Network Access card for the DTC48, RS-422 interface

Note: Option #001 must also be ordered if card installed on DTC containing a date code less than 2851.

From one to six Asynchronous Connector cards may be ordered with the HP 2345A controller. These cards are factory installed:

625 Provides six additional RS-232-C 25-pin modem connections.

803 Provides eight HP Type 232 3-pin direct connections.

805 Provides eight HP Type 422 5-pin direct connections.

HP Field Installed add-on Asynchronous connector cards are available:

HP 2346A: Add-on DTC48 Asynchronous Connector card. Provides eight HP Type 232-C 3-pin direct connections.
HP 2346B: Add-on DTC48 Asynchronous Connector card. Provides eight HP Type 422 5-pin direct connections.
HP 2346C: Add-on DTC48 Asynchronous Connector card. Provides six RS-232-C 25-pin direct or modem connections.

HP Field Installed add-on X.25 cards are available:

HP 2346D: Add-on X.25 Network Access card for the DTC48, RS-232 interface
001 DTC hardware upgrade kit
HP 2346E: Add-on X.25 Network Access card for the DTC48, V.35 interface
001 DTC hardware upgrade kit
HP 2346F: Add-on X.25 Network Access card for the DTC48, V.36 interface
001 DTC hardware upgrade kit
HP 2346G: Add-on X.25 Network Access card for the DTC48, RS-422 interface
001 DTC hardware upgrade kit

HP 2348A: DTC48 upgrade kit (required for DTC48 with date code less than 3110).

Ordering the DTC Management products

To order the DTC Management products, please use the following rules:

- Local end-user access/single system access: order J2120A for HP-UX access; nothing to order for iX access
- Remote enduser access or multisystem access:
- Order D2355A if PC available with HP OpenView Windows Workstation configuration
- Order 32054B option 201 and one network connection option if PC not available

HP D2355A: HP OpenView DTC Manager
HP J2120A: HP OpenView DTC Entry-Level Manager/UX

One of the following must be ordered:

AA0 software on ¼-inch cartridge tape
AA1 software on ½-inch mag reel tape 1600 bpi
AAH software on DAT cartridge tape
0CC update to latest version

HP 32054B: HP OpenView Windows Workstation

The HP OpenView Windows Workstation is a specially configured HP Vectra, with PC software already installed. It includes 2 Mbytes of additional memory, HP ThinkJet printer, and MS-DOS, MS-Windows, HP ARPA/DOS services, HP OpenView Windows, HP AdvanceLink for Windows.

It provides the required PC hardware and software to run the HP OpenView DTC Manager.

- **Localization options: must order Option ABA-> ABZ.**

- Network connection options (**must order one**; only one may be ordered per workstation):

  101 ThinLAN connection
  102 ThickLAN connection
  103 EtherTwist connection

- Application options (**must order one**; a mix of the option 201 and one of the Switch/PAD Manager software options can be ordered.)

  201 HP OpenView DTC Manager software

For information on the Switch/PAD Manager software options, please refer to the HP OpenView Switch/PAD Manager data sheet)

HP D1824B: HP OpenView Workstation upgrade

201 HP OpenView DTC Manager upgrade

Updates an existing HP OpenView Workstation with the latest revision of all required software.

Documentation

With D2355A HP OpenView DTC Manager (PC-based management):
Using HP OpenView DTC Manager, D2355-90001
Quick Reference Guide for Terminal Users, D2355-90002
DTC Network Planning and Configuration Guide, D2355-90012

With J2120A HP OpenView DTC Entry-Level Manager/UX:
Using the HP OpenView DTC Entry-Level Manager, J2120A-61000

With the NMMGR and TermDSM utilites of the MPE/iX FOS:
Configuring Systems for Terminals, Printers, and Other Serial Devices, 32022-90004; Using Node Management Service Utilities, 36922-90008

With DTC16 (HP 2340A) and accessories:
HP 2340A DTC Installation and Service Manual, 02340-90001

With DTC48 (HP 2345A) and accessories:
HP 2345A DTC Installation and Service Manual, 02345-60030

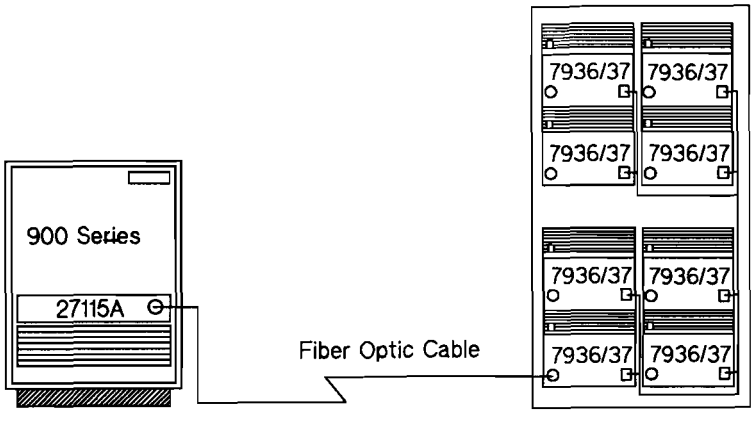
HEWLETT PACKARD

Fiber-Optic Peripheral Interface

Technical Data

For HP3000 Series 900 Computer Systems Product Number 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 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 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/XL 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

HEWLETT PACKARD

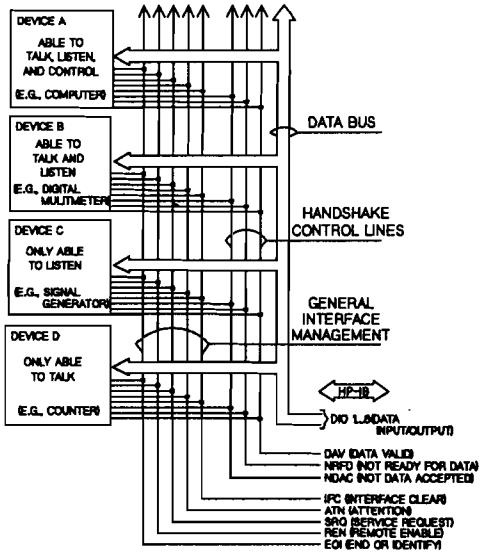
HP-IB* Interface for HP 3000 Series 900 Computer Systems

Technical Data

For HP 3000 Series 900 Computer Systems
Product Number 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 Kbytes/s high-speed, 500 Kbytes/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

* 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.

- 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

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 Kbytes/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: 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/XL Systems
30070-00043 HP-IB Backplate

HP 27113A Option

001 Deletes manual
002 Firmware upgrade
003 Sliverspan adapter

HEWLETT PACKARD

ThinLAN 3000/V Link

Technical Data

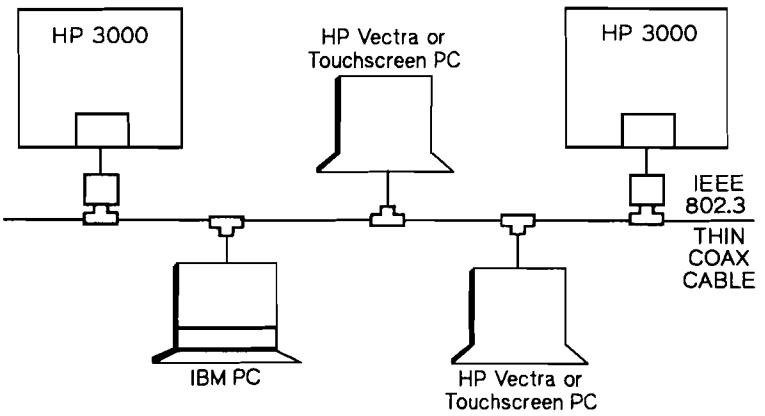
For HP 3000 Computer Systems
Product Number
30240A

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

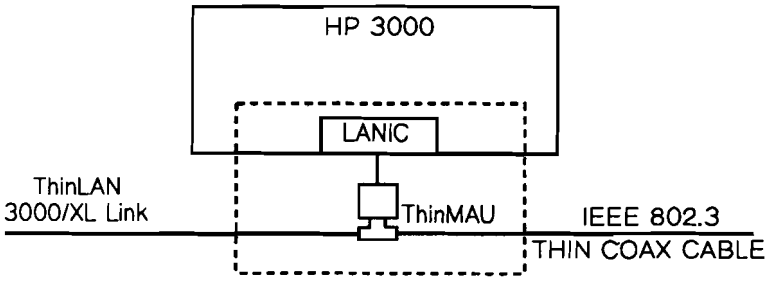
ThinLAN 3000/V Link contains the hardware and software required to connect an HP 3000 MICRO, MICRO/XE/LX/GX, Series 37 and 39 through 70 to an IEEE 802.3 Type 10BASE2 thin coaxial cable. It also provides programmatic access to network communication between HP 3000s, through a set of Network InterProcess 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.

FIGURE 2



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.

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 systems LANIC and ThinMAU, as well as send test frames to and receive test responses from other nodes.

FIGURE 3

OSI MODEL	THINLAN LINK SOFTWARE COMPONENTS
7 APPLICATION	NS3000/XL (HP 32344A)
6 PRESENTATION	
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)

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.

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.

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 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 on-site 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.

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

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 MICRO 3000, MICRO 3000XE, MICRO 3000LX, MICRO 3000GX, Series 37
300 For Series 39, 40, 42, 52
400 For Series 44, 48, 58
500 For Series 64, 68, 70

EtherTwist Options

142 Substitutes twisted-pair MAU with integrated 1-meter AUI cable for use with EtherTwist. A port must be available on a EtherTwist Hub (28684A) to connect this option.
242 Deletes ThinMAU and substitutes ThickLAN product (also known as LAN3000/V). This option deletes the ThinMAU, "T" connector cover, and other hardware associated with the standard product. In its place, the ThickMAU, 6-meter AUI cable, and TAP is added. The LAN3000/V Link includes everything needed to connect an HP 3000 to an IEEE 802.3 Type 10BASE5 local area network.

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.

See the HP Computer Users Catalog for ThickLAN test kit and installation tools.

HEWLETT PACKARD

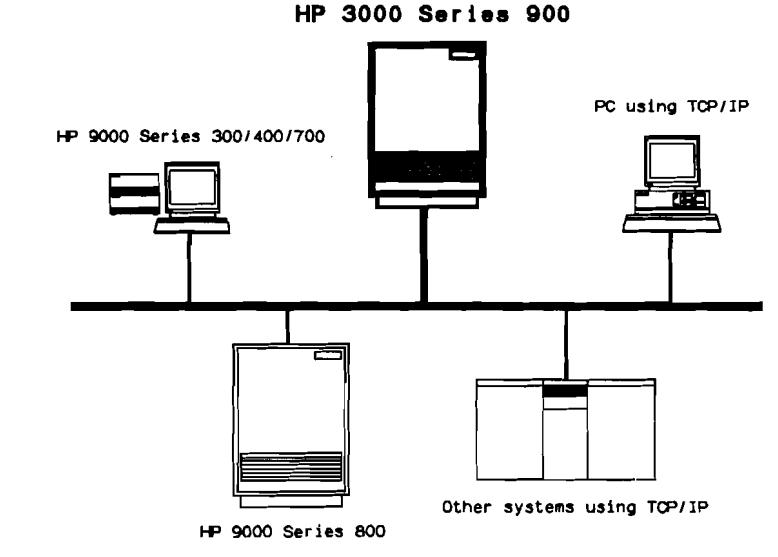
ThinLAN 3000/XL Link

Technical Data

For HP 3000 Series 900 Computer Systems
Product Number 36923A

The ThinLAN 3000/XL Link provides the hardware and software to connect an HP 3000 Series 900 computer to a multivendor LAN. The LAN/3000 Link includes the hardware interface card and the device driver, network transport, and network management agent software. The LAN/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 LAN/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 Mbits/s burst transfer rate.
- Uses a microprocessor-driven interface controller to minimize the HP 3000 overhead associated with datacommunications 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 on-line 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 10BASE-T
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 LAN/3000 link provides the hardware and software to connect an HP 3000 Series 900 computer system to a multivendor Local Area Network (LAN). The LAN/3000 link supports system-to-system communications to other HP 3000s; HP 1000s, 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 LAN/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

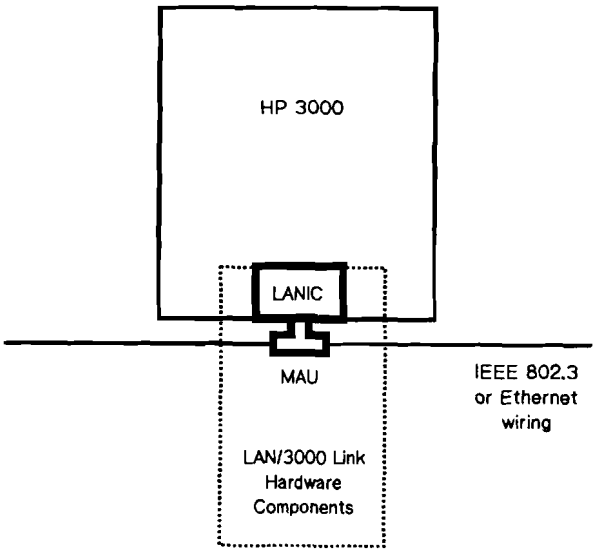
Note: The standard LAN/3000 Link connects to a thin coaxial cable (IEEE Type 10BASE2); connections to thick coaxial cable (IEEE 10BASE5) or unshielded twisted-pair wiring (IEEE Type 10BASE-T) are also available but optional.

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
- On-line 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 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 LAN/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 LAN/3000 Link; the other MAUs are ordered separately. The ThinMAU is powered by the LANIC.

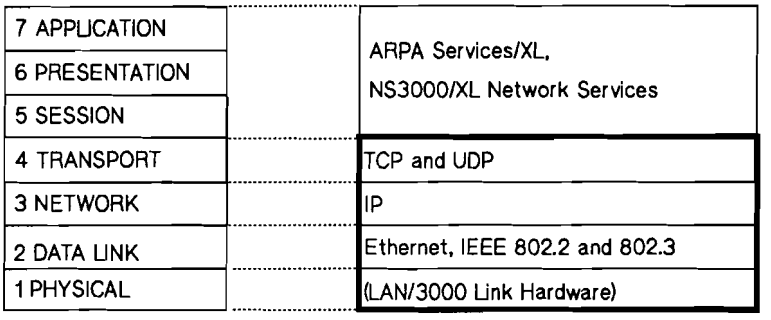
Note: The specific MAU and cabling supplied with the LAN/3000 Link differs, depending on the specific HP 3000 system. Please see the ordering instructions for more details.

Software Components

The LAN/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

FIGURE 3



OSI Model **LAN/3000 Link Software Components**

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.

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 connection-less delivery service over IP.

The LAN/3000 Link provides two application programmatic interfaces (APIs) to the network transport, Berkeley (BSD) sockets and HP's Network Inter-Proccess 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 LAN/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 LAN/3000 Link and provides a user interface for configuration, tracing, and logging. An on-line user configurator supports easy initial configuration and reconfiguration of the LAN/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.

On-line 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 LAN/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 LAN/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 LAN/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 LAN/3000 Link software onto the system. HP will install the LANIC card and perform minimum configuration of the LAN/3000 Link to verify minimum product functionality. This activity is included in the product purchase price.

Customer Responsibility

Prior to having HP personnel on-site to verify the installation and perform minimum configuration of LAN/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 LAN/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 LAN/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 on-site to complete the installation and minimum configuration of the LAN/3000 Link.

After HP has completed the minimum configuration of the LAN/3000 Link, the customer is also responsible for completing the configuration in order to fully integrate the LAN/3000 Link into the existing customer network.

HP Responsibility

Following the installation of the LAN/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 LAN/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 LAN/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 LAN/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 multi-function 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 Datacommunications and Terminal Controller DTC/3000 product. For system-to-system communications via a LAN, the customer may either use the 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 LAN/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 LAN/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)

36923A ThinLAN 3000/XL 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.

Processor Options
(see instructions above; may select one option)

310 For Tier 1 SPUs, one RTU/sublicense

315 For Tier 2 SPUs, one RTU/sublicense

320 For Tier 3 SPUs, one RTU/sublicense
330 For Tier 4 SPUs, one RTU/sublicense
335 For Tier 5 SPUs, one RTU/sublicense
340 For Tier 6 SPUs, one RTU/sublicense
350 For Tier 7 SPUs, one RTU/sublicense

Upgrade Credit Options

Previous purchase of the LAN/3000 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 option on the same order.

0CD Upgrade Credit for Option 310
0GJ Upgrade Credit for Option 315
0CE Upgrade Credit for Option 320
0CF Upgrade Credit for Option 330
0GL Upgrade Credit for Option 335
0GM Upgrade Credit for Option 340

Alternate MAUs

28685B EtherTwist MAU
30241A ThickMAU

Support Products

36923A+S00 Software Material Subscription (SMS) for LAN/3000 Link
36923A+W00 Extended SMS for LAN/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 LAN/3000 Link

36922-61023 HP 3000/XL 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/XL Error Messages Reference Manual
36920-61005 NS3000/XL Programmer's 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/XL 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

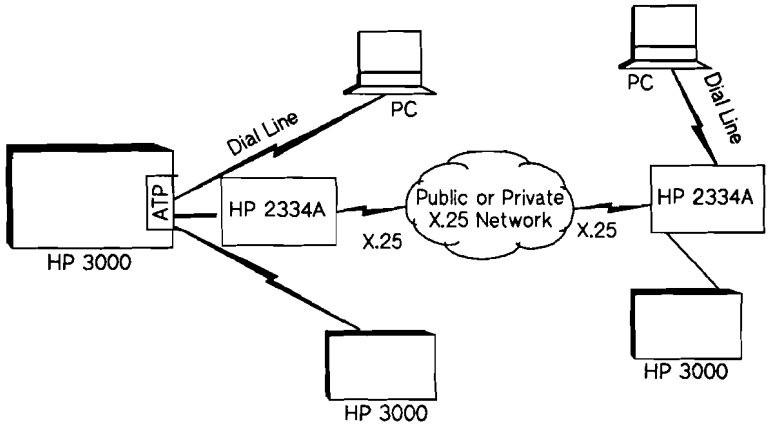
HP SERIAL Network

Technical Data

For HP 3000/V Computer Systems
Product Number
32003A

HP SERIAL Network 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 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 on-line configuration and logging with integrated node management software

Functional Description

HP SERIAL Network provides an asynchronous point-to-point link allowing HP Vectra PCs, IBM PCs, and HP Touchscreen PCs to communicate with HP 3000s. 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 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 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

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 Series 3x, MICRO 3000 Series
320	For Series 4x and 5x
330	For Series 6x and 7x

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.

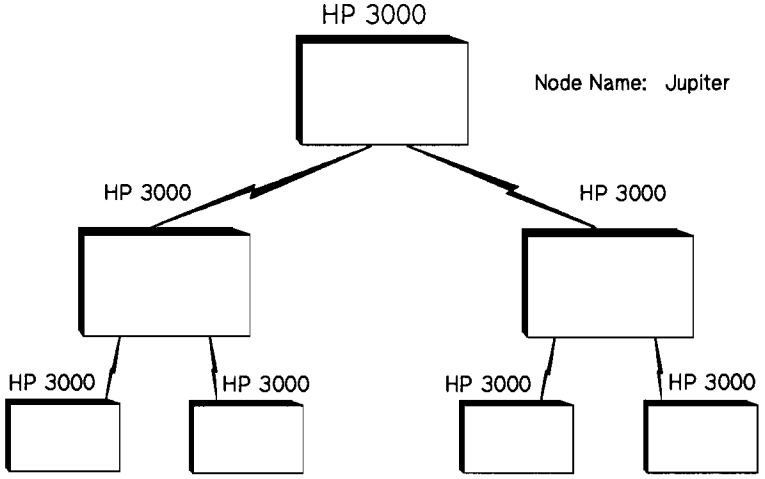
HEWLETT PACKARD

NS Point-to-Point Network Link/V

Technical Data

For HP 3000 Computer Sy
Product Numbers
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-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.

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 MICRO 3000, MICRO 3000XE, MICRO 3000LX, MICRO 3000GX or S/37. Compatible with NS3000/V Network Services (32344A). Requires selection of one hardware/cable option or one software option.

Hardware Options (HP 30280A)

- **110** Connection to synchronous modem
- **120** Connection to V.35 digital phone network
- **125** Connection to synchronous modem with autocall connection
- **810** Add-on INP with synchronous modem connection
- **820** Add-on INP with V.35 digital phone network connection
- **825** Add-on INP with synchronous modem with autocall connection
- **190** Software only, no hardware

Upgrade Options (HP 30280A)

15x DS upgrade credit options
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)

- **310** For Series 39 through 42 and 52 connection to synchronous modem
- **320** For Series 39 through 42 and 52 connection to V.35 digital phone network
- **325** For Series 39 through 42 and 52 connection to synchronous modem with autocall
- **410** For Series 44, 48 and 58 through 70 connection to synchronous modem
- **420** For Series 44, 48 and 58 through 70 connection to V.35 digital phone network
- **425** For Series 44, 48 and 58 through 70 connection to synchronous modem with autocall
- **710** Add-on INP with synchronous modem connection for Series 39 through 42 and 52
- **720** Add-on INP with V.35 digital phone network connection for Series 39 through 42 and 52
- **725** Add-on INP with synchronous modem with autocall connection for Series 39 through 42 and 52
- **810** Add-on INP with synchronous modem connection for Series 44, 48 and 58 through 70
- **820** Add-on INP with V.35 digital phone network connection for Series 44, 48 and 58 through 70
- **825** Add-on INP with synchronous modem connection with autocall for Series 44, 48 and 58 through 70

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)

35x DS upgrade credit options for Series 39 through 42 and 52

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 Point-to-Point Network Link/XL

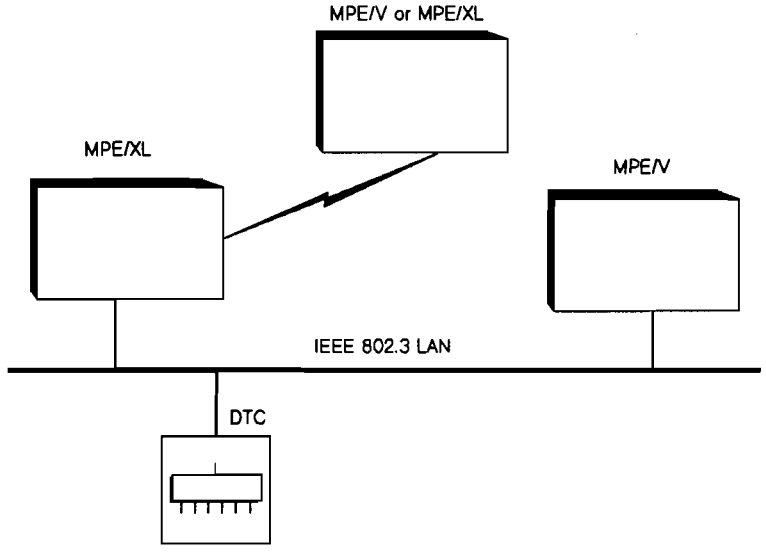
Technical Data

For HP 3000 Series 900 Computer Systems Product Number 36922A

The NS Point-to-Point Network Link for MPE/XL-based systems provides the network connection for an HP 3000 Series 900 computer to communicate with another HP 3000, MPE/XL- 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/XL Network Services (P/N 36920A).
- Supports LAPB protocol, an OSI standard for full-duplex line communication.



Functional Description

This product can be used in conjunction with NS3000/XL 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/XL 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/XL 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/XL Network Link (utilizing the LAPB 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/XL Network Link utilizing the LAPB 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

Product Components

Hardware

NS Point-to-Point 3000/XL 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/XL Network Link provides the OSI level 2 Standard, LAPB Protocol. LAPB provides full-duplex transmission, thereby eliminating line turn-around time.

Functional Specifications

The following modem support is provided with NS Point-to-Point 3000/XL Network Link:

Modem Migration from DS/V Point-to-Point or NS/V Point-to-Point to NS/XL Point-to-Point

Mode of Operation	DS/V Pt-to-Pt	NS/V Pt-to-Pt		NS/XL Pt-to-Pt
		BISYNC	LAPB	
Half Duplex	YES	YES	NO	NO
Full Duplex	YES	NO	YES	YES

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 mid-bus 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/XL Network Services. Customers need to be aware that program-to-program communication (PTOP) is not supported in the MPE/XL environment. Customers whose applications use PTOP are strongly encouraged to move to the newer, more efficient NetIPC environment for MPE/XL user applications. The NS Point-to-Point 3000/XL Link can be added to networks that currently include DS link products. In order for DS nodes to communicate with NS/XL 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/XL 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/XL 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/XL 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/XL 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/XL 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/XL Network Link

- Obtaining a valid IP address prior to the configuration of the NS Point-to-Point 3000/XL Network Link
- Updating the HP 3000 system to the proper release level and installing the NS Point-to-Point 3000/XL Network Link software using AUTOINST. Refer to the HP 3000 MPE/XL 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/XL Network Link

The customer is also responsible for completing the configuration in order to fully integrate the NS Point-to-Point 3000/XL Network Link into the existing customer network after HP has completed the minimum configuration of the NS Point-to-Point 3000/XL Network Link.

HP Responsibility

Following the installation of the software component of the NS Point-to-Point 3000/XL 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/XL 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/XL 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/XL Network Link configuration by issuing the NETCONTROL (and NSCONTROL, if applicable) start command for the NS Point-to-Point 3000/XL Network Link, NI, and ensuring that a connection can be established with another HP 3000 system using this new NS Point-to-Point 3000/XL Network Link.

These steps complete HP's portion of the installation and minimum configuration of the NS Point-to-Point 3000/XL 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/XL Link may be used as a standalone product with intrinsic access, or with NS3000/XL Network Services (P/N 36920A).

36922A NS Point-to-Point 3000/XL Network Link for HP 3000 Series 900 systems. Compatible with NS3000/XL 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, 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)

Processor Options:

310 For Series 920, 922LX
315 For Series 922RX
320 For Series 922, 925, 925LX, 932
330 For Series 935, 948
335 For Series 949
340 For Series 950, 955, 958, 960
350 For Series 980
399 Hardware only

Upgrade Credit Options:

0CD Upgrade Credit for Option 310
0GJ Upgrade Credit for Option 315
0CE Upgrade Credit for Option 320
0CF Upgrade Credit for Option 330
0GL Upgrade Credit for Option 335
0GM Upgrade Credit for Option 340

Support Products

36922A+S00 Software Material Subscription (SMS) for NS Point-to-Point 3000/XL Network Link.

36922A+W00 Extended SMS for NS Point-to-Point 3000/XL 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/XL Network Link:

36922-61001 NS Point-to-Point 3000/XL Network Configuration Guide
36923-61001 Guide to NS 3000/XL Documentation
36922-61002 NS 3000/XL Configuration Planning and Design Guide
36922-61005 NS 3000/XL Operations and Maintenance Reference Manual
36923-61000 NS 3000/XL Error Message Reference Manual
36922-61003 NS 3000/XL NMMGR Screen Reference Manual
36920-61005 NetIPC 3000/XL Programmer's Reference Manual

HEWLETT PACKARD

NS X25 3000/V Network Link

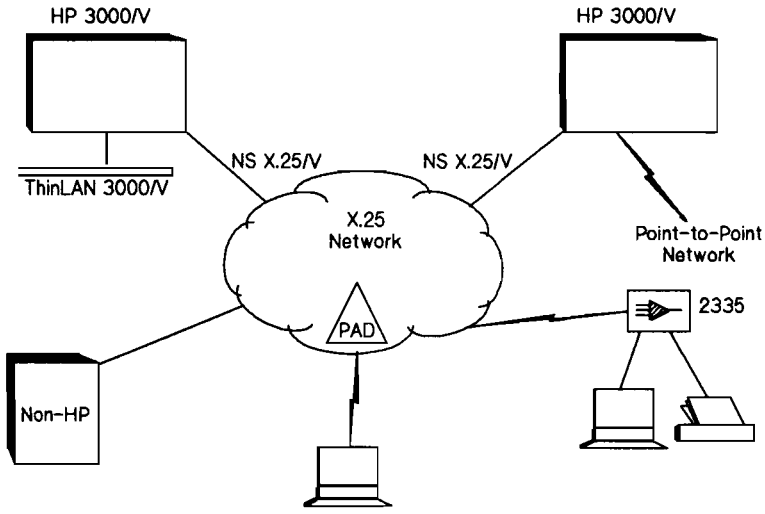
Technical Data

Product Number
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 (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

24405A NS X.25 3000/V Network Link

Hardware Options

110	For Series 37, MICRO 3000, MICRO 3000 XE, LX, and GX for RS-232 sync modems
120	For Series 37, MICRO 3000, MICRO 3000 XE, LX, and GX for V.35 sync modems
135	For Series 37, MICRO 3000, MICRO 3000 XE, LX, and GX for direct hardwired connections (see 30224L below)
310	For Series 39, 40, 42, 44, 48, 52, and 58 for RS-232 sync modems
320	For Series 39, 40, 42, 44, 48, 52, and 58 for V.35 sync modems
335	For Series 39, 40, 42, 44, 48, 52, and 58 for direct hardwired connections (see 30224L below)
410	For Series 64, 68, and 70 for RS-232 sync modems
420	For Series 64, 68, and 70 for V.35 sync modems
435	For Series 64, 68, and 70 for direct hardwired connections (see 30224L below)

30224L External Interconnect cable (required for hardwired connections)

Software Only Options

190 For S/37, MICRO 3000, MICRO 3000 XE, LX, and GX (requires 30244M INP)
390 For Series 39, 40, 42, 44, 48, 52, and 58 (requires 30020B INP)
490 For Series 64, 68, and 70. (requires 30020B INP)

Documentation Options

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

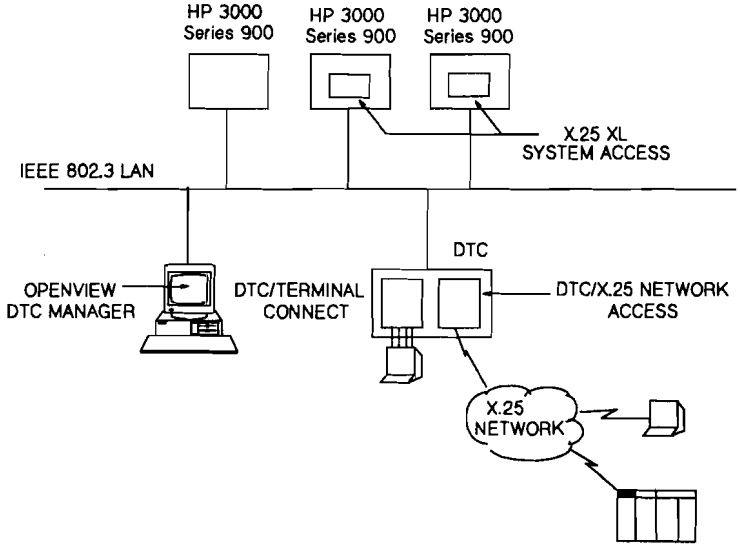
X.25 iX Network Link

Technical Data

For HP 3000 Series 900 Computer Systems Product Numbers 2340A, 2343D, 2345A, 2346D/E/F/G, D2355A, 369

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 Management 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)

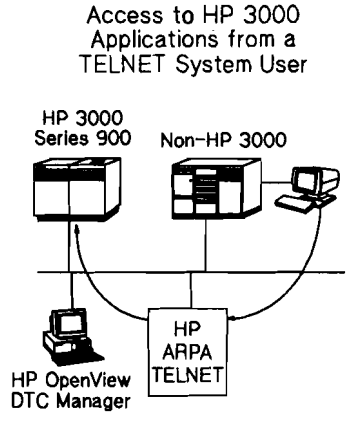
HEWLETT PACKARD

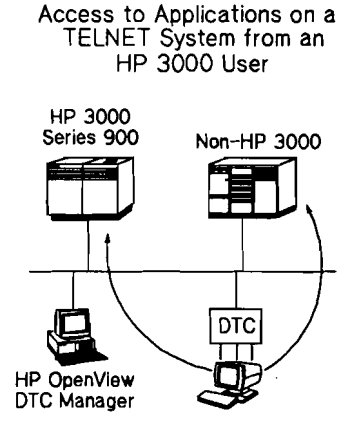
ARPA Services/XL

Technical Data

For HP 3000 Series 900 Computers
Product Numbers
2344A, 2347A, 2348A, 36955A, 36956A, 36957A, and D2355A

ARPA Services/XL (ARPA/XL) 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/XL uses networking protocols that have been implemented for most vendors' systems, ARPA/XL can be used to connect the HP 3000 Series 900 to HP and many non-HP systems. ARPA/XL protects HP 3000 investment in a diverse computing environment by offering wider access to valuable computing resources and applications. ARPA/XL provides file transfer using the FTP protocol and virtual terminal access using the TELNET protocol.





Features

HP ARPA File Transfer Protocol (FTP) 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.

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 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.

HP ARPA File Transfer Protocol supports the following FTP user commands:

ascii	binary	bye
case	cd	close
debug	delete	dir
disconnect	exit	exitonerror
form	get	help
ls	mdelete	mget
mode	mput	open
prompt	put	pwd
quit	quote	recv
remotehelp	rename	send
struct	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 XL, the programmatic interface mentioned above can be used to simulate MPE XL commands (for example, MPE XL's "LISTF" instead of FTP's "dir").

Supported Networks with HP ARPA FTP

For LAN connections, the ThinLAN 3000/XL 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.

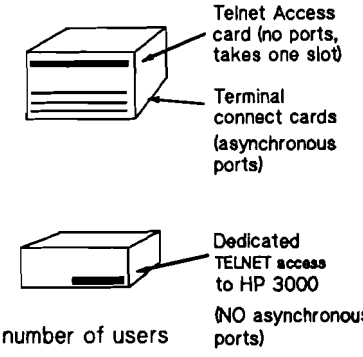
For WAN X.25 connections, the X.25 XL Network Link provides the TCP/IP transport mechanism and the X.25 connection for HP ARPA File Transfer Protocol.

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/XL Network Services (HP36920A) can run over the same link products simultaneously.

- 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

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 XL Network Link. If you desire interactive access over X.25, HP suggests the use of PAD. (See the "DTC/X.25 XL 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/XL is expected to interoperate with most of these.

HP has extensively tested the ARPA/XL 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/XL. Any ARPA software or associated hardware that is proven by HP not to interoperate well with ARPA/XL 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/XL 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/XL 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.

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/XL Link or X.25 XL 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 XL 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

ARPA Services/XL - 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.

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/XL:

- HP 3000 Series 900 software:
  - MPE XL 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/XL (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/XL Network Link (HP 36923A) or the DTC/X.25 XL Network Link (HP 36939A). Please refer to the data sheets in this specification guide.

Ordering Information

Five ARPA/XL products provide maximum flexibility:

1. HP ARPA/40 Services/XL – 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/XL – 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/XL

HP 36955A – HP ARPA/40 Services/XL 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 36956A – HP ARPA/80 Services/XL provides HP ARPA FTP for the selected system and an HP ARPA Telnet Express solution (80 concurrent TELNET sessions).

Select **one** Processor Option (3XX), one LAN option (24X), and if necessary, option 015 for 220 volt operation.

Processor Options

330 For Series 935 and 948
335 For Series 949
340 For Series 950, 955, 958, and 960
350 For Series 980
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 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

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

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

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/XL 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/XL)
02344-90001 HP 2344A ARPA Telnet Express Installation Guide for the HP ARPA Telnet Express (if you purchase HP ARPA/80 Services/XL)

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

HP NCS 1.5.1 for the HP 3000

Technical Data

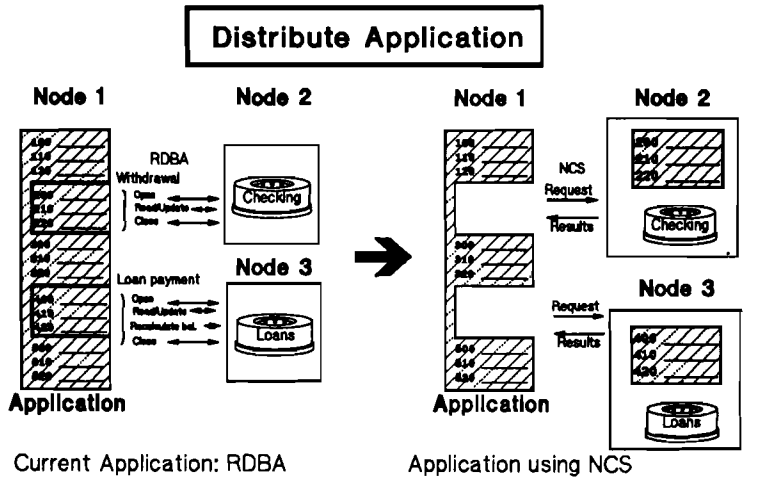
The NCS 1.5.1 Product is the Network Computing System Remote Procedure Call version 1.5.1 for our HP 3000 MPE/iX systems. NCS 1.5.1 provides capabilities for transparently making network resources available to users and applications by allowing applications written to NCS 1.5.1 to be distributed.

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 runtime 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 runtime. 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 runtime library
- NS 3000/iX LAN LINK and Transport
- NS 3000/iX Network Services

Ordering Instructions:

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 the network sales center at 447-4444.

HEWLETT PACKARD

HP FTAM 3000/XL

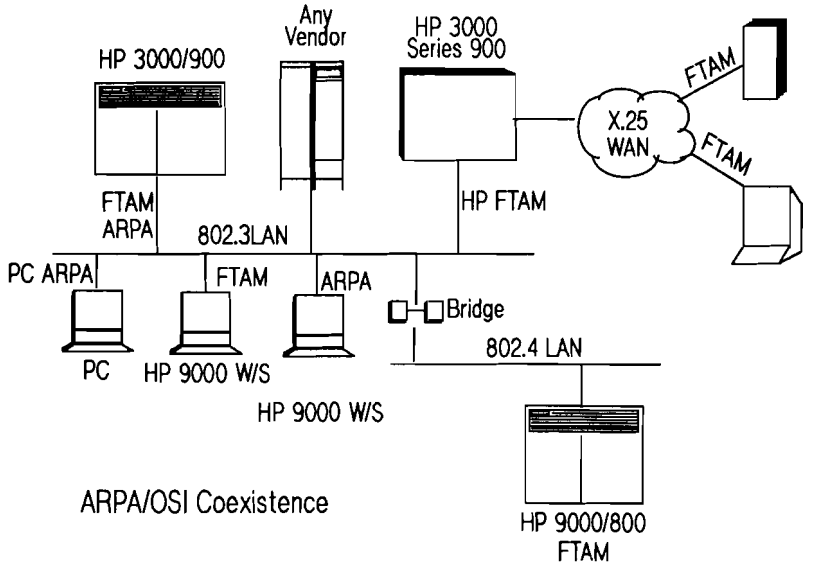
Technical Data

Product Numbers
36972A HP FTAM
36971A HP OTS

HP FTAM 3000/XL 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 manage-ment, 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/XL 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.

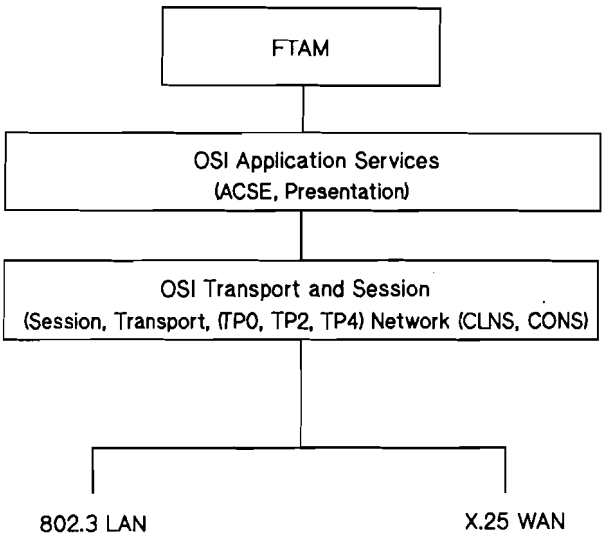
Functional Description

HP FTAM 3000/XL 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 NFT (Network File Transfer) 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/XL 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/XL User's Guide supplied with the HP FTAM 3000/XL product.

HP FTAM 3000/XL 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/XL 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/XL distributed file systems capabilities.

Configuration Information

Product Requirements

The HP OTS 3000/XL product and either the ThinLAN 3000/XL 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/XL product includes the software and manuals. The HP FTAM 3000/XL manual set includes the FTAM User's Guide, OSI/XL Configuration and Startup Guide, and OSI/XL Operations and Maintenance Guide.

Processor Requirements

- HP 3000 Series 900 system with the ThinLAN 3000/XL Link or DTC X.25 link or both
- HP 3000 Series 900 Operating System Version 3.0 or later

Ordering Information

FTAM 36972A HP FTAM 3000/XL 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 36971A HP OTS 3000/XL 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/XL User's Guide
36971-61001 Installing, Configuring, and Starting OSI/XL Network Manager's Guide
36971-61002 OSI/XL Operations and Maintenance Guide

Installation and Support

Customers purchasing HP FTAM 3000/XL 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/XL.

   Hewlett-Packard strongly recommends that the customer purchase support services for HP FTAM 3000/XL 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/XL 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

HP LAN Manager/XL* (Named Pipes)

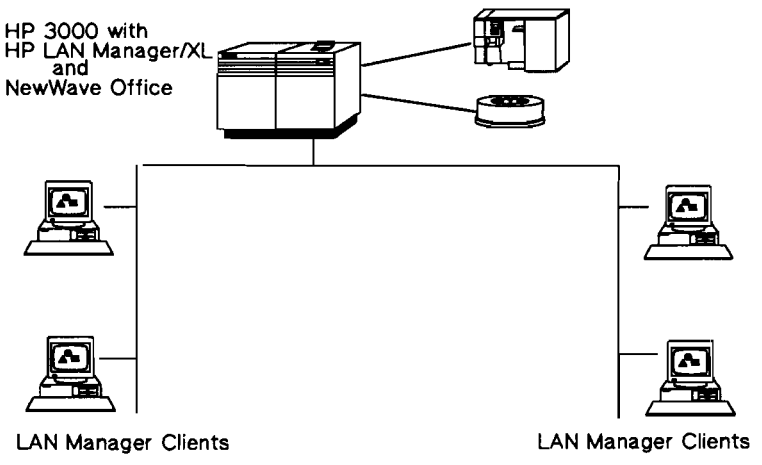
Technical Data

Product Number 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/XL 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/XL 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/XL 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/XL is available on all HP 3000 Series 900 systems with Release 3.0 or later.

Note: HP LAN Manager/XL requires installation and operation of the ThinLAN 3000/XL Link.

Installation Policy

HP LAN Manager/XL 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/XL server and client product:

- Verify the proper installation, configuration, and functioning of the ThinLAN 3000/XL Link.
- Update the HP 3000 system to the proper release level and install the HP LAN Manager/XL 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/XL product by accessing the HP LAN Manager/XL server from a LAN Manager PC client.

HP installation is available on a time-and-materials basis chargeable to the customer.

Ordering Information

32015A HP LAN Manager/XL 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/XL:

32015-61003 HP LAN Manager/XL Programmer's Reference Manual
32015-61001 Installing and Administering HP LAN Manager/XL

HEWLETT PACKARD

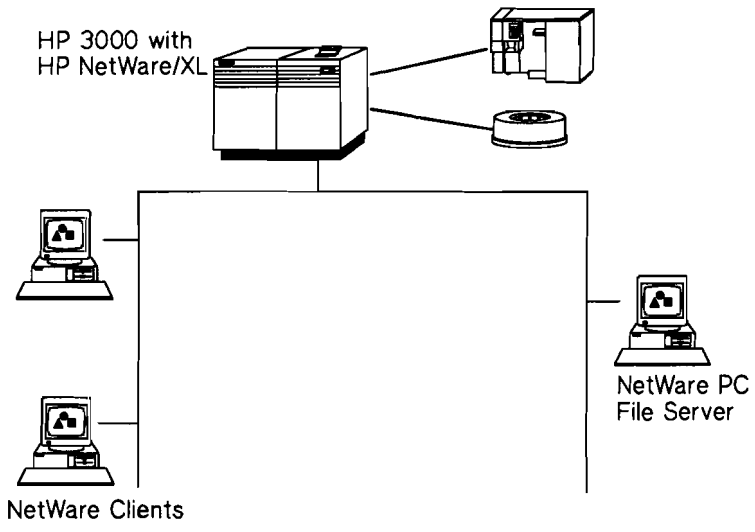
NetWare for the HP 3000

Technical Data

Product Number
32020A

NetWare for the HP 3000 brings the most commonly installed Personal Computer (PC) Network Operating System (NOS) to the HP 3000 Series 900. NetWare® on the HP 3000 provides the functionality of Novell® Inc.'s PC services including file and printer sharing, 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 including multiprocessors. These features will bring expandability to PC networks never before possible.

In addition to file and print sharing capabilities, NetWare on the HP 3000 will provide support for NetWare Application Programming Interfaces (API) such as Sequence Packet Exchange (SPX). 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. NS 2.1 for NetWare which can be added to the PC client providing full NS capabilities is ordered seperately. These include VT, NFT, and RPM/NetIPC. The complimentary Network Service must be available on the HP 3000.

Features

- HP 3000 server offers NetWare clients scalability and expandability never before achievable to a PC network.
- Support for NetWare's application programming interface (API)s.
- Uses NetWare's SPX/IPX network transport.
- NetWare functionality on the HP 3000 identical to other NetWare implementations.

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 can only be brought by the power 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®, OS/2, or MAC/OS files from MPE applications is provided by a set of function calls when the server is in operation.

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. 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 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 3000.

Apple Macintosh Connectivity

In addition to DOS and OS/2 clients, NetWare for the HP 3000 includes the ability to connect Apple Macintosh clients. Mac connectivity is provided through the use of Novell's Service Protocol Gateway (SPG). The SPG is software that runs on an HP Vectra PC connected to the network and acts as a protocol converter. To the Apple Macintosh, NetWare for the HP 3000 looks just like an Apple file server. Unlike other connectivity products, Mac users will not be restricted to a DOS eight character file name format.

HP Network Services 2.1 Connectivity
Access to existing HP 3000 applications from a NetWare client is very important. HP NS 2.1/MS-DOS for NetWare provides this capability. HP NS 2.1 is ordered separately.
HP Network Services 2.1/MS-DOS provides NetWare client PCs running MS-DOS with Terminal Access (VT), Network File Transfer (NFT), and Network InterProcess Communication (NetIPC) connectivity to hosts with the complimentary NS services.

For detailed information on this option see the HP Network Services 2.1/MS-DOS 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/XL 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 HP NetWare/XL:

- Verify the proper installation, configuration, and functioning of the ThinLAN 3000/XL Link.
- Update the HP 3000 system to the proper release level and install the HP NetWare/XL 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 NetWare/XL product by accessing the NetWare/XL 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 for NetAssure for PC LAN products.

Ordering Information

32020A NetWare for the HP 3000 Right-to-Use

Select **one** Processor Option.

Processor Options

310	For Series 920 and 922LX
315	For Series 922RX
320	For Series 922, 925LX, 925, 932
330	For Series 935 and 948
335	For Series 949
340	For Series 950, 955, 958, 960
350	For Series 980/100

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 which pertains to their current processor option in addition to the new processor option on the same order.

Documentation

The following documentation is provided with NetWare for the HP 3000:

32020-61001 NetWare for the HP 3000 Installation Manual
32020-61002 NetWare for the HP 3000 System Administration Manual
32020-61004 NetWare for the HP 3000 Utilities Reference Manual
32020-61005 NetWare for the HP 3000 Concepts Manual
32020-61006 NetWare for the HP 3000 System Error Messages Manual
32020-61003 NetWare for the HP 3000 User Basics for DOS Workstations Manual
32020-61010 Installation and Maintenance, NetWare for Macintosh Manual
32020-61011 Basic Operations, NetWare for Macintosh Manual
32020-61012 NetWare 286 External Bridges Supplement Manual
32020-61013 NetWare Requester for OS/2 Manual
32020-61014 Supplements NetWare

HEWLETT PACKARD

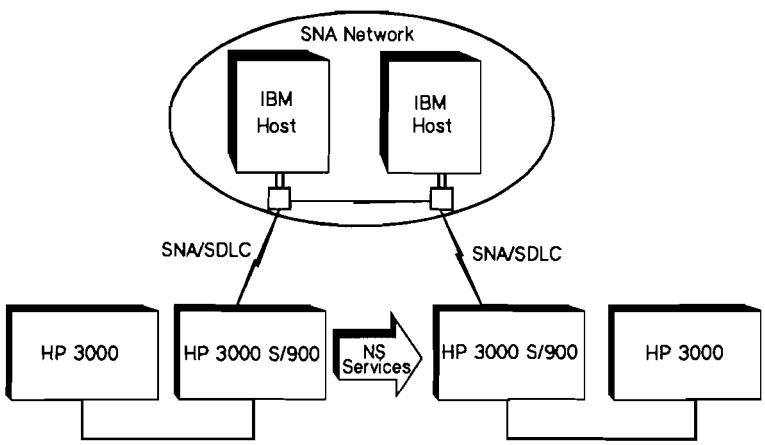
NS Over SNA/XL

Technical Data

For HP 3000 Series 900 Computer Systems Product Number 30296A

The NS over SNA/XL product enables the NS3000/XL Network Services (such as NFT and VT) to run over an IBM SNA network for HP 3000-to-HP 3000 communications.

NS over SNA/XL gives NS3000/XL Network Services (NS) the capability to run over an SNA network. This product supports connectivity of standalone HP 3000 Series 900 computers over an SNA network. These standalone HP 3000 Series 900 computers can also be used as IP (Internet Protocol) gateways for MPE/V and MPE XL HP 3000 computers connected via LAN (or WAN) for HP 3000-to-HP 3000 access through the SNA network.



NS over SNA/XL can run simultaneously with HP SNA service products (such as SNA IMF/XL, SNA NRJE/XL, SNA LU 6.2 API/XL, or SNA DHCF/XL) over the same SNA network connection.

The MPE iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE iX environment without modifications.

NS over SNA/XL uses IBM's Node Type 2.1 implementation. This allows the HP 3000 to initiate a session through the SNA network without IBM host processor intervention.

NS over SNA/XL requires the installation and use of SNA/SDLC Link/XL (30291A). SNA/SDLC Link/XL manages the physical link to the IBM host and implements protocols in the lower three layers of SNA. The link product contains software, a hardware interface card, and a cable. The SNA/SDLC

Link/XL product has been enhanced so that NS over SNA/XL can leverage from the type 2.1 node capabilities. Please refer to the SNA/SDLC Link/XL Data Sheet in this guide for more information.

Installation of the NS3000/XL Network Services product is also required. Network Services provide capabilities such as:

- Remote Data Base Access
- Remote File Access
- Remote Peripheral Access
- Network File Transfer (NFT)
- Virtual Terminal Access (VT)
- Network InterProcess Communication (NetIPC)
- Remote Process Management (RPM)

Please refer to the NS3000/XL Network Services Data Sheet in this guide for more information.

Features

- All NS3000/XL Network Services can be used across an SNA network.
- NS over SNA/XL can run simultaneously with HP SNA service products (such as SNA IMF/XL, SNA NRJE/XL, SNA LU 6.2 API/XL, or SNA DHCF/XL) over the same SNA network connection.
- An MPE XL system running NS over SNA/XL may act as an "IP Gateway" to the SNA network for other HP 3000 computers running either MPE V or MPE XL.

Functional Description

NS over SNA/XL gives NS3000/XL Network Services (NS) the capability to run over an SNA network. The NS over SNA/XL product encapsulates NS packets inside SNA packets on the local HP 3000. These packets are sent into the SNA network via SNA/SDLC Link/XL. Once received, the destination HP 3000 removes the SNA headers and trailer information, and the NS packet is sent to the NS Services.

NS over SNA/XL takes advantage of SNA/SDLC Link/XL's Node Type 2.1 functionality. This enables the HP 3000 Series 900 to initiate an LU-LU session in an IBM environment.

Product Requirements

Requirements for IBM host:

- An IBM System/370 or compatible mainframe.
- A port on an IBM 37xx or compatible communications controller that supports an SNA Line. (Please check with your HP Sales Representative for specific communications controller model support.)
- MVS or DOS/VSE operating system.
- ACF/VTAM version 3.2 or later.
- ACF/NCP version 5.2 or later (version 4.3 or later for the IBM 3725).

Requirements for the HP 3000:

- An HP 3000 Series 900 computer system running the MPE/XL operating system release 2.1 or later.
- SNA/SDLC Link/XL (30291A). Refer to data sheet for more information.
- NS3000/XL Network Services (36920A). Refer to data sheet for more information.

Installation and Configuration Policy

The customer is responsible for loading the NS over SNA/XL software onto the system.

Hewlett-Packard will perform minimum configuration of NS over SNA/XL 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 NS over SNA/XL, 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 and hardware are installed and configured to support SNA/SDLC Link/XL and NS over SNA/XL. 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 a switched or nonswitched line between the HP 3000 and the IBM host communications controller is properly installed with a matched pair of synchronous modems that are certified for use with HP 3000 systems at each end of the line prior to the installation of NS over SNA/XL.
- Updating the HP 3000 system to the proper release level and installing the NS over SNA/XL 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 minimum configuration of NS over SNA/XL.

If SNA/SDLC Link/XL and/or NS Services have previously been installed, at the time of the NS over SNA/XL installation, these products should be operational. If NS over SNA/XL is being installed along with SNA/SDLC Link/XL and/or NS Services, the customer must comply with customer installation responsibility of the other products in addition to the responsibilities listed above.

The customer is also responsible for completing the configuration to fully integrate NS over SNA/XL into the existing customer network after HP has completed the minimum configuration of NS over SNA/XL.

HP Responsibility

Following the installation of NS over SNA/XL, 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 NS over SNA/XL product to a minimum configuration (1 PU, 1 independent LU) necessary to verify software functionality.

For first installation of NS over SNA/XL for customer:

- Verifying the NS over SNA/XL configuration by issuing the SNACONTROL STATUS command and ensuring that the product properly activates the PU when started.

For subsequent installation of NS over SNA/XL for customer:

- Logging on to a remote HP 3000 after installing Network Services and conducting an interactive session via virtual terminal.

These steps complete HP's portion of the installation and minimum configuration of NS over SNA/XL.

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

NS over SNA/XL Product Number: 30296A

One processor option below must be selected. An upgrade credit option may be selected when applicable:

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

To receive upgrade credits, 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:

0CD	Credit for NS over SNA/XL opt 310
0GJ	Credit for NS over SNA/XL opt 315
0CE	Credit for NS over SNA/XL opt 320
0CF	Credit for NS over SNA/XL opt 330
0GL	Credit for NS over SNA/XL opt 335
0GM	Credit for NS over SNA/XL opt 340

Note: Ordering information for SNA/SDLC Link/XL (30291A) and NS3000/XL Network Services (36920A) may be found in their respective data sheets in this 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.

Documentation

The following manuals are included with the purchase of NS over SNA/XL:

30296-61000 NS over SNA/XL Configuration Guide
5958-8542 HP SNA Products: Manager's Guide
5958-8543 HP SNA Products: ACF/NCP and ACF/VTAM Guide

HEWLETT PACKARD

NS3000/V Network Services

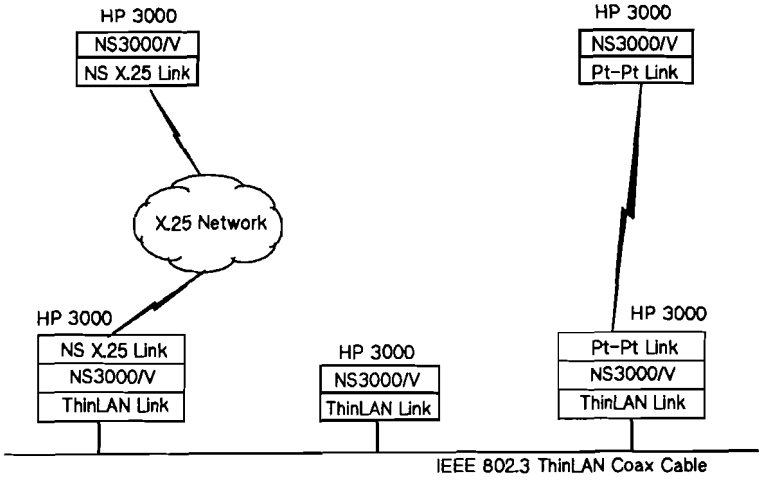
Technical Data

For HP 3000 Computer Sy
Product Number
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 V/E 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/XL 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/XL 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/XL, 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
- 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 (eg, 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.

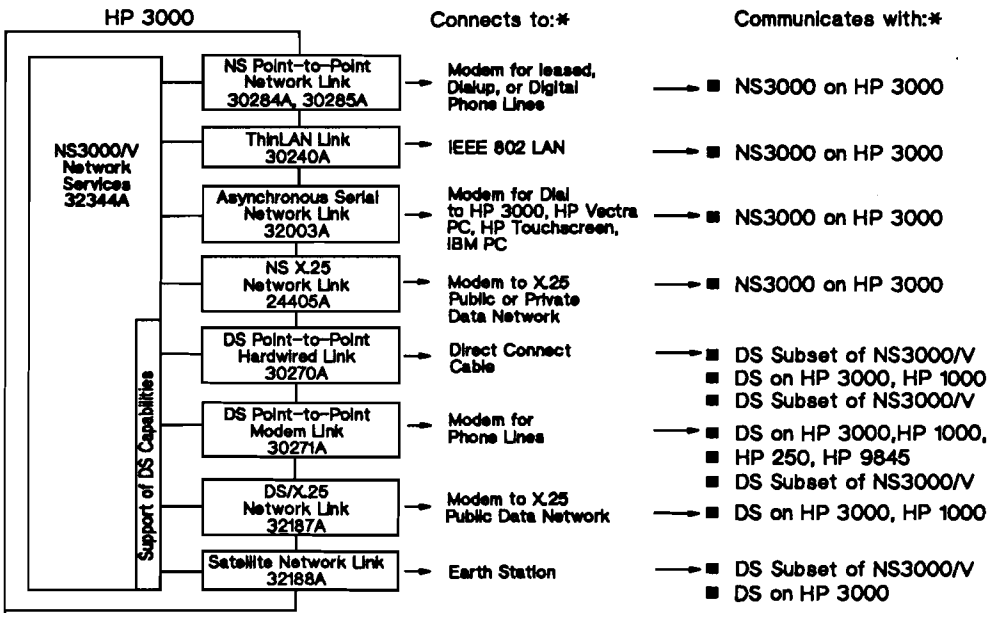
It is recommended that users establish a migration plan working with a Dedicated Network Systems Engineer.

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.

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.

Table 1.



*All network links require the same link products at both ends of the connection

NS3000/V and Network Links on HP 3000

Product Requirements

- An HP 3000 MICRO 3000 (LX, GX, or XE), 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.

System Environment

NS3000/V is supported on the HP 3000 MICRO 3000 (LX, GX, or XE), Series 37 through 70, executing the MPE V/E 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/XL 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

32344A NS3000/V Right-to-Use on HP 3000 Series

Select one Processor Option.

Processor Options

310 For MICRO 3000 (LX, GX, or XE) and Series 37
311 For MICRO 3000 (LX, GX, or XE) and Series 37 upgrade from DS (32185A)
320 For Series 39, 40, 42, 44, 48, 52, 58
330 For Series 64, 68, 70
321 For Series 39, 40, 42, 44, 48, 52, 58, 64, 68, 70 upgrade from DS (32185A)

Upgrade Credit Options

0CD For Processor Option 310
0CE For Processor Option 320

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

NS3000/XL Network Services

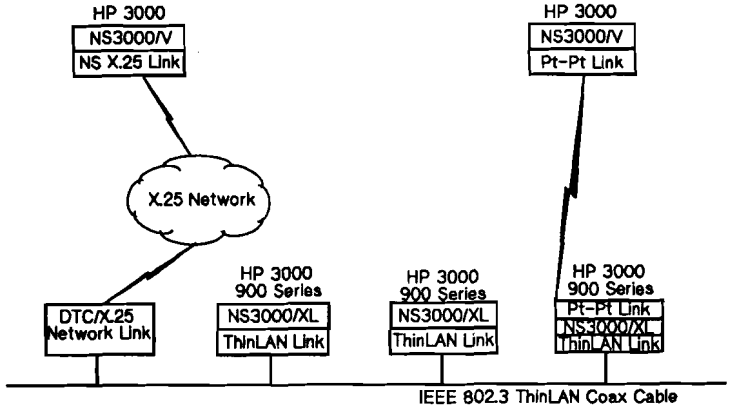
Technical Data

For HP 3000 Series 900 Computer Systems
Product Number 36920A

NS3000/XL (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 TurboIMAGE database access, virtual terminal access, and remote file and peripheral access.

For MPE XL-based processors, NS3000/XL 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 XL-based system with NS3000/XL can communicate with HP 3000s running NS3000/V or NS3000/XL over HP local and wide area network links, including the ThinLAN 3000/XL Network Link, the NS Point-to-Point 3000/XL Network Link, NS over SNA, and the X.25 XL Network Link (see network link data sheets for availability).



Features

- For communication with other HP 3000 systems running NS3000/V or NS3000/XL, 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/XL 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/XL 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/XL provides the functionality of OSI layers six and seven (presentation and application layers).
- NS3000/XL capabilities are accessible from applications in many languages, including COBOL II, FORTRAN, Pascal and SPL Programs.

Functional Description

NS3000/XL is designed to extend the capabilities of the MPE XL operating system beyond a single computer to a network of computers. NS3000/XL 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/XL. The terminal user or application programmer requires no knowledge of the communication protocol or physical link.

NS3000/XL requires users to pass all the security checks imposed by MPE XL, such as entering passwords when logging on to a remote system. NS3000/XL 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/XL, communicating with NS on an MPE V/E- or MPE XL-based HP 3000 system.

Remote File and Peripheral Access

With NS3000/XL 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/XL transparently extends the operation of these intrinsics to files and peripherals residing on another HP 3000.

NS3000/XL 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/XL 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

TurboIMAGE provides a set of intrinsics (DBOPEN, DBGET, DBPUT, etc.) that allows an application program to access a TurboIMAGE database. NS3000/XL transparently extends these intrinsics to permit manipulation of a TurboIMAGE database residing on a remote system. Password security for logon and TurboIMAGE 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, TurboIMAGE 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; TurboIMAGE and NS3000/XL 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/XL 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.

Network InterProcess Communication

Network InterProcess Communication is a set of intrinsics used when there is a need to rapidly exchange data between processes. The relation between the processes 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/XL transparent extensions of the low-level TurboIMAGE 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.

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/XL 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 XL-based system via a STORE tape. They will run using NS3000/XL with no recompilation necessary in most cases. (Note that the NS3000/V Program-to-Program communication is not supported on NS3000/XL. In addition, no-wait I/O for RFA is not available.)

Migration to NS3000/XL 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 XL-based system via a STORE tape. They will run with NS3000/XL 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/XL. 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/XL 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 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.

Supported HP Subsystems and Applications

Most HP subsystems are supported by NS3000/XL. These include the MPE Commands and FOS Subsystems provided with MPE XL. 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/XL 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/XL 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/XL Link, NS Point-to-Point 3000/XL Network Link and/or DTC X.25/XL Network Link).
- Updating the HP 3000 system to the proper release level and installing the NS3000/XL Services product using AUTOINST. Refer to the HP 3000 MPE/XL 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/XL 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/XL 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

36920A NS 3000/XL Right-to-Use

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

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

Migration Credit Options for MPE/V to MPE/XL Software Upgrades

0G1	For MPE/V Software Option 310
0G2	For MPE/V Software Option 320
0G3	For MPE/V Software Option 330

In order to receive the upgrade credit, customers must select the upgrade credit option which pertains to their current processor option in addition to the new processor option on the same order.

Network Links

36923A ThinLAN 3000/XL Network Link
36922A NS Point-to-Point 3000/XL Network Link

DTC/X.25 XL Network Link

36939A X.25 XL System Access
2345A DTC/X.25 Network Access

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/XL
36920A+W00 Extended SMS for NS3000/XL

Documentation

Provided with NS3000/XL

36920-61000 Using NS3000/XL Network Services

Related Documentation

36922-61005 NS3000/XL Operations and Maintenance Reference Manual
36923-61000 NS3000/XL Error Messages Reference Manual
36922-61003 NS3000/XL NMMGR Screens Reference Manual
36920-61005 NetIPC 3000/XL Programmer's Reference Manual
32022-61005 Using the Node Management Services (NMS) Utilities
36922-61023 HP 3000/XL Network Planning and Configuration Guide
36922-61029 HP SNMP/XL User's Guide
36939-61004 Configuring and Managing Host-Based X.25 disks

HEWLETT PACKARD

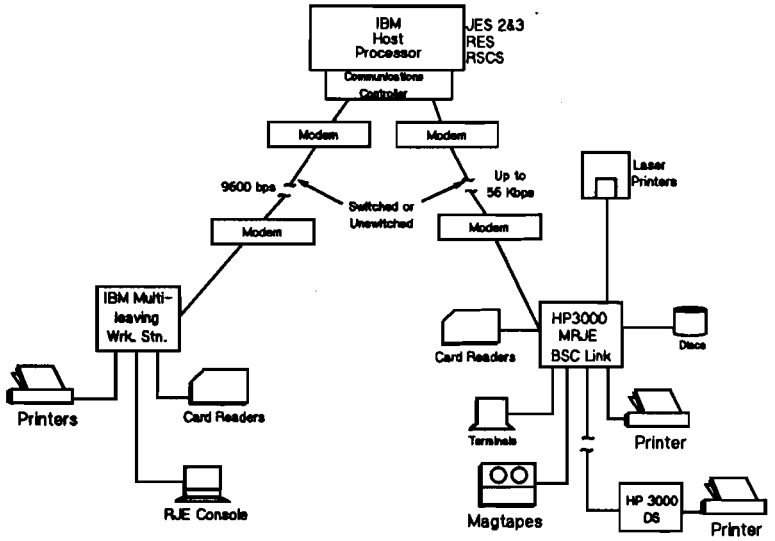
BSC MRJE/V
Multileaving Remote Job Entry

Technical Data

For HP 3000 MPE/V Computer Systems
Product Number
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.

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."

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.

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

30249A MRJE Multileaving Remote Job Entry Requires 30251A BSC Link

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

30249-90001 MRJE User/Programmer Reference Manual

HEWLETT PACKARD

HP LU 6.2 Application Programming Interface

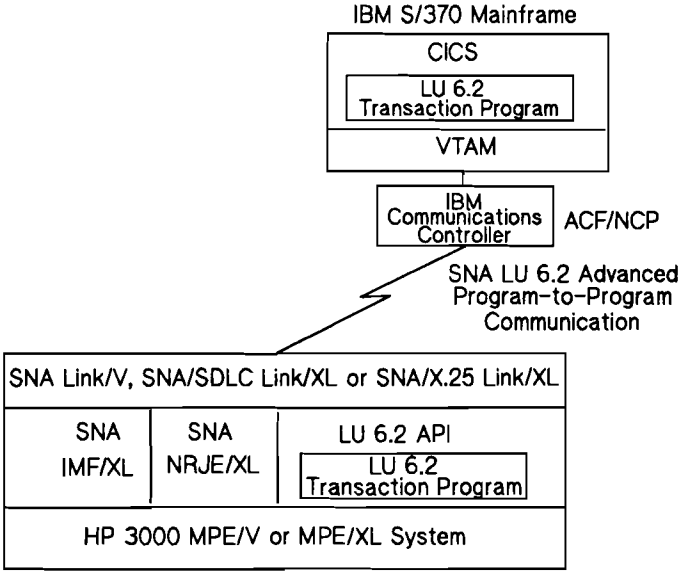
Technical Data

For HP 3000 V or XL Computer Systems
Product Numbers
30253A and 30294A

This data sheet describes HP LU 6.2 API (Application Programming Interface) for both MPE V and MPE XL 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/XL products. The terms HP LU 6.2 API/V and HP LU 6.2 API/XL 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/XL 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/XL, C language applications are also supported.

- **Support for IBM Applications**: HP LU 6.2 API supports Mapped Conversations with CICS in a MVS or DOS/VSE environment and Mapped Conversations with VTAM in an MVS environment.
- **Multiple Sessions**: An HP 3000 application program using LU 6.2 API intrinsics may have up to 8 LU-LU sessions running simultaneously, each session responsible for a separate communication task or for adding additional bandwidth to a single communication task.
- **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) and SNA Network Remote Job Entry (SNA NRJE). These products may all be running simultaneously over the same SNA Link/V, SNA/SDLC Link/XL, or SNA/X.25 Link/XL 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.
- **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.
- **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/XL.
- Efficient and easy-to-program problem detection and recovery procedures.
- As with all HP SNA services, customizable error and help facilities are provided.
- HP LU 6.2 API/XL can communicate to the IBM host over an X.25 connection.

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. 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 table on the following page.

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

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.

Product Requirements

Requirements for host hardware and software are the same for both HP LU 6.2 API/V and HP LU 6.2 API/XL.

Host Hardware Requirement:

- 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.)

Host Software Requirement:

- 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

Listed below are the 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 (30246A)

- For HP LU 6.2 API/XL: An HP 3000 Series 9xx computer system, the MPE XL operating system, and the SNA/SDLC Link/XL product (30291A) or the SNA/X.25 Link/XL product (30298A)
- The MPE ix operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE ix environment without modifications.
- A full- or half-duplex data communications line (switched or leased) between the HP 3000 and the IBM host.
- A block mode terminal that is supported by VPLUS/3000 for configuration.
- A pair of modems as described in the HP 3000 Computer Systems Data Communications Handbook.
- A COBOL II, PASCAL, C (with HP LU 6.2 API/XL), 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 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" (5958-8543) and the "HP SNA Products: CICS Guide" (5958-8546) for details.
- Verifying that SNA Link/V, SNA/SDLC Link/XL, or SNA/X.25 Link/XL 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 XL Installation and Update Manual (36123-90001) for MPE XL 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:
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/XL:

30294A License to use

Select one processor option. Upgrade credits may be used where applicable.

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

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 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 order the migration credit option in addition to the new MPE XL software option on the same order.

Migration Credit Options for MPE V software to MPE XL 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/XL, and HP 30298A SNA/X.25 Link/XL 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/XL:

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 Programmer's Reference Manual

For HP LU 6.2 API/XL:

30294-61001 HP LU 6.2 API/XL Node Manager's Guide
30294-61002 APPC Subsystem on MPE XL 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/XL:

30291-61000 SNA Link/XL 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

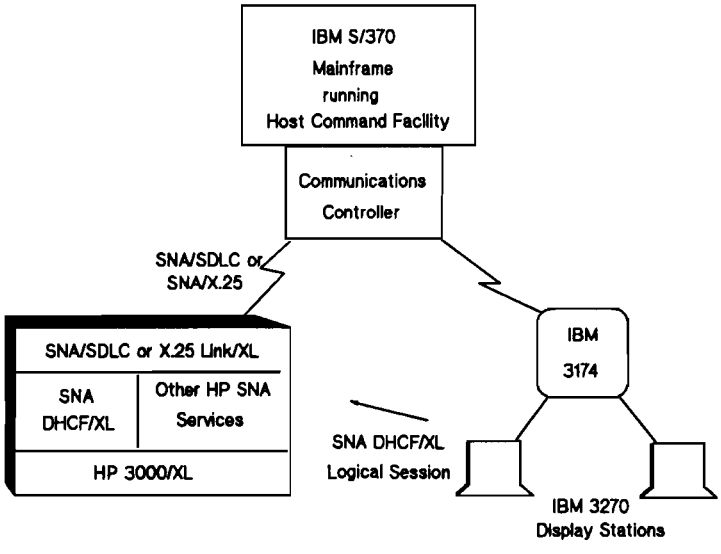
HP SNA Distributed Host Command Facility/XL

Technical Data

For HP 3000 Series 900 Computer Systems Product Number 36935A

The HP SNA Distributed Host Command Facility/XL (HP SNA DHCF/XL) 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/XL 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.

The MPE/iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE/iX environment without modifications.



SNA DHCF/XL 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/XL enables IBM 3270 display station users to access the HP 3000 system over their existing SNA or X.25 network. SNA DHCF/XL requires the installation and use of the SNA/SDLC Link/XL (P/N 30291A) or the SNA/X.25 Link/XL (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 only.

Features

- SNA DHCF/XL 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/XL; VPLUS forms can be compiled into IBM 3270 terminal formats prior to runtime.
- SNA DHCF/XL 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/XL 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 XL session is provided for every SNA DHCF/XL user; each SNA DHCF/XL session appears as a Network Services Virtual Terminal (NS VT) session. Each SNA DHCF/XL session counts against the HP 3000 VT session limit on MPE XL release 2.0. With MPE XL release 2.1 or greater, this limitation no longer applies.
- SNA DHCF/XL supports the HP "Break" and "Control-Y" keys.
- SNA DHCF/XL can support up to 64 simultaneous sessions per SNA Link node. Using multiple SNA Link nodes, SNA DHCF/XL's session count is limited only by the number of VT sessions available (on MPE XL 2.0 or earlier) or the shareable LDEVs available (on MPE XL 2.1 or later). SNA DHCF/XL must compete with NS VT for sessions or LDEVs depending on the MPE XL release.
- SNA DHCF/XL, SNA NRJE/XL, SNA IMF/XL, and LU6.2 API/XL 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/XL users can access HP MM II applications on the HP 3000.
- SNA DHCF/XL provides a full screen, ISPF-like editor for use by HP DeskManager users.
- SNA DHCF/XL contains a comprehensive and flexible logging facility that records SNA DHCF/XL session and error messages.

Functional Description

HP SNA DHCF/XL is a software product that provides an IBM 3270 display station with access to applications on an HP 3000. SNA DHCF/XL 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/XL can be operated across an existing SNA or X.25 network.

SNA DHCF/XL 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/XL session appears as a NS VT session. For IBM 3270 display stations, SNA DHCF/XL 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/XL translates the data as output being sent to the IBM terminal. This group of applications includes the basic MPE XL 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/XL.

When developing VPLUS applications for use with SNA DHCF/XL, 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/XL 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/XL cannot support all HP 3000 applications. In addition, some HP 3000 applications may require modifications prior to use with SNA DHCF/XL. Please refer to the SNA DHCF/XL Application Programmer's Guide 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/XL can provide universal access to HPDESK for an integrated office automation solution.

Within VPLUS applications, SNA DHCF/XL 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/XL. In addition, several points need to be considered in VPLUS forms design including:

- Prior to using a VPLUS application with SNA DHCF/XL, 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/XL, 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/XL. An error condition will be returned to the application when an unsupported feature is used. Prior to installation of SNA DHCF/XL, target HP 3000 applications should be qualified to ensure that they meet these restrictions.

When using SNA DHCF/XL, 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.

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

Functional Specifications

- SNA DHCF/XL 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/XL 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/XL 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/XL can be accessed from an IBM S/36 running SNA 3270 Emulation to HCF.
- Each SNA DHCF/XL 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/XL sessions that are currently active.
- SNA DHCF/XL can support multiple simultaneous sessions, depending upon the number of VT sessions or LDEVs (depending on the MPE XL release) distributed across multiple SNA Links.
- Each SNA Link can support up to 64 concurrent sessions distributed among the various SNA/XL services.
- Using an HP 3000 Series 900 and SNA DHCF/XL as a gateway system, IBM 3270 display stations can access only TTY-mode applications on other HP 3000 (MPE/V or MPE XL) systems. Access to other systems requires the NS Network Service and Link products.
- SNA DHCF/XL supports "reverse VT" functionality; this permits an HP application to acquire remote IBM 3270 display stations provided that the SNA DHCF/XL session has already been established.

Product Requirements

- Hewlett-Packard System Requirements
  - HP 3000 Series 900 Computer System
  - MPE XL Release 2.0 or later
  - SNA/SDLC Link/XL (P/N 30291A) or SNA/X.25 Link/XL (P/N 30298A)
- SNA DHCF/XL requires an IBM System/370 or compatible mainframe with an IBM 37xx communications controller. SNA DHCF/XL 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/XL 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/XL 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/XL.

Installation and Configuration Policy

The customer is responsible for loading the SNA DHCF/XL software onto the system.

Hewlett-Packard will perform minimum configuration of SNA DHCF/XL 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/XL, 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/XL. 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/XL 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/XL software using AUTOINST. Refer to the HP 3000 MPE XL 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/XL.

The customer is also responsible for completing the configuration in order to fully integrate SNA DHCF/XL into the existing customer network after HP has completed the minimum configuration of SNA DHCF/XL.

HP Responsibility
Following the installation of SNA DHCF/XL, 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/XL product to a minimum configuration (1 LU) in order to verify software and hardware functionality.
- Verifying the SNA DHCF/XL 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/XL.

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/XL License to Use

Select **one** processor option. Upgrade credits may be used where applicable.

Processor Options:

310	For Series 922LX, 920
315	For Series 922RX
320	For Series 925LX, 925, 932, 922
330	For Series 935, 948
335	For Series 949
340	For Series 950, 955, 958, 960
350	For Series 980

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	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

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/XL:

36935-61001 HP SNA DHCF/XL User Support Guide
36935-61002 HP SNA DHCF/XL Node Manager's Guide
36935-61003 HP SNA DHCF/XL Application Programmer's Manual
36935-61004 HP SNA DHCF/XL 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/XL

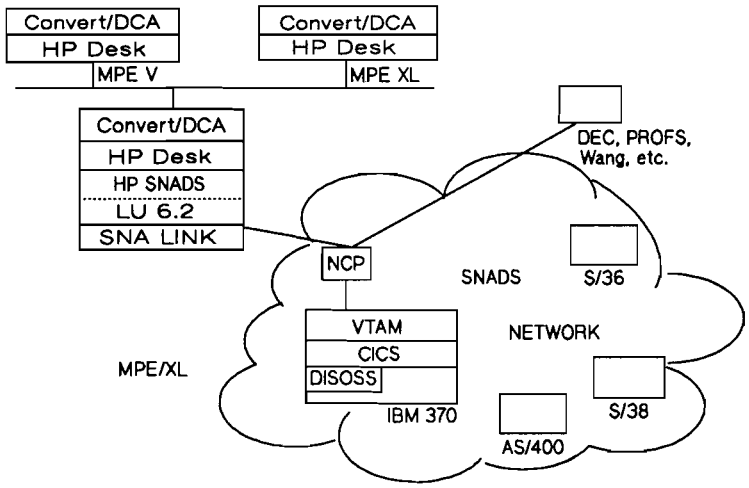
Technical Data

For HP 3000 Series 900 Computer Systems
Product Number 32006A

HP SNA Distribution Services/XL (HP SNADS/XL), an element of New Wave Computing, strengthens Hewlett-Packard's transparent multivendor connectivity commitment. HP SNADS/XL implements IBM's SNA Distribution Services (SNA/DS), a strategic component of Systems Application Architecture (SAA).

HP SNADS/XL provides electronic mail exchange between HP DeskManager and IBM's OfficeVision/MVS or DISOSS products. It enables both HP DeskManager users and users of IBM's 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 IBM host. IBM's OfficeVision/MVS and DISOSS products will collectively be called OV/MVS in the remainder of this data sheet.

HP SNADS/XL provides a migration path to MPE XL for current HP OfficeConnect to DISOSS/V customers and offers improved performance and simplified configuration and administration.



Features And Benefits

With HP SNADS/XL, 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. High performance is maintained on the HP SNADS/XL 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/XL 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/XL continues to operate if one of its components is inactive. For example, if the SNA connection is unavailable, HP SNADS/XL continues to process outgoing HP Desk messages. If HP DeskManager is temporarily unavailable, HP SNADS/XL continues to receive incoming messages from the SNA network.
- **Administrative and Diagnostic Tools:** HP SNADS/XL provides a complete tool set including dynamic reconfiguration, configuration validation, and error recovery.
- **Easy Migration:** Migration from HP OfficeConnect to DISOSS to HP SNADS/XL is simplified with a table conversion utility. At the time of installation, the user addresses in the HP OfficeConnect to DISOSS Address Conversion Table (ACT) are converted to address entries in a format expected by HP SNADS/XL. 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 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/XL is a bundled product that includes the LU 6.2 base component. HP LU 6.2 API/XL (P/N 30294A) can be purchased separately for other application use.

The MPE/iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE/iX environment without modifications.

HP SNADS/XL is required on only one MPE XL system in an HP DeskManager network. The HP DeskManager subnetwork may be comprised of either MPE/V or MPE XL 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/XL node.

HP CONVERT/DCA will be bundled with HP DeskManager PLUS V and later releases.

HP SNADS/XL can share an SNA Link with other HP SNA services including SNA NRJE/XL, SNA IMF/XL, SNA DHCF/XL, and LU 6.2 API/XL. Either of the SNA Link types can be used: SNA/SDLC Link/XL or SNA/X.25 Link/XL.

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.

Interoperability

HP SNADS/XL has been verified to interoperate with other electronic mail systems which also connect to an IBM DISOSS host. The following products have been tested:

- IBM OV/MVS
- IBM PS/CICS
- 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 2.2 or later operating system
- SNA Link: either SNA/SDLC Link/XL (P/N 30291A) or SNA/X.25 Link/XL (P/N 30298A)
- HP DeskManager B.03.R0 or later (P/N 36570A) plus Superpatch B.03.R0 and HP Convert/DCA/XL A.00.09 or later (P/N 27509A) or
- HP DeskManager Plus V

HP 3000 Disk Space requirements:
Installation: 300,000 free sectors
Product Installed Size: 22,000 sectors
Free Space needed to run: 40,000 sectors plus space for message storage
User Acknowledgement Table (UAT) Size: 256 bytes/DISOSS recipient

- An IBM System/370 or compatible mainframe with an IBM 37xx communications controller. HP SNADS/XL 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

Installation and Configuration Policy

The customer is responsible for loading the HP SNADS/XL software onto the system.

Hewlett-Packard will perform minimum configuration of HP SNADS/XL to verify minimum product functionality. These activities are included in the product purchase price.

Customer Responsibility
Prior to having HP personnel on site to perform minimum configuration of HP SNADS/XL, 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/XL. 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/XL or SNA/X.25 Link/XL) is properly installed and configured prior to the installation of HP SNADS/XL.
- Verifying that HP DeskManager is installed and configured.
- Verifying that HP SNADS/XL gateway is configured in HP DeskManager.
- Updating the HP 3000 system to the proper release level and installing the HP SNADS/XL 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/XL.

The customer is also responsible for completing the configuration in order to fully integrate HP SNADS/XL into the existing customer network after HP has completed the minimum configuration of HP SNADS/XL.

HP Responsibility
Following the installation of HP SNADS/XL, 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/XL subsystem with two APPC sessions.
- Configuring the HP SNADS/XL product to a minimum configuration necessary to verify software functionality. This includes configuring one cluster and one mapper in SNADS.
- Verifying the HP SNADS/XL configuration by issuing the VERIFY command in the HP SNADS/XL Manager Program and ensuring that the test completes successfully. Further verification may be performed by sending one message from HP DeskManager to DISOSS and another from DISOSS to HP DeskManager.

These steps complete HP's portion of the installation and minimum configuration of HP SNADS/XL.

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

32006A HP SNA Distribution Services/XL

One Processor Option must be selected. In addition, one Upgrade Credit Option or one Migration Credit Option may be selected, if applicable.

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 Credit for HP SNADS/XL Option 310
OGJ Credit for HP SNADS/XL Option 315
OCE Credit for HP SNADS/XL Option 320
OCF Credit for HP SNADS/XL Option 330
OGL Credit for HP SNADS/XL Option 335
OGM Credit for HP SNADS/XL Option 340

Migration Credit Options for HP OfficeConnect to DISOSS (MPE V) software to HP SNADS/XL:

A Migration Credit Option must be ordered with a Processor Option on the same software order. Only one Migration Credit Option is permitted per HP SNADS/XL Processor 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/XL:

32006-61001 HP SNADS/XL HP Desk Gateway Administrator's Guide
32006-61002 HP SNADS/XL Node Manager's Guide
32006-61003 HP SNADS/XL SNA/Distribution Services: Electronic Mail User Support Guide
32006-61004 HP SNADS/XL 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/XL is implemented according to IBM Systems Network Architecture Format and Protocol Reference Manual: Distribution Services (IBM P/N SC 30-3098-2).

HEWLETT PACKARD

HP SNA Server/HP SNA Server Access

Technical Data

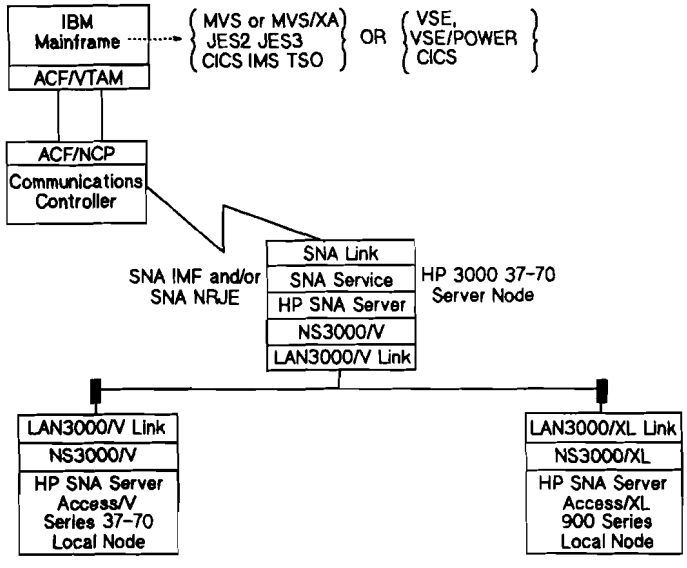
For HP 3000 Systems
Product Number
30254A and 30255A

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 (30254)
- HP SNA Server Access (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 XL 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 (eg, 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 V/E-based HP 3000, the following is required:

- An HP 3000 Series 37 through 70 running MPE V/E (U delta-1 or later).
- HP SNA Server Access (30255).
- LAN3000/V Link (30242A).
- NS3000/V (32344).
- 2 Mbytes of system memory is recommended. An HP Applications Engineer can help determine your requirements.

For Server Access from an MPE XL-based HP 3000, the following is required:

- HP 3000 Series 900.
- HP SNA Server Access (30255 Option 340).
- LAN3000/XL Link (36921A).
- NS3000/XL (36920).
- 2 Mbytes of system memory is recommended. An HP Applications Engineer can help determine your requirements.

Server Node

To provide Server capability on an MPE V/E-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 (30254).
- SNA Link (30246A).
- SNA NRJE (30245) and/or SNA IMF (30247).
- LAN3000/V Link (30242A).
- NS3000/V (32344).
- 4 Mbytes 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 43xxx) 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 XL 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 (30254A) and SNA Server Access (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

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

Requires:

30246A SNA Link
30242A LAN 3000/V Link
32344A NS3000/V
30245A SNA NRJE and/or
30247A SNA IMF

30255A HP SNA Server Access License to Use

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 the upgrade credit option that pertains to their current processor option in addition to the new processor option on the same order.

HEWLETT PACKARD

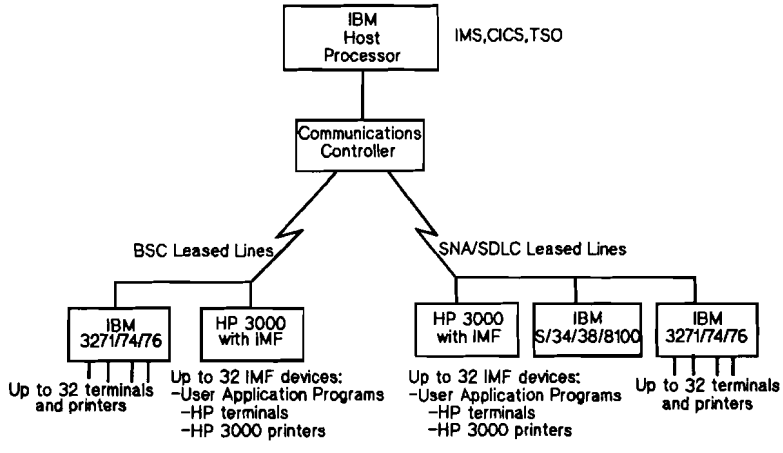
IMF/Interactive Mainframe Facility

Technical Data

For HP 3000 MPE/V Computer Systems
Product Number 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, 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, 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, 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 2645A
HP 2625A	HP 2647A
HP 2626A	HP 2648A
HP 2628A	

- The following terminals are supported in PassThru mode via ADCC or ATP attachment:

HP 120	HP 2640A
HP 125	HP 2641A
HP 150	HP 2642B
HP 2344A	HP 2645A
HP 2382A	HP 2647A
HP 2392A	HP 2648A
HP 2622A	HP 2649A
HP 2623A	with
HP 2624A/B	emulator
HP 2625A	program
HP 2626A/W	HP 98x6
HP 2627A	with
HP 2628A	emulator
HP 700/94	program
HP 700/96	HP 700/92
HP 700/98	

- 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

30250A IMF/Interactive Mainframe Facility Requires 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

HEWLETT PACKARD

RJE/Remote Job Entry/V

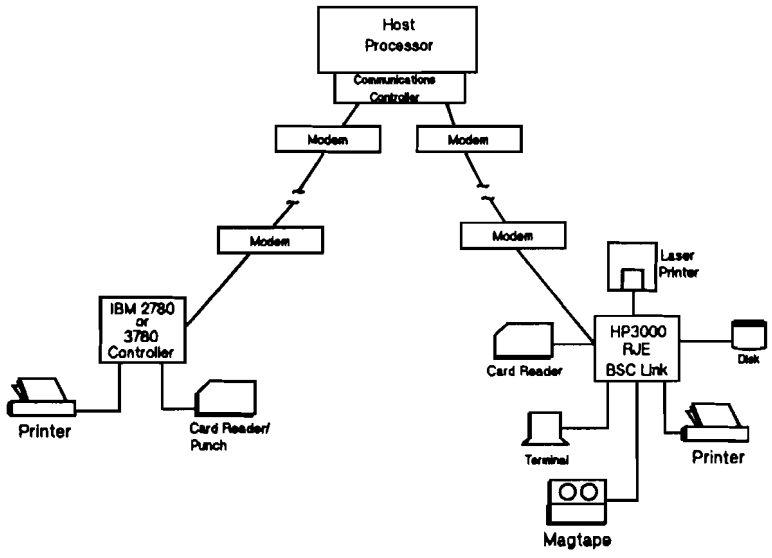
Technical Data

For HP 3000 MPE/V Computer Systems Product Number 30248A

RJE/Remote Job Entry/V 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.

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.

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).

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

30248A RJE/Remote Job Entry
Requires 30251A BSC Link

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

30248-90002 RJE/V Node Manager's Guide
30295-61001 RJE User/Programmer Reference Manual

HEWLETT PACKARD

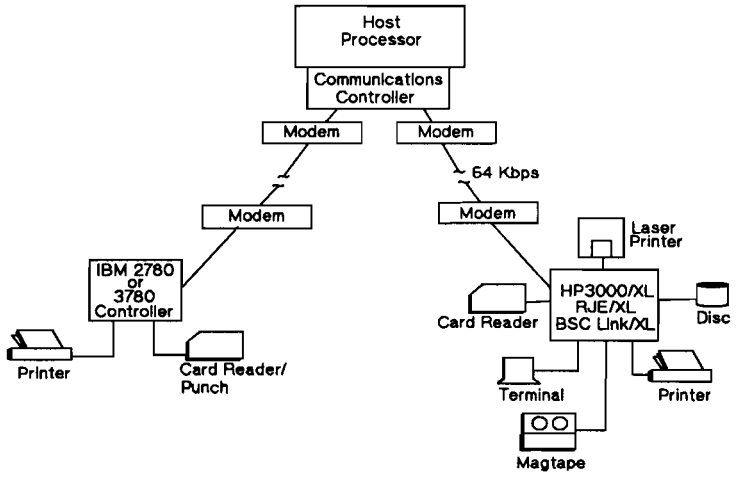
RJE/Remote Job Entry/XL

Technical Data

For HP 3000 Series 900 Computer Systems Product Number 30295A

RJE/Remote Job Entry/XL and BSC Link/XL allow an HP 3000 Series 900 system to emulate the major functions of an IBM 2780 or IBM 3780 workstation. RJE/XL can transmit batch jobs to, and receive output from, a host processor that can support standard IBM 2780/3780 devices. Additionally, RJE/XL can exchange files between an HP 3000 Series 900 and many other processors that emulate standard IBM 2780/3780 devices.

RJE/XL requires the installation and use of BSC Link/XL. BSC Link/XL 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.

Functional Description

RJE/XL and BSC Link/XL allow an HP 3000 Series 900 system to emulate the major features of an IBM 2780 or IBM 3780 workstation. Using RJE/XL, 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/XL and BSC Link/XL to exchange files between an HP 3000 and many other processors that emulate standard IBM 2780/3780 devices, including another HP 3000.

The MPE iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE iX environment without modifications.

An HP 3000 Series 900 and an HP 2680 Laser Printer can use RJE/XL and BSC Link/XL 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/XL 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/XL Subsystem sequentially scans the message file and executes commands encountered in each of the command files. The RJE/XL 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/XL Subsystem in a single-user-at-a-time manual mode, if desired.

RJE/XL and BSC Link/XL 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/XL 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/XL 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/XL 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/XL emulates all standard features of the IBM 2780/3780 systems except it does not accept the six-bit transcode.

RJE/XL 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, Simple Chinese, and Traditional Chinese.

Command	Function
#:MPE command	Enables the user to execute many MPE XL commands from RJE by preceding the command with a colon.
#RJCMDFILE	Causes RJE/XL 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 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 of data from an RJIN command.
#RJEND	Terminates the HP RJE/XL 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/XL upper level logging.
#RJHELP	Displays a help screen showing the RJE/XL commands and each command's description and syntax.

Product Requirements

- An HP 3000 Series 900 running the current version of the MPE XL Operating System.
- HP 32007A BSC Link/XL.
- 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.

Installation and Configuration Policy

The customer is responsible for loading the RJE/XL software onto the system. Hewlett-Packard will perform minimum configuration of RJE/XL 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/XL, 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/XL.
- Updating the HP 3000 system to the proper release level and installing the RJE/XL software using AUTOINST. Refer to the HP 3000 MPE XL 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/XL.

  The customer is also responsible for completing the configuration in order to fully integrate RJE/XL into the existing customer network after HP has completed the minimum configuration of RJE/XL.

  HP Responsibility
  Following the installation of RJE/XL, 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/XL product to a minimum configuration in order to verify software and hardware functionality.
- Verifying the RJE/XL 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/XL.

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/XL and BSC Link/XL are available on the entire HP 3000 Series 900 product line running MPE XL 2.0 or greater.

Ordering Information

RJE/Remote Job Entry/XL Requires 32007A BSC Link/XL

30295A License to Use

One processor option below must be selected:

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 the upgrade credit option that pertains to their current processor option in addition to the new processor option on the same order.

Migration Credit Options for MPE V software to MPE XL 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 upgrade credit, customers must order the migration credit option in addition to the new MPE XL 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/XL Node Manager's Guide

HEWLETT PACKARD

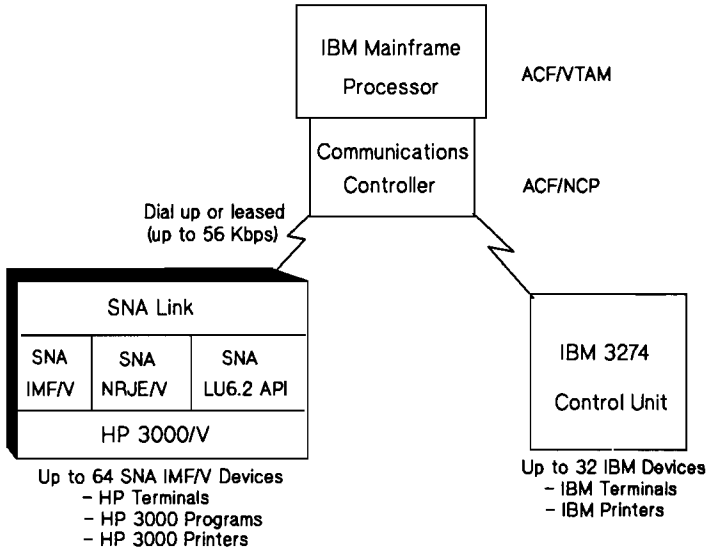
SNA IMF/V Interactive Mainframe Facility

Technical Data

For HP 3000 MPE V Comp Systems
Product Number 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/XL, P/N 30293A, provides similar functionality for MPE XL 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 (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.

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	^

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.

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 (24405A) and NS 3000/V Network Services (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/XL (30293A) only and is NOT supported on the IMF/V (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

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

HEWLETT PACKARD

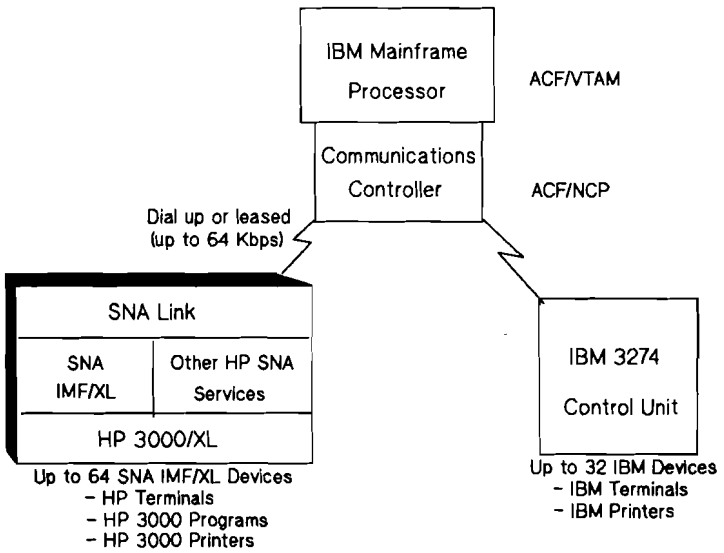
SNA IMF/XL Interactive Mainframe Facility

Technical Data

For HP 3000 Series 900 Computer Systems Product Number 30293A

The SNA Interactive Mainframe Facility/XL (SNA IMF/XL) 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/XL 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/XL 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/XL emulate IBM terminal and printer functions.

SNA IMF/XL 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 subsystems on the host as if they were using IBM 3270 devices.

SNA IMF/XL requires the installation and use of SNA/SDLC Link/XL (30291A) or SNA/X.25 Link/XL (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/XL 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/XL, SNA NRJE/XL, LU6.2 API/XL, and SNA DHCF/XL can all be supported simultaneously over one SNA/SDLC Link/XL or SNA/X.25 Link/XL. The maximum datacom line speed is 64 Kbps.
- SNA IMF/XL supports up to 64 devices per link (terminals, printers, and application programs) concurrently.
- The PassThru capability of SNA IMF/XL allows HP 3000-attached printers and terminals to emulate the base function set of IBM 3270 printers and terminals.
- SNA IMF/XL 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/XL 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/XL 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/XL runs concurrently with other HP 3000 applications and can be accessed from other systems via HP's Network Services.
- SNA IMF/XL 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/XL supports IBM applications with 480, 1920, or 3440 character screen sizes.
- For Asian options only:
  - SNA IMF/XL (ASIAN) supports IBM's DBCS protocol to ensure 16-bit data integrity communication between the HP 3000 and the Asian host.
  - SNA IMF/XL (ASIAN) allows both 16-bit interactive as well as programmable access to the Asian IBM host.
  - SNA IMF/XL (ASIAN) provides 16-bit character mapping between the HP (HP-15) and the IBM (DBCS) data.

Functional Description

SNA IMF/XL 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.

The MPE iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE iX environment without modifications.

SNA IMF/XL requires SNA/SDLC Link/XL or SNA/X.25 Link/XL. These links manage the communications link and implement lower-level SNA (PU2) protocols. SNA IMF/XL provides interactive and programmatic 3270 communications with a mainframe and can run simultaneously along with other SNA services such as

SNA NRJE/XL and LU6.2 API/XL on MPE XL 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.

***Table 1*: SNA IMF/XL Intrinsics Summary**

Intrinsic	Function
ABORT3270	Aborts an outstanding no-wait REC3270 or TRAN3270 request.
ACQUIRE3270	Provides the SNA IMF/XL 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.
EXTFIELDATTR	Returns the IBM attribute information 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/XL.
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/XL 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/XL 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/XL 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/XL 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/XL 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/XL 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 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/XL, 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. SNA IMF/XL does not support the numeric lock feature.
7. PassThru mode does not support slave printers (printers attached to terminals).

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	^

Functional Specifications

- SNA IMF/XL 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/XL 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/XL 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/XL product supports Physical Unit Type 2 protocols; SNA IMF/XL provides Logical Unit Type 1, 2, and 3 emulation over the link. The SNA Link/XL can support interactive (SNA IMF/XL and SNA DHCF/XL), batch (SNA NRJE/XL), and programmatic (LU6.2 API/XL) communications simultaneously over a single link to an IBM host.
- In PassThru mode, SNA IMF/XL emulates the IBM 3278-2, 3278-3 and 3278-4 display stations and IBM 3287 printers.
- SNA IMF/XL supports up to 64 devices (terminals, printers, or application programs) concurrently per SNA link.
- The HP 700/94 terminal is recommended for use with SNA IMF/XL in PassThru mode as it offers the greatest performance and functionality. SNA IMF/XL 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 PassThru 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 greater)
- 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 is strongly recommended to be the terminal of choice.

The following terminals are supported with HP 3000 MPE XL systems in PassThru mode via the DTC attachment.

- HP 150
- HP 700/92
- HP 700/94
- HP 2392A
- HP 2394A
- HP Vectra PC with AdvanceLink 2392
- HP Vectra PC with Reflection 7 PLUS, Version 3.3 (or greater)

- SNA IMF/XL supports the write optimization feature for improved performance in PassThru mode with the following terminals:
  - HP 150
  - HP 700/92
  - HP 700/94
  - HP 2392A
  - HP 2394A

- With the HP DTC X.25 XL Network Link (36939A) and NS 3000/XL Network Services (36920A), SNA IMF/XL 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/XL or SNA IMF/V (30247A) only and is NOT supported on the IMF/V (30250A) product. Other PassThru-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/XL supports any HP system printer.
- The HP 150 does not support the 43-line feature of SNA IMF/XL.
- The HP 2392 terminal running in PassThru mode must have at least 8 Kbytes of memory.
- Link Level Message encoding:
  - SNA IMF/XL supports both NRZ and NRZI encoding.
- Access to the SNA IMF/XL intrinsics in programmatic mode is provided in compatibility-mode as well as native-mode with the use of HP-provided switch stubs.
- In PassThru mode, terminals configured as consoles are not supported.
- The following Asian devices are supported in PassThru 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/XL and SNA/SDLC Link/XL may require occasional IBM operator intervention when connected to the IBM S/38.

Product Requirements

- SNA IMF/XL 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 2.0 or greater
- 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/XL 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/XL in a particular network.
- SNA IMF/XL Product Requirements
  - HP 3000 Series 900 computer system
  - HP 30291A SNA/SDLC Link/XL

  or

- HP 30298A SNA/X.25 Link/XL

Installation and Configuration Policy

The customer is responsible for loading the SNA IMF/XL software onto the system.

Hewlett-Packard will perform minimum configuration of SNA IMF/XL 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/XL, 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/XL. 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/XL or SNA/X.25 Link/XL is properly installed and configured prior to the installation of SNA IMF/XL 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/XL software using AUTOINST. Refer to the HP 3000 MPE XL 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/XL.

The customer is also responsible for completing the configuration in order to fully integrate SNA IMF/XL into the existing customer network after HP has completed the minimum configuration of SNA IMF/XL.

HP Responsibility
Following the installation of SNA IMF/XL, 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/XL product to a minimum configuration in order to verify software and hardware functionality.
- Verifying the SNA IMF/XL 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/XL.

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/XL is available on all HP 3000 Series 900 systems with MPE XL Release 1.1 or later operating system.

Note: SNA IMF/XL requires installation and operation of HP 30291A, SNA/SDLC Link/XL or HP 30298A, SNA/X.25 Link/XL.

Ordering Information

30293A SNA IMF/XL License to use

Select **one** processor option. Upgrade credits may be used where applicable.

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

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	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
OGX	Upgrade Credit for Options AB0, AB1, ABJ

Migration Credit Options for MPE V Software to MPE XL 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 upgrade credit, customer must order the migration credit option in addition to the new MPE XL 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/XL:

30293-61000 SNA IMF/XL Node Manager's Guide
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
30293-60211 SNA IMF/XL: User Support Guide (For use in Taiwan)
30293-60221 SNA IMF/XL: User Support Guide (For use in Japan)
30293-60231 SNA IMF/XL: User Support Guide (For use in Korea)

HEWLETT PACKARD

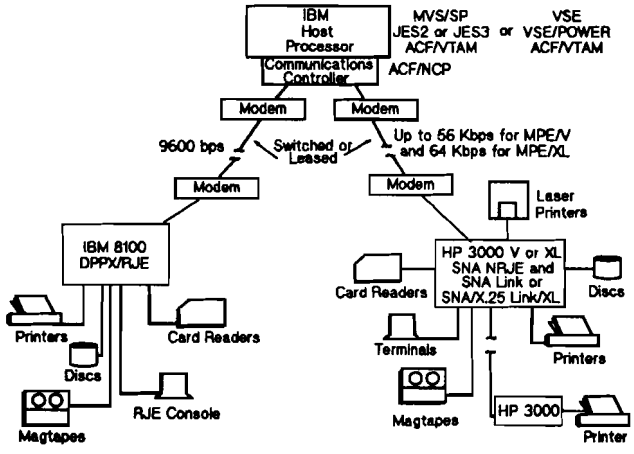
SNA NRJE Network Remote Job Entry

Technical Data

For HP 3000 V or XL Computer Systems
Product Numbers
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 XL (SNA NRJE/XL) operating systems. The term SNA NRJE is used to refer to both SNA NRJE/V and SNA NRJE/XL. The terms SNA NRJE/V and SNA NRJE/XL are used when a distinction is necessary.

SNA NRJE/V on the HP 3000 Series 37-70 or SNA NRJE/XL 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.



The MPE iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE iX environment without modifications.

SNA NRJE/XL requires the installation and use of SNA/SDLC Link/XL (30291A) or SNA/X.25 Link/XL (30298A), SNA NRJE/V requires SNA Link/V (30246A). SNA/SDLC Link/XL, SNA X.25 Link/XL, 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 XL 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, Simple 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 XL.
- 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 XL 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.

- Updating the HP 3000 system to the proper release level and installing the SNA NRJE software using AUTOINST. Refer to the HP 3000 MPE XL Installation and Update Manual (36123-90001) for MPE XL 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/XL, SNA SDLC Link/XL, and SNA/X.25 Link/XL are available on the HP 3000 Series 900 with MPE XL 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/XL Ordering Information

30292A License to use

Select one processor option. Upgrade credits may be used where applicable.

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

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

30251A BSC Link/V
For use with 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

BSC Link/XL

Technical Data

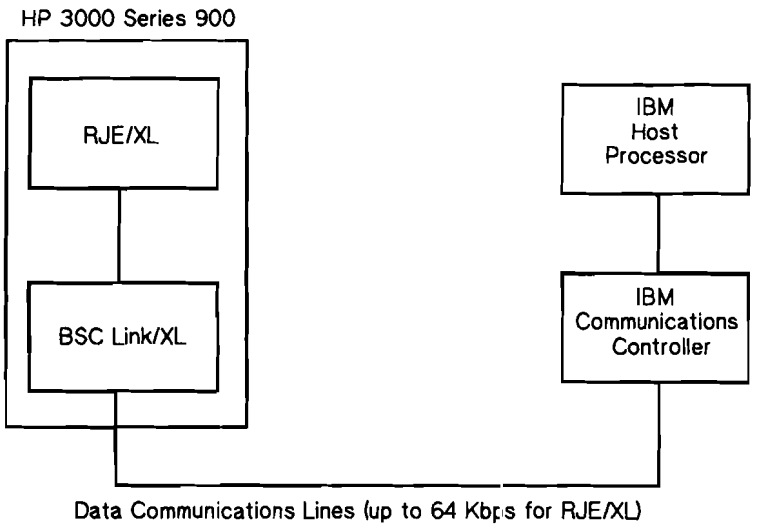
For HP 3000 Series 900 Computer Systems Product Number 32007A

BSC Link/XL provides the network connection to an IBM System/370-compatible host processor using bisynchronous (BSC) protocol. BSC Link/XL provides the lower level network connection, including the protocol management software, a hardware interface card, and a cable.

BSC Link/XL supports operation of HP 30295A RJE/XL.

Features

- BSC Link/XL 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/XL reduces CPU overhead.
- User applications run concurrently with BSC data communications.
- Each BSC Link/XL 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/XL provides the network connection to an IBM System/370-compatible mainframe using bisynchronous protocol. The BSC Link/XL interface card and cable connect to an IBM 37xx communications controller on the host, through a pair of synchronous modems.

Each BSC Link/XL 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/XL 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 MPE/iX operating system is a superset of the MPE/XL operating system. This MPE/XL product functions in an MPE/iX environment without modifications.

The following modems have been tested with BSC Link/XL:

- 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/XL consists of protocol handling software, an interface card, and modem cable.

Interface Card

The interface card for BSC Link/XL 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/XL
- 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/XL 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/XL to perform other tasks, making it a more efficient resource.

Note: The HP 3000/XL 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/XL 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 the current version of the MPE/XL operating system.
- A switched or leased data communications line is required between the BSC Link/XL and the host communications controller.
- A modem with an external clock signal must be provided for operation.
- BSC Link/XL 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/XL with RJE/XL 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/XL and BSC Link/XL will support your application.

Installation and Configuration Policy

The software component of BSC Link/XL is customer installable. Hewlett-Packard will install the PSI card and perform minimum configuration of BSC Link/XL 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/XL, 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/XL.
- Updating the HP 3000 system to the proper release level and installing the BSC Link/XL software using AUTOINST. Refer to the HP MPE/XL 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/XL.

The customer is also responsible for completing the configuration in order to fully integrate BSC Link/XL into the existing customer network after HP has completed the minimum configuration of the BSC Link/XL.

HP Responsibility
Following the installation of BSC Link/XL, HP is responsible for the following:

- Installing and verifying the PSI card for BSC Link/XL.
- Connecting the BSC Link/XL 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/XL 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/XL.

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/XL and BSC Link/XL are available on the entire HP 3000 Series 900 product line running MPE/XL 2.0 or greater.

Note: BSC Link/XL requires HP 30295A RJE/XL. BSC Link/XL does not support user access to its intrinsics.

Ordering Information

32007A BSC Link/XL For use with 30295A RJE/XL. Requires service contract for hardware.

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, 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)

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

Partial credit for BSC Link/XL is available when moving from one MPE/XL system to another.

Upgrade Credit Options:

0CD	Upgrade Credit for Option 310
0CE	Upgrade Credit for Option 320
0CF	Upgrade Credit for Option 330
0GJ	Upgrade Credit for Option 315
0GL	Upgrade Credit for Option 335
0GM	Upgrade Credit for Option 340

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

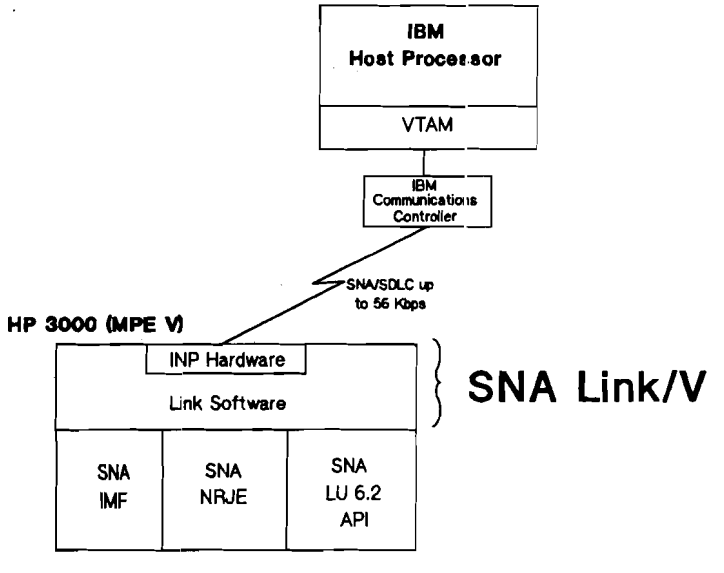
SNA Link/V

Technical Data

For HP 3000 MPE/V Computer Systems
Product Number 30246A

SNA Link/V provides the network connection for SNA services running on an HP 3000 Series 37 through 70, such as SNA IMF/V and SNA NRJE/V, 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/V, SNA NRJE/V, or SNA LU6.2 API/V, 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/V:

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/V 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
- On-line 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/V 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/V, SNA IMF/V, or HP LU6.2) are required to utilize SNA Link/V.

SNA Link/V 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/V software onto the system.

Hewlett-Packard will install the INP card and perform minimum configuration of SNA Link/V 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 INP card and perform minimum configuration of SNA 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 necessary host mainframe software is installed and configured to support SNA Link/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.
- Updating the HP 3000 system to the proper release level and installing the SNA Link/V 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 on-site to complete the INP card installation and perform minimum configuration of SNA Link/V.

The customer is also responsible for completing the configuration in order to fully integrate SNA Link/V into the existing customer network after HP has completed the minimum configuration of SNA Link/V.

HP Responsibility
Following the installation of SNA Link/V, HP is responsible for the following:

- Installing and verifying the INP card for SNA Link/V.
- Connecting the SNA 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 SNA Link/V product to a minimum configuration (1 PU and 1 LU) in order to verify software and hardware functionality.
- Verifying the SNA Link/V 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/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 Link/V 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

30246A SNA Link/V 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

For SNA Link/V:

30246-90002 Getting Started with SNA Node Management
30246-90003 SNA Link Services Reference Manual

HEWLETT PACKARD

SNA/SDLC Link/XL

Technical Data

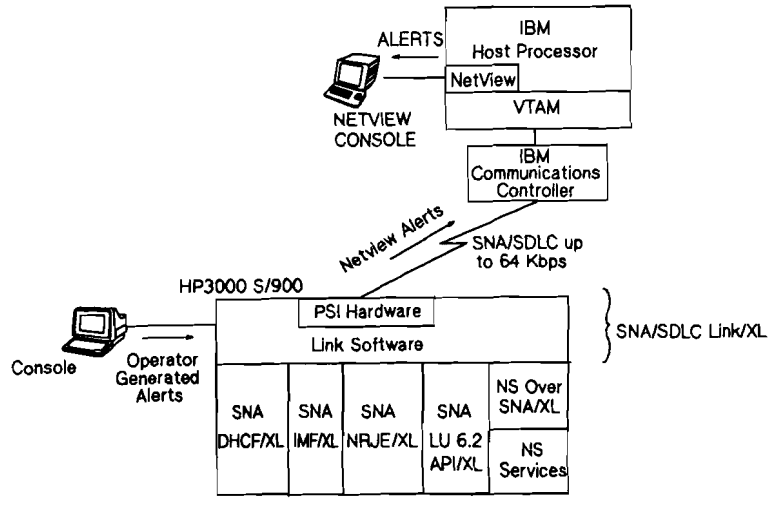
For HP 3000 Series 900 Computer Systems Product Number 30291A

SNA/SDLC Link/XL provides the network connection for SNA services running on an HP 3000 Series 900, such as SNA IMF/XL, SNA NRJE/XL, LU 6.2 API/XL, and SNA DHCF/XL. System Network Architecture (SNA) is IBM's comprehensive specification for distributed data processing networks. SNA/SDLC Link/XL emulates the functions of the Transmission Control Path Control and Data Link Control SNA layers on an HP 3000.

The MPE iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE iX environment without modifications.

SNA Link supports the simultaneous operation of two or more SNA services.

Depending upon the SNA service, SNA Link allows the HP 3000 to appear as a Node Type 2.0 (T2.0) or a Node Type 2.1 (T2.1) device. SNA 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. 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, or multiple data communications lines to a single mainframe. The maximum line speed supported is 64 Kbps for SNA/SDLC Link/XL.

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. Currently, all the SNA Service Products support NodeType 2.0 except for NS over SNA/XL, which supports NodeType 2.1.

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. It manages the SNA/SDLC protocol for a switched or nonswitched data communications line, through synchronous modems.

The following modems have been tested with SNA/SDLC Link/XL:

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/XL 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
- On-line diagnostics run under MPE XL
- 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

- SNA/SDLC Link/XL 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

  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/XL Product Requirements

- An HP 3000 Series 900 computer system
- MPE XL operating system, Release 1.25 or greater. (For NetView Alerts, release 2.1 or greater is required.)

Installation and Configuration Policy

The customer is responsible for loading the SNA/SDLC Link/XL software onto the system.

Hewlett-Packard will install the PSI card and perform minimum configuration of SNA/SDLC Link/XL 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/XL, 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/XL. 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/XL software using AUTOINST. Refer to the HP 3000 MPE XL 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/XL.

The customer is also responsible for completing the configuration in order to fully integrate SNA/SDLC Link/XL into the existing customer network after HP has completed the minimum configuration of SNA/SDLC Link/XL.

HP Responsibility
Following the installation of SNA/SDLC Link/XL, HP is responsible for the following:

- Installing and verifying the PSI card for SNA/SDLC Link/XL.
- Connecting the SNA/SDLC Link/XL 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/XL product to a minimum configuration (1 PU and 1 LU) in order to verify software and hardware functionality.
- Verifying the SNA/SDLC Link/XL 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/XL.

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/XL is available on the HP 3000 Series 900 with MPE XL release 1.25 or greater (release 2.1 or greater for NetView alerts).

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

30291A SNA/SDLC Link/XL requires service contract for hardware.

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, 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)

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

To receive upgrade credits, 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.

Upgrade Credit Options:

0CD	Upgrade Credit for Option 310
0CE	Upgrade Credit for Option 320
0CF	Upgrade Credit for Option 330
0GJ	Upgrade Credit for Option 315
OGL	Upgrade Credit for Option 335
0GM	Upgrade Credit for Option 340

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/XL:

30291-61000 SNA Link/XL Node Manager's Guide

HEWLETT PACKARD

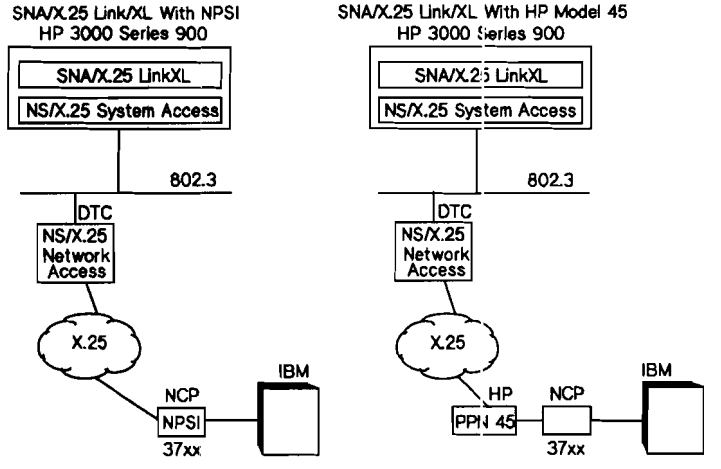
SNA/X.25 Link/XL

Technical Data

For HP 3000 Series 900 Computer Systems Product Number 30298A

SNA/X.25 Link/XL 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/XL 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/XL communicates with IBM systems via an HP Model 45 Multiprotocol X.25 Switch as a host PAD or via IBM X.25 NCP Packet Switching Interface (NPSI). SNA/X.25 Link/XL 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/XL requires the installation and use of the DTC/X.25 XL Network Link hardware and software components. DTC/X.25 XL Network Link provides access to public or private X.25 packet-switching networks.

The MPE/iX operating system is a superset of the MPE XL operating system. This MPE XL product functions in an MPE/iX environment without modifications.

Benefits and Features

With SNA/X.25 Link/XL, 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/XL, NRJE/XL, IMF/XL, DHCF/XL) 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/XL 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/XL 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/XL is the DTC/X.25 XL Network Link.

SNA/X.25 Link/XL 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/XL 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 Multiprotocol X.25 Switching Node can be used as an SNA/SDLC PAD, eliminating the need for NPSI.

SNA/X.25 Link/XL supports the simultaneous operation of two or more SNA services. With an SNA service, SNA/X.25 Link/XL allows the HP 3000 to appear as a Node Type 2.0 (T2.0) device. Depending upon the SNA service, SNA/X.25 Link/XL can support several logical unit types that include LU 1, LU 2, LU 3, and LU 6.2.

SNA/X.25 Link/XL encapsulates SNA data inside X.25 packets on the HP 3000. These packets are sent to the DTC/X.25 XL Network Link to access the X.25 network. The destination IBM communications controller or the HP Model 45 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 2.1 or greater operating system.
- The DTC/X.25 XL Network Link hardware and software components.
- An HP Model 45 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 Multiprotocol X.25 Switch

Installation and Configuration Policy

The customer is responsible for loading the SNA/X.25 Link/XL software onto the system.

Hewlett-Packard will perform minimum configuration of SNA/X.25 Link/XL 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/XL, 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/XL.

  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 2345A #3XX) is installed, configured, and verified to include accommodation for the installation of SNA/X.25 Link/XL.
- Verifying that the X.25 XL System Access product (P/N HP 36939A) is installed, configured, and validated for proper operation prior to the installation of SNA/X.25 Link/XL.
- Updating the HP 3000 system to the proper release level and installing the SNA/X.25 Link/XL 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/XL.

  The customer is also responsible for completing the configuration in order to fully integrate SNA/X.25 Link/XL into the existing customer network after HP has completed the minimum configuration of SNA/X.25 Link/XL.

HP Responsibility

Following the installation of SNA/X.25 Link/XL, 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/XL product to a minimum configuration (1 PU and 1 LU) necessary to verify software and hardware functionality.
- Verifying the SNA/X.25 Link/XL configuration by issuing the SNACONTROL STATUS command and ensuring that the PU activates when the SNA/X.25 Link/XL subsystem is started.

These steps complete HP's portion of the installation and minimum configuration of SNA/X.25 Link/XL.

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 License to Use

Must order **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:

0CD	Credit for SNA/X.25 Link/XL Opt 310
0GJ	Credit for SNA/X.25 Link/XL Opt 315
0CE	Credit for SNA/X.25 Link/XL Opt 320
0CF	Credit for SNA/X.25 Link/XL Opt 330
0GL	Credit for SNA/X.25 Link/XL Opt 335
0GM	Credit for SNA/X.25 Link/XL Opt 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.

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/XL 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:

- DTC/X.25 Network Link (P/N 2345A, 2346D/E/F/G, D2355A, 36939A, 2340A, 2343D)
- HP Model 45 Multiprotocol X.25 Switch (P/N J2000A, J2001A)
- SNA DHCF/XL (P/N 36935A)
- SNA IMF/XL (P/N 30293A)
- SNA NRJE/XL (P/N 30292A)
- LU 6.2 API/XL (P/N 30294A)

HEWLETT PACKARD

16 Input/16 Output Isolated Digital Card

Technical Data

For HP 1000
A-Series Computer Systems
Product Numbers
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 Example Level Selection *Table 1*

Level	Resistor Value	Threshold Voltage Turn-off	Turn-on
5 V dc	None	2.0 V min 2.8 V max	3.4 V min 4.0 V max
12 V dc	909 ohms	4.3 V min 5.6 V max	6.5 V min 8.2 V max
16 Vrms ac	3.48 kilohms	8.1 V min 11.4 V max	8.1 V min 11.3 V max

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

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

HEWLETT PACKARD

8-Channel Asynchronous Multiplexer Interface

Technical Data

For HP 1000 A-Series Computer Systems Product Number 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

8-Channel Multiuse Asynchronous Multiplexer Interface

Technical Data

For HP 1000
A-Series Computer Systems
Product Number
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

Analog Input Cards and Cables

Technical Data

For HP 1000 A-Series Pro with 25 kHz Power
Product Numbers 12060B, 12060BC, 12061A, 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	Gain 2	Gain 3	Gain 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

HEWLETT PACKARD

Analog Output Card and Cable

Technical Data

For HP 1000 A-Series Prod with 24 kHz Power Product Number 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

Asynchronous Serial Interface

Technical Data

For HP 1000
A-Series Computer Systems
Product Number
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.

HEWLETT PACKARD

Breadboard Interface

Technical Data

For HP 1000
A-Series Computer Systems
Product Number
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

Color Video Output Interface

Technical Data

For HP 1000
A-Series Computer System
Product Number
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.

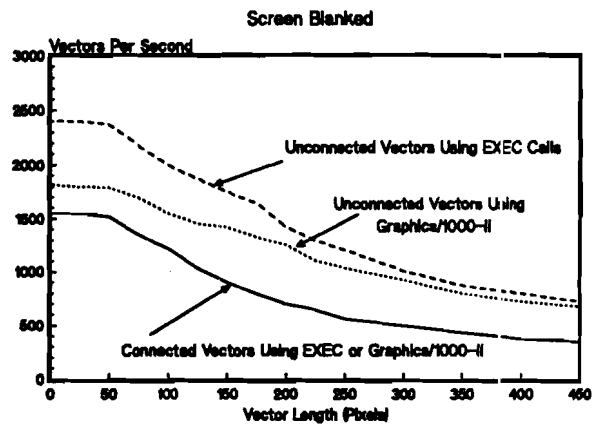
A standard character set is provided in ROM with user-specified size and orientation for maximum flexibility. In addition, the card will support user-defined characters, for example, foreign languages which can be downloaded to local RAM from the A-Series CPU.

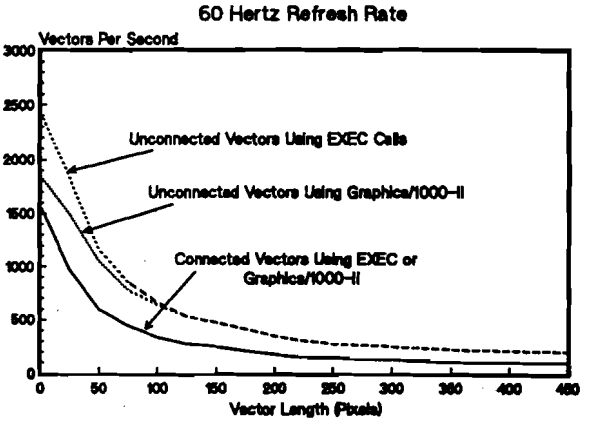
Benefits of the on-card intelligence and the DMA per I/O card A-Series architecture result in flexible drawing capabilities. In an Update mode, an existing screen is added to, either with characters or vectors, with immediate display of results. This is the mode you would use to change data or to perform limited animation, such as increasing or decreasing tank levels in a process control flow application.

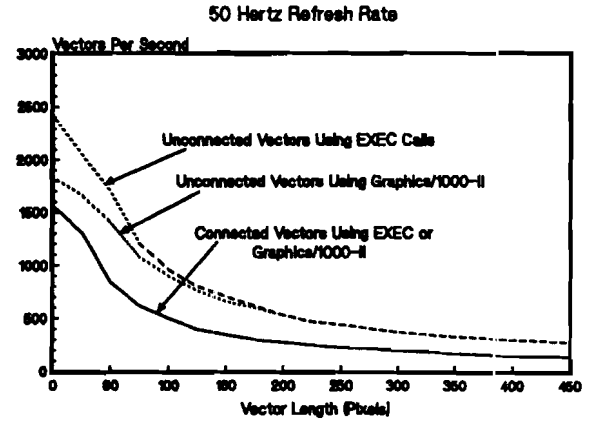
Using the Frame Buffer Read/Write capability, entire screens can be downloaded via DMA to pixel display memory (frame buffer) and then to the screen. The whole screen image is displayed within seconds. This feature is particularly useful in applications where several displays are used frequently as operators 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.

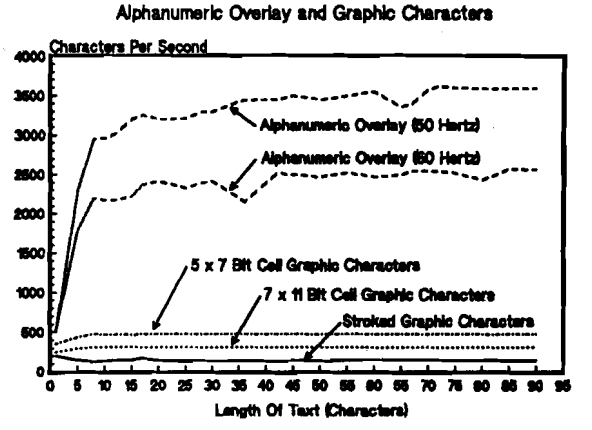
In general, display images used frequently will be initially created in Update mode. Once in frame buffer memory, the image will be stored in A-Series memory, or on disk, via Frame Buffer Reads. Later, the A-Series can redisplay the image using Frame Buffer Writes; additional modifications can be made 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.

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

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 (HP P/N 12065-67001)

HEWLETT PACKARD

Extender Card and Priority Jumper Card

Technical Data

For HP 1000 A-Series Computer Systems Product Numbers 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

HEWLETT PACKARD

HDLC Network Interfaces for DS/1000-IV

Technical Data

For HP 1000 A-Series Computer Syster
Product Numbers 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.

HEWLETT PACKARD

HP-IB* Interface for HP 1000 A-Series Computer Systems

Technical Data

For HP 1000
A-Series Computer Systems
Product Number
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.

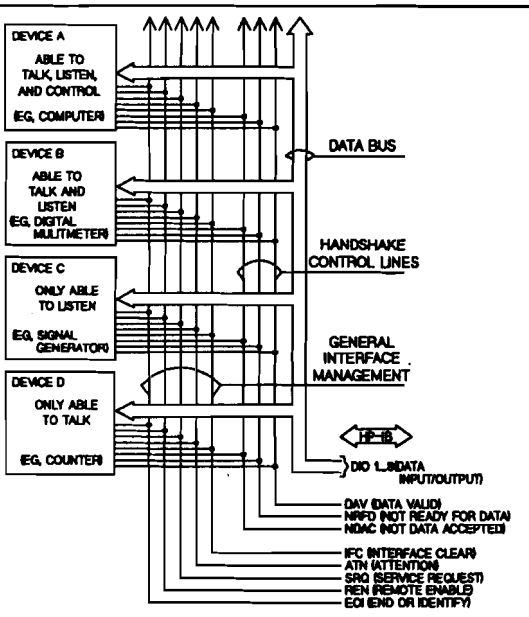
Features

- 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

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 MC 1.1. The term "HP-IB" is also used to identify Hewlett-Packard instruments conforming with this standard.

"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

Multiuse Programmable Serial Interface

Technical Data

For HP 1000 A-Series Computer System
Product Number 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 Supply	+12 V Supply	-12 V 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

Parallel Interface

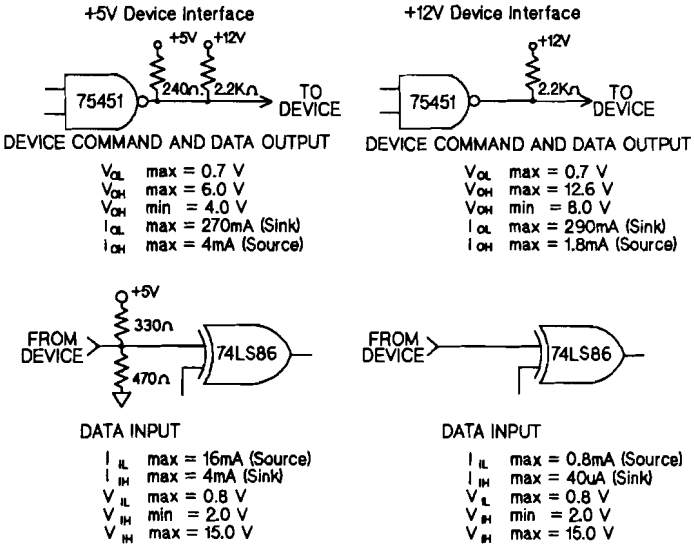
Technical Data

For HP 1000 A-Series Computer System Product Number 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

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.

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.

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

HEWLETT PACKARD

Programmable Serial Interface

Technical Data

For HP 1000
A-Series Computer Systems
Product Number
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
	Bell 201C
Private Lines	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

PROM Storage Module

Technical Data

For HP 1000
A-Series Computer Systems
Product Number
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

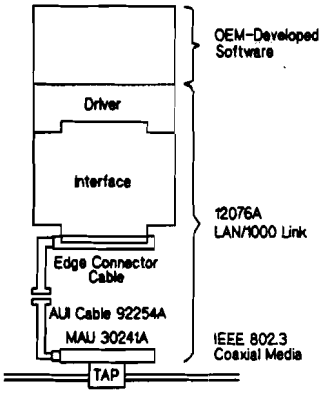
LAN/1000 Link and DDA

Technical Data

Local Area Network Interface Controller
Product Numbers
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 (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 Mbits/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 Kbytes 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-it 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 Direct Marketing Division. 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 Direct Marketing Division 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.

HEWLETT PACKARD

LAP-B Modem Interface Package

Technical Data

For HP 1000
A-Series Computer Systems
Product Number
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 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

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.

12075A Installation: Set the interface configuration switch for baud rate. On the 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

HEWLETT PACKARD

ARPA Services/1000

Technical Data

Product Number
98170A/R

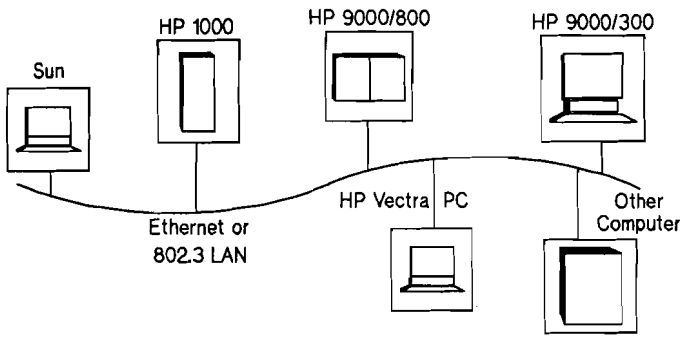
ARPA Services/1000 (ARPA/1000) provides industry-standard, multivendor networking on the HP 1000 over a high-speed Local Area Network (LAN). It provides an easy method of transferring files or logging on remotely between the HP 1000 A-Series and HP 9000, HP 3000, HP Vectra PC, IBM PC, Sun, and other 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.

ARPA/1000 supports the following FTP commands:

!	delete	ll	open	rmdir
append	dir	ls	prompt	send
ascii	exit	mdelete	put	status
bell	form	mdir	pwd	struct
binary	get	mget	quit	tr
bye	glob	mkdir	quote	type
cd	hash	mls	recv	user
close	help	mode	remotehelp	verbose
debug	lcd	mput	rename	?
??	/	..		

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 (ie, 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.

HP has selected a small number of these machines for rigorous testing. Those that interoperate well with ARPA/1000 are certified and supported by HP. The testing program is continually being expanded, and customers are advised to contact their HP Representative for the most recent list of supported machines. HP currently supports FTP and TELNET between ARPA/1000 and the configurations below:

Computer	Operating System*	Networking Software
HP 1000	RTE-A	HP ARPA/1000
HP 1000	RTE-A	HP NS-ARPA/1000
HP 9000	HP-UX	HP ARPA
HP Vectra	MS-DOS®	HP ARPA Services/Vectra
IBM PC	MS-DOS	
Sun (680x0)	SunOS	
HP 3000	MPE/V	WIN/TCP from Wollongong
HP 3000/9XX	MPE/iX	TELNET/XL, FTP/XL

* Unless otherwise indicated, all subsequent releases are also supported.
Note: FTP and TELNET between an HP 1000 system and an HP Vectra PC or IBM PC must be run from the keyboard. For all other combinations, the services may be run from either end, so the HP 1000 system may be either the local or the remote machine.

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 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 Account Management Support (AMS) or Response Center Support (RCS) for ARPA/1000 and related hardware and software products.

Ordering Information

ARPA/1000

The first copy of ARPA/1000 ordered by a customer must be 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 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.

98170A	ARPA/1000 Right-to-Use
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
401	Update to latest version, A400
600	Use in A600 computer
601	Update to latest version, A600
890	Use in A900 computer
891	Update to latest version, A900
894	Upgrade from A400 to A900

896 Upgrade from A600 to A900
990 Use in A990 computer
991 Update to latest version, A990
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 98170A (not 98170R). To obtain additional copies, order either or both of the following manuals from HP DIRECT (binders must be ordered separately):

98170-90001 ARPA/1000 Node Manager's Manual
98170-90002 ARPA/1000 User's Manual
9940-4622 Economical 3-ring Binder (2 inch rings)
5958-5154 3-ring Binder that matches RTE manuals
9940-4192 Economical 3-ring Binder (1 inch rings)
5958-5155 3-ring Binder that matches RTE manuals

Related Hardware

ARPA/1000 requires the LAN/1000 Link product (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 DIRECT, 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
B1014A	ARPA	HP 9000/300/400/900
50981-3A/R, B1016A	ARPA	HP 9000/800
D1800A	ARPA Services/Vectra	HP Vectra
HP36955A HP36956A HP2344A	ARPA Services/XL	HP 3000/900
–	WIN/TCP for MPE/V	HP 3000

HEWLETT PACKARD

NS-ARPA/1000

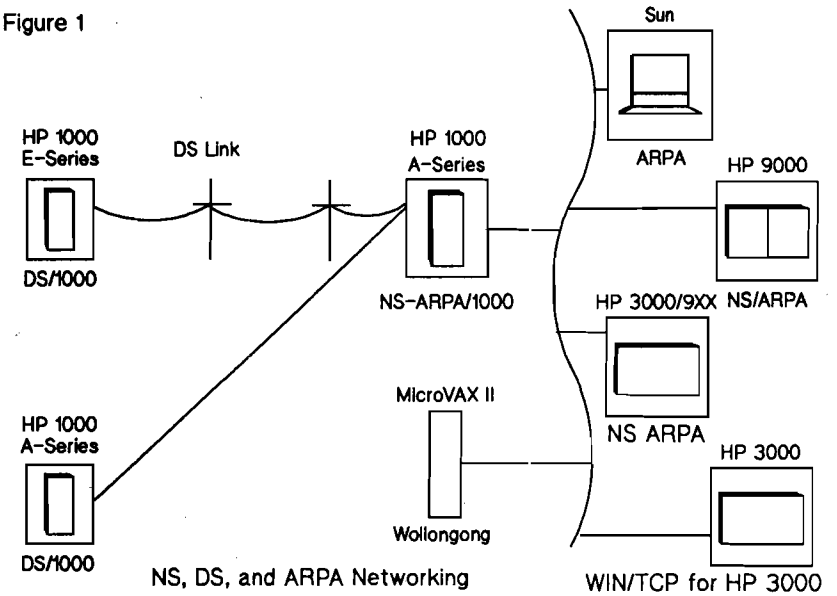
Technical Data

Product Number
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, HP Vectra, IBM PC, DEC VAX, Sun, 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



NS, DS, and ARPA Networking

WIN/TCP for HP 3000

Features and Benefits

NS-ARPA/1000 runs on HP 1000 A-Series computers, and provides the user with several key benefits:

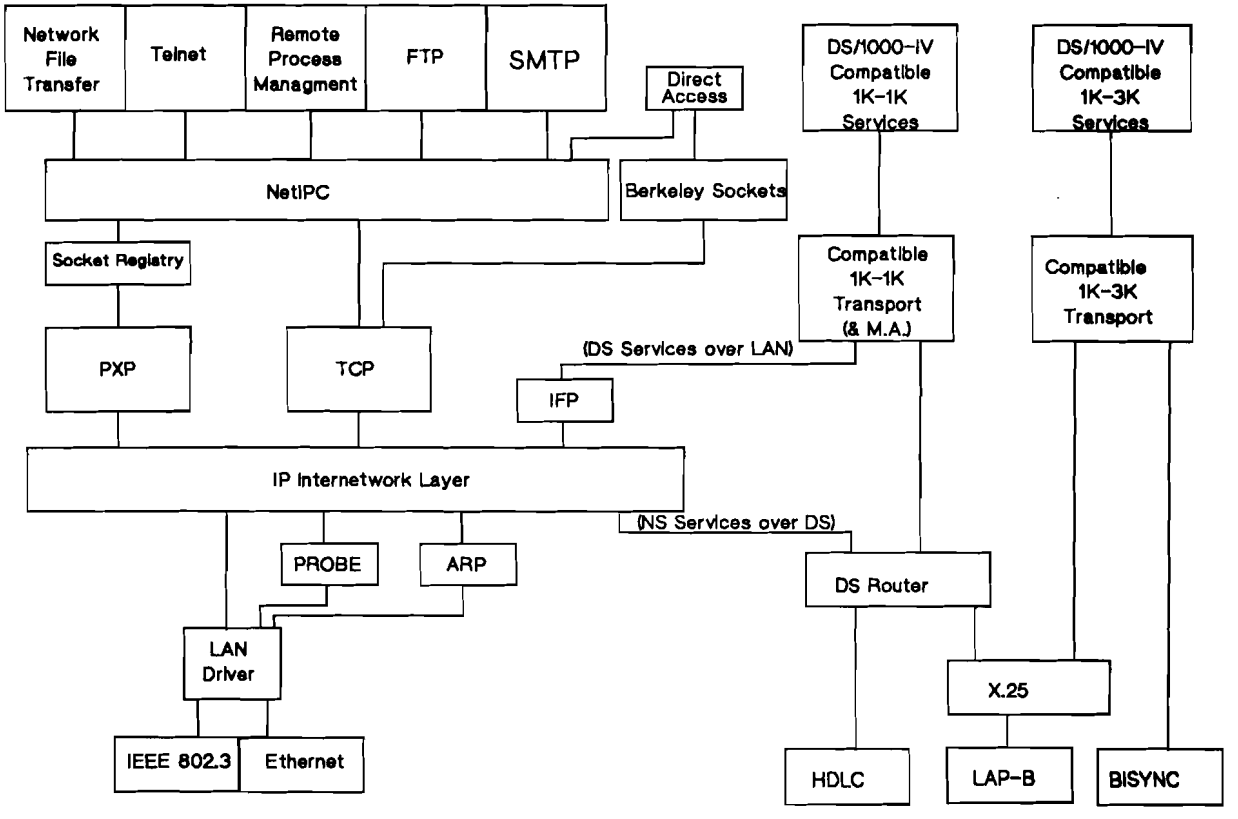
- High-speed, high-reliability communication from an HP 1000 A-Series computer to an HP 1000 F-Series, or to machines from several vendors including HP, DEC, Sun, and IBM. The result is easier and more cost-effective integration and implementation of distributed systems.
- An underlying transport mechanism 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)

NS-ARPA/1000



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 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, including a list of commands, 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, HP Vectra PC, DEC VAX, Sun, 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.

NS-ARPA/1000 is expected to communicate with most of these. HP has selected a small number of these machines for rigorous testing. Those that interoperate well with NS-ARPA/1000 are certified and supported by HP. The testing program is continually being expanded, and customers are advised to contact their HP Representative for the most recent list of supported machines. Table 1 shows which services are currently supported over which links. Not all services operate on all links or on all systems.

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/X	NFT,NetIPC, BSD IPC	802.3
DS/3000	DS/1000-3000 Services	LAP-B[3]
NS/9000 & LAN/9000	NFT,NetIPC, BSD IPC	802.3/Ethernet
ARPA/9000 & LAN/9000	FTP,TELNET,NetIPC BSD IPC	802.3/Ethernet
NS for the DEC VAX	NFT,TELNET	802.3/Ethernet
OfficeShare-NS Vectra PC	NFT,NetIPC,TELNET	802.3/Ethernet
ARPA/Vectra PC	FTP,TELNET	802.3/Ethernet
Sun 3.X/4.0	FTP,TELNET, BSD IPC	802.3/Ethernet

Notes:

1. Remote Control Panel and Forced Cold Load are only available over HDLC to DS/1000-IV 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 Account Management Support (AMS) or Response Center Support (RMS) for NS-ARPA/1000 and related hardware and software products.

Ordering Information

The first copy of NS-ARPA/1000 must be 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
401	Update to latest version, A400
600	Use in A600 computer
601	Update to latest version, A600
890	Use in A900 computer
891	Update to latest version, A900
894	Upgrade from A400 to A900

896 Upgrade from A600 to A900
990 Use in A990 computer
991 Update to latest version, A990
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 91790A are the following manuals:

Note: 91790R does not include 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

HEWLETT PACKARD

DS/1000-IV

Technical Data

For HP 1000 Computers
Product Number
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 Account Management Support (AMS) or Response Center Support (RCS) for DS/1000-IV and related hardware and software products.

Ordering Information

The first copy of DS/1000-IV must be 91750A. One processor option and one media option must be specified. Additional licenses for use of DS/1000-IV should be ordered as 91750R. Only a processor feature code should be specified, as the "R" copy does not include media. The "R" copy does include documentation. The "A" copy must always be ordered for (or upgraded to) the most powerful HP 1000 that DS/1000-IV will be used on.

91750A	DS/1000-IV Right-to-Use
91750R	DS/1000-IV Right-to-Copy
022	CS/80 Cartridge Tape Media
041	8-inch Flexible Disk
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
401	Update to latest version, A400
600	Use in A600 Computer
601	Update to latest version, A600
700	Use in A700 Computer
701	Update to latest version, A700
890	Use in A900 Computer
891	Update to latest version, A900
894	Upgrade from A400 to A900
896	Upgrade from A600 to A900
897	Upgrade from A700 to A900
990	Use in A990 Computer
991	Update to latest version, A990
994	Upgrade from A400 to A990
996	Upgrade from A600 to A990
997	Upgrade from A700 to A990
998	Upgrade from A900 to A990

001 For 91750R: Discount for Right-to-Copy 91750A+001 product or **91750T/S** updates for customer who has previously purchased a 91750R product

Upgrade credits are only applicable when purchasing a license for DS/1000-IV on a larger HP 1000.

Both the 91750A and 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 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

Support Products

91790A+S00 Software Materials Subscription (SMS)
91790A+W00 Extended Software Materials Subscription (EMS)

Response Center Support (RCS) and AMS (Account Management Support) customers also need to order or have the appropriate Data Communications Category support.

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

HEWLETT PACKARD

Remote Job Entry-II (RJE/1000-II)

Technical Data

For HP 1000 Computer Systems Product Number 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:

12043A—A-Series

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
601 Update to latest version of 91781A for 91781A customers not on support services
700 Use on A700 or E/F-Series
701 Update to latest version of 91781A for 91781A customers not on support services

Customers using RJE (91780) may use this option to upgrade to 91781A

890 Use on A900
891 Update to latest version of 91781A for 91781A customers not on support services
990 Use on A990
991 Update to latest version of 91781A for 91781A customers not on support services

Media Options

022 7908/11/12/14 Cartridge
042 5¼-inch Flexible Disk
0500 800 bpi Mag tape (E/F-Series only)
051 1600 bpi Mag Tape

91781R Right-to-Copy RJE/1000-II to one system.

Must order one processor option.

400 Use on A400
600 Use on A600
601 Update to latest version of 91781R for 91781R customers not on support services
700 Use on A700 or E/F-Series
701 Update to latest version of 91781R for 91781R customers not on support services
890 Use on A900
891 Update to latest version of 91781R for 91781R customers not on support services
990 Use on A990
991 Update to latest version of 91781R for 91781R customers not on support services

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.

HEWLETT PACKARD

HP EtherTwist Adapter Cards

Technical Data

Product Numbers
27245A, 27246A, 27247A, 27248A, 27267A, 27269A

The HP EtherTwist family of LAN adapter cards includes four Type 10BASE-T cards that allow direct connections to 10-Mbit/s twisted-pair local area networks. This full line covers both clients and servers on the ISA (AT), EISA, and Micro Channel buses; and includes drivers for all the popular network operating systems (NOSs). The EtherTwist adapter cards offer industry-leading reliability, top-rated performance, and remarkable value.

The EISA Adapter Card/32 is designed for the demanding environment of an EISA server. The 16-bit Adapter Card/16 works well in server applications in an ISA (AT-type) machine. The Micro Channel Adapter Card/16 does client or server duty in Micro Channel computers. The 8-bit Adapter Card/8 is ideally suited for client nodes in ISA (AT) machines.

The Adapter Card/8 6-pack is a good starter kit for new networks: it bundles six 8-bit ISA cards with one set of manuals and drivers. The Adapter Card/16 comes in an aggressively priced 6-pack as well.

The EtherTwist adapter cards are part of the HP EtherTwist family of network components. These LAN components—adapter cards, transceivers, hubs, and bridges—provide a high-performance, low-cost hardware foundation for your network.

Features

- Connects to hubs via unshielded twisted-pair (telephone) cabling. Shielded twisted-pair cabling can also be used.
- Complies with the IEEE 802.3 Type 10BASE-T standard.
- Supports 100 meters of cable to the hub. Greater distances can be achieved with low-loss cable.
- Connects to twisted-pair cable via standard 8-pin modular (RJ-45) jacks. EISA card also offers AUI port for connection to coaxial or fiber-optic cable.
- Breaks out voice signals through 6-pin modular (RJ-11) jack for systems that route voice and data signals in the same 4-pair twisted-pair cable (all cards except EISA card).
- Provides efficient data transfer using burst DMA transfers or REP I/O.
- Provides 32 Kbytes or 64 Kbytes of onboard static RAM for packet buffering.
- Support fully HP StarLAN 10 networks through configuration of link beat signal.
- Provides drivers for Novell® NetWare®, LAN Manager (except for HP 27248A), and other popular network operating systems (NOSs).
- Meets VDE Class B standards for radiated emissions.

Specific Features of Individual Cards

EISA Adapter Card/32

- High throughput and low CPU utilization
- 32-bit EISA backplane connection
- Burst DMA data transfer (33-Mbyte/s transfer rate)
- 64 Kbytes of on-board static RAM for packet buffering
- 8-pin modular (RJ-45) jack for 10BASE-T connection
- AUI port for connection to coaxial or fiber-optic cabling
- LED indicators for transmit and receive signals

Adapter Card/16 (ISA) and Adapter Card/16 6-Pack

- 16-bit ISA (AT) backplane connection
- REP I/O data transfer
- 64 Kbytes of on-board static RAM for packet buffering
- 8-pin modular (RJ-45) jack for 10BASE-T connection
- 6-pin modular (RJ-11) jack for breakout of phone wires

Micro Channel Adapter Card/16

- 16-bit Micro Channel backplane connection
- REP I/O data transfer
- 64 Kbytes of onboard static RAM for packet buffering
- 8-pin modular (RJ-45) jack for 10BASE-T connection
- 6-pin modular (RJ-11) jack for breakout of phone wires

Adapter Card/8 (ISA) and Adapter Card/8 6-Pack

- 8-bit ISA (AT) backplane connection
- REP I/O data transfer
- 32 Kbytes of onboard static RAM for packet buffering
- 8-pin modular (RJ-45) jack for 10BASE-T connection
- 6-pin modular (RJ-11) jack for breakout of phone wires

Reliability

The HP EtherTwist adapter cards give you long-term, trouble-free operation. These adapter cards are designed for reliability, using the latest surface-mount technology with fewer parts than many competing products. They have observed mean-time-between-failure (MTBF) rates of more than 350 years. The reliability of these adapter cards makes them highly competitive against any leading competitor's products.

Performance

The EtherTwist adapter cards are designed for superior real-world performance. In a recent *PC Magazine* evaluation of Type 10BASE-T adapter cards (October 16, 1990), the HP EtherTwist Adapter Card/8 had the highest performance of 8-bit cards under all types of network loads.

Not only is high throughput important in a LAN card, but is just as vital as low CPU utilization. The power of a CPU is needed not only to drive the adapter card, but to perform other functions, like disk I/O, as well. HP EtherTwist adapter cards have some of the lowest CPU utilization figures in their class.

The amount of memory on an adapter card is another important performance consideration. As traffic increases, especially at the server, a card must have enough memory to buffer a number of packets. Otherwise, a full buffer will cause dropped packets, retransmission, and degradation of network performance. The EtherTwist cards have either 32 Kbytes or 64 Kbytes of memory, plenty of memory for the increasing number of applications that require packet buffering.

Finally, the software drivers for the EtherTwist cards were designed to optimize performance. The result of all this attention to detail is best-in-class performance, under all types of network loads.

Value

Because HP pays attention to the details from early concept stages through final production, the HP EtherTwist adapter cards are not only industry-leading products, but also competitively priced.

Driver Software

The EtherTwist adapter cards come with drivers for a wide variety of network operating systems (NOSs). You can choose the NOS that best meets your needs and still be able to get the benefits of HP's EtherTwist network hardware, whether you use Novell NetWare, LAN Manager, or any of the other supported NOSs. All software drivers are available at no additional charge. They are shipped with the product or are available electronically on CompuServe™ or other electronic bulletin board services. New drivers can be found on these electronic services.

HP WireTest and Cabling

HP EtherTwist local area networks use twisted-pair (telephone) cabling. Two pairs of 22, 24, or 26 AWG unshielded twisted-pair cable are required for each connection. (Standard 4-pair telephone cable allows running telephone signals in the same cable with the LAN data.) Shielded twisted-pair cable can also be used.

The HP WireTest Service is available to qualify your existing telephone cabling for a Type 10BASE-T local area network. Contact your local HP Sales and Support Office or your authorized HP LAN Dealer for information and availability of this service.

New drivers are continually being written, and different NOSs tested for HP EtherTwist products. Check with your HP Representative or authorized HP dealer for the latest software compatibility list.

Specifications

Hardware Characteristics

	27248A	27247A/ 27269A	27246A	27245A/ 27267A
Environmental:				
Operating Temperature	0°C to +55°C (+32°F to +131°F)			
Relative Humidity	15% to 95% at 40°C (104°F) noncondensing			
Power Requirements:				
Typical	1.9A @ 5V	0.85A @ 5V	1.2A @ 5V	0.65A @ 5V
Maximum	2.0A @ 5V	0.95A @ 5V	1.4A @ 5V	0.70A @ 5V
Frequency	50 to 60 Hz			
Physical:				
Dimensions	22.9 cm by 12.1 cm (9.0 in by 4.75 in)	22.9 cm by 12.1 cm (9.0 in by 4.75 in)	10.5 cm by 8.6 cm (4.1 in by 3.4 in)	10.5 cm by 8.6 cm (4.1 in by 3.4 in)
Weight	147 grams (5.2 oz)	94 grams (3.3 oz)	116 grams (4.1 oz)	71 grams (2.5 oz)

Driver Compatibility

Network Operating Systems (NOS)	27248A	27247A/ 27269A	27246A	27245A/ 27267A
Novell NetWare 286 V. 2.15	X	X	X	X
Novell NetWare 386 V. 3.0 (ODI Server)	X	X	X	X
HP LAN Manager OS/2[1]	X	X	X	X
HP LMX	X	X	X	X
3Com 3+Open V. 1.1	X	X	X	X
SCO UNIX®[2]	X	X	X	X
Banyan Vines[1]	O	O	O	O
FTP Inc. PCXTCP Plus[1]	–	O	O	O
FTP Inc. PCXTCP[3]	–	O	O	O
HP OfficeShare III	–	–	X	X

1 = Via NDIS Driver
2 = Via Stream Driver (available on SCO BBS)
3 = Via Packet Driver
X = Tested by HP
O = Software vendor claims compatibility with driver. This configuration not tested by HP.

Note: NDIS 1.0 is a generic driver specification. The LAN Manager product from Microsoft® works with it as does Banyan Vines, PC/TCP Plus, and many other products. New vendors are announcing support for this driver specification continually. Check with the NOS vendor for support of the driver specification.

Warranty

All members of the HP EtherTwist adapter card family are warranted for one year against defects. Check with your local Hewlett-Packard Sales and Support Office or your authorized HP LAN Dealer for more information.

System Requirements

The HP 27245A Adapter Card/8, HP 27267A Adapter Card/8 6-Pack, HP 27247A Adapter Card/16, and HP 27269A Adapter Card/16 6-Pack are intended for use in PCs with an ISA backplane (including HP Vectra, Compaq DeskPro, and IBM PC/XT/AT and PS/2 with AT backplanes). The HP 27246A Micro Channel Adapter Card/16 is intended for use in a PC with a Micro Channel backplane (including IBM PS/2 models with Micro Channel backplanes). The HP 27248A EISA Adapter Card/32 is intended for use in PCs with EISA backplanes (including Hewlett-Packard and Compaq EISA computers).

Ordering Information

HP 27245A EtherTwist Adapter Card/8
HP 27246A EtherTwist MCA Adapter Card/16
HP 27247A EtherTwist Adapter Card/16
HP 27248A EtherTwist EISA Adapter Card/32
HP 27267A EtherTwist Adapter Card/8 6-Pack
HP 27269A EtherTwist Adapter Card/16 6-Pack

Each of these products must be ordered with a local language option for documentation (no cost). One of the following options must be chosen:

Option ABA	English
Option ABD	German
Option ABE	Spanish
Option ABF	French
Option ABZ	Italian

Updates of driver software are distributed by electronic means. Refer to the "Driver Software" section of this document for more information.

Related product: One HP 28689B Troubleshooting Kit should be purchased for each LAN installation.

HEWLETT PACKARD

ThinLAN PC Adapter Card

Technical Data

For the HP Vectra, Compa and IBM PC/ XT/AT and PS Model 30
Product Number 27250A

The HP 27250A ThinLAN PC Adapter Card connects a PC to a Thin Ethernet network. It includes drivers for Novell® NetWare®, HP LAN Manager and HP OfficeShare 3.

The HP 27250A is a higher-performance, lower-priced replacement for most applications using the existing HP 27210B and HP 50927F (check "Software Compatibility" for more details).

Functional Description

The HP 27250A PC Adapter Card provides the hardware for connecting to an IEEE 802.3 or Ethernet network. The adapter card is compatible with the Type 10BASE2 version of the IEEE 802.3 specification for CSMA/CD networks. The BNC connector on the card provides direct connection to a thin coaxial LAN cable (such as HP ThinLAN). An AUI connector on the card allows connection via a transceiver to thick coaxial and fiber-optic LAN cables.

Also included in the product are several drivers: NDIS (HP LAN Manager, 3Com 3+Open), Novell NetWare 2.15, and HP OfficeShare 3.0.

Features/Benefits

- 32 Kbytes static RAM on board
  - Ability to buffer back-to-back packets
  - Higher throughput than HP 27210B and HP 50927F
- ThinLAN BNC connector
  - Direct connection to thin coax LAN cables
- AUI port
  - Ability to connect to thick coax or fiber-optic LAN cabling
- ISA backbone
  - Compatibility with HP Vectra PCs, IBM PC/XT/AT and PS/2 Model 30, and Compaq PCs
- External loopback diagnostic software
  - Simplified verification and troubleshooting

Functional Specifications

Hardware and Software Compatibility

HP has designed the HP 27250A ThinLAN PC Adapter Card to operate with industry-standard hardware and software products. Based on limited testing, HP believes the products noted below achieve compatibility with HP's ThinLAN PC Adapter Card. HP relies in part upon information from the suppliers of the products and makes no warranty, expressed or implied, with respect to the following products' operation with worldwide regulatory requirements. HP advises customers to conduct independent examination to determine suitable levels of compatibility for the customer's individual needs.

The HP 27250A is intended for use in HP Vectra, Compaq, and IBM PC/XT/AT and PS/2 PCs with AT backplanes. This card has been tested with the following software:
HP OfficeShare, HP LAN Manager OS/2, HP LM/X, Novell NetWare 286 version 2.15 (client and server), Novell NetWare 386 version 3.0 (DOS client only) SCO UNIX®, and 3Com 3+Open. Contact an authorized dealer or HP Representative for additional information on tested software configurations.

Environmental Characteristics

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

Electrical Characteristics

Power Requirements:
0.6 V amp at 5 dc

Physical Characteristics

Dimensions: 13.8 cm by 8.6 cm (5.5 in by 3.4 in)
Weight: 89.6 g (3.2 oz)

Ordering Information

HP 27250A ThinLAN PC Adapter Card includes:

27250-60001 PC Card Assembly
27250-90001 Installation Manual
27250-90006 ThinLAN PC Adapter Card Installation Steps
27245-13401 3.5-inch AT Support Disk (includes transport/ drivers and diagnostics)
27245-13402 5.25-inch AT Support Disk (includes transport/ drivers and diagnostics)

Related Products

One HP 28689A Troubleshooting Kit should be purchased for each LAN installation.

Warranty

The HP 27250A ThinLAN PC Adapter Card is warranted for one year against defects. Check with your local Hewlett-Packard Sales Office or authorized HP LAN dealer for more information.

HEWLETT PACKARD

HP AdvanceLink for MS-DOS®

Technical Data

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, HP2393A, 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 (eg 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.

Product Number	Description
MS-DOS Environment	
D2102B	AdvanceLink, single copy IBM PC format, 5.25" and 3.5" 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 Option #OF8	HP ResponseLine for Commercial Systems Software; integrated PC office option (#OF8) includes ResponseLine coverage for your HP PC operating system and software products
H2011 + H00 Option #OF8	HP ResponseLine for HP 9000 systems software; integrated PC office option (#OF8) includes HP ResonseLine coverage for your HP PC operating system and software products

5091-8177F

HEWLETT PACKARD

HP AdvanceLink for MS-Windows and HP NewWave

Technical Data

HP AdvanceLink for MS-Windows® and HP NewWave is a comprehensive data communications product that enables you to integrate host/terminal applications with your client/server and personal computer allocation. 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. AdvanceLink is supported on a variety of personal computers and supports serial and LAN connections to the host computer.

MS-Windows

The multitasking capability of MS-Windows permits you to establish multiple, simultaneous host connections over serial or LAN links. Microsoft's® DDE protocol, combined with AdvanceLink's powerful TermTalk command language, enables you to integrate host applications with your PC even more closely.

HP NewWave

HP NewWave offers further benefits beyond MS-Windows. HP offers you the choice of installing AdvanceLink either as an MS-Windows or a native HP NewWave application, from a single set of disks. When you install it in the HP NewWave environment, additional user interface and task automation functions are enabled. AdvanceLink can then recognize and handle HP NewWave data objects, simplifying data transfer. The TermTalk command language has features in common with the HP NewWave Agent language, and is better suited to data communications tasks. TermTalk can also invoke HP NewWave Agents. When you use AdvanceLink within the HP NewWave environment, you have the benefits of this sophisticated user interface and the powerful task automation capabilities, enabling you to achieve a level of integration that is impossible in other environments.

AdvanceLink for MS-Windows

Features

- Full block/line mode emulation of HP 2392, including ANSI mode, plus DEC VT100 and the main features of HP 700/94.
- MS-Windows 3.0 support and user interface style.
- Real, standard, or enhanced modes of MS-Windows 3.0 are supported depending upon host connection method.

Display Features

- 26 line by 80 column display
- Vertical and horizontal scrolling
- Support for all 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
- Support for 132 and 160 columns (directly displayed or scrolled, depending on monitor resolution)
- Virtual memory support
- Configurable display memory, up to 7200 lines
- Intelligent type ahead
- Log to directly connected or networked printer, clipboard or disk file

HP 700/94 Terminal Features

- Transmit only fields
- Forms cache
- Modified data tags

Network Capability

- Direct RS-232-C or RS-422 connection (COM1, COM2, COM3, COM4)
- Hayes compatible modem support
- Baud rates from 300 to 19200
- HP LAN Manager via HP DOS Network Services 2.1 (HP 3000)
- HP LAN Manager via HP DOS ARPA Services 2.1 (HP 9000)
- 3COM LAN Manager for connection to other hosts
- Novell® NetWare® to HP 3000 via HP NetWare/XL or HP NS LAN gateway
- X.25 network via PAD 2334/5
- Eicon Technology X.25 network adapter card (with Eicon driver software) support for standalone and NetBIOS compatible LANs
- Windows Dynamic Link Libraries allowing connection to hosts over NDIS-compatible TCP/IP networks, using NetManage Inc. NEWT, or Frontier Technology Corp's SuperTCP.

File Transfer

- File transfer to HP 3000 or HP 9000 computers
- Automatic calculation of blocksize for optimum performance
- Blocksize adjustable via TermTalk
- Data compression for faster transfer
- XMODEM for file transfer to non HP hosts
- Support for 7 bit and sensitive networks
- Automatic character conversion for HP Roman8 for ANSI international characters

*See Network Support diagram

TermTalk Command Language

- 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 handing, string manipulation, logical operators, if/then/else instructions, looping, comments
- Language editor—files can be written, debugged and run within AdvanceLink
- 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 script menu for quick access
- Script recording (user can perform a task within AdvanceLink and a command file will be automatically created.)
- Support for Microsoft DDE in both client and server modes.
- Conversion utility (This simplifies the translation of AdvanceLink for MS-DOS command files for use with TermTalk.)

HP NewWave Integration

The two disks contain the required files for installation, either as an MS-Windows, or full HP NewWave application.

AdvanceLink for HP NewWave

AdvanceLink for Windows can be installed in the HP NewWave environment. In this case, the following additional features are enabled:

Network Support for Version A.03.11

Host Requiring HP Terminal Emulation	PC Connectivity	Protocol	AdvanceLink Connection to Select	Windows 3.0 Modes Support
Any Host: (HP 3000/ 9000 HP 1000 DEC VAX, UNIX®)	Serial Port	RS232C	COM1, COM2	R, S, E
	Int 14 Drive		INT 14 1-2	R, S, E
	Eicon Redirector	X.25	COM1, COM2	R, S, E
HP 3000	HP OfficeShare III	VT	AdvanceNet	R, E
	HP Network Services 2.0	VT	AdvanceNet	R, E
	HP Network Services 2.1	VT	AdvanceNet	R, S, E
HP 3000 With Wallongong ARPA Services	HP ARPA Services 2.0	Telnet	BAPI	R, E
	HP ARPA Services 2.1	Telnet	BAPI	R, E
	3Com LAN Manager	Telnet	BAPI	R, E
HP 9000	HP OfficeShare III	CVT Telnet	HP Telnet	R
	HP ARPA Services 2.0	Telnet	BAPI	R, E
	HP ARPA Services 2.1	Telnet	BAPI	R, E
	3 Com LAN Manager	Telnet	BAPI	R, E
	NetManage NEWT	Telnet	NEWT Telnet	E, S
	Frontier SuperTCP	Telnet	SuperTCP Telnet	E, S
Other UNIX or TCIP Systems HP 1000, Sun, DEC, VAX, Apollo, etc.	HP ARPA Services 2.0	Telnet	BAPI	R, E
	HP ARPA Services 2.1	Telnet	BAPI	R, E
	3Com LAN Manager	Telnet	BAPI	R, E
	NetManage NEWT	Telnet	NEWT Telnet	E, S
	Frontier SuperTCP	Telnet	SuperTCP Telnet	E, S

R Real Mode
S Standard Modes
S' Standard Mode requires MS-Windows 3.00A
E Enhanced Mode
VT Virtual Terminal
CVT Character Virtual Terminal

HP NewWave Agent Task Integration

Agent can invoke a single TermTalk command. Agent can call a TermTalk file. TermTalk can invoke an Agent task.

Object Handling

AdvanceLink can recognize and manipulate New Wave Objects. TermTalk contains Object Import and Export commands.

Drag and Drop

You can "drag" and Object across the desktop and "drop" it onto the AdvanceLink Connection Object to initiate file transfer. You can use TermTalk to produce "drag an drop" command files to automate file transfer or other operations.

HP NewWave Help Integration

You can invoke HP NewWave help from within AdvanceLink.

Hardware Requirements

Host system
HP 3000, HP 9000, HP 1000

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
Microsoft Windows 3.0 manages the memory usage of applications. AdvanceLink for Windows will run in any memory configuration supported by MS-Windows 3.0.

Monitor
An EGA or VGA video adapter (with a minimum of 128KB RAM) with color monitor is required for color graphics and text.

Software Requirements

Operating System
MS-DOS 3.1 or later plus MS-Windows 3.0, HP NewWave 3.0

Networking
- Single LAN session to HP 3000 via HP OfficeShare III
- Single LAN session to HP 9000 via HP OfficeShare III
- Multiple LAN session to HP 3000 via HP OfficeShare and HP DOS Network Services 2.1
- Multiple LAN session to HP 9000 via HP LAN Manager and HP DOS ARPA Services 2.1

Product Number	Description
MS-DOS Environment	
D2104B	IBM format 5.25" and 3.5" disks, plus one set of documentation and license for a single user
D2104-60006	Upgrade from any previous version of AdvanceLink for Windows (D2104A) or AdvanceLink for MS-DOS (68333F, 68333B) to the current version of AdvanceLink for Windows (D2104B); IBM formats 5.25" and 3.5" disks
D2114B	Single user license certificate only
D2434B	User license upgrade from any previous version of AdvanceLink for Windows (D2114A) or AdvanceLink for MS-DOS (68333L, 68333Q, 68333S, 68333J) to the current version of AdvanceLink for Windows (D2114B); 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 Option #OF8	HP ResponseLine for Commercial Systems Software; integrated PC office option (#OF8) includes ResponseLine coverage for your HP PC operating system and software products
H2011 + H00 Option #OF8	HP ResponseLine for HP 9000 systems software; integrated PC office option (#OF8) includes HP ResonseLine coverage for your HP PC operating system and software products.

Note: In all HP OfficeShare LAN, AdvanceLink requires the presence of a PROBE server (ie at least one HP 3000 or HP 9000 computer running Network Services). If no PROBE server is present, HP ARPA Services 2.1 MUST be installed on the PC.

Ordering Instructions

To order the following products, contact your HP Sales Office or your local HP dealer.

5091-3147E

HEWLETT PACKARD

Novell® NetWare® 386 v3.11 Master Disk Program

Technical Data

Product Number
J2242A (Version 3.11)

NetWare v3.11

Large organizations are finding significant benefits in purchasing site licenses of networking products. These include the ability to quickly distribute preconfigured servers throughout their organization, reduced maintenance costs by maintaining the same versions of software throughout the organization, and the convenience of ordering at one time.

Hewlett-Packard sells Novell NetWare v3.11 in volumes of 20 servers or more. HP's version of NetWare v3.11 is exactly the same as the version available from NetWare resellers.

NetWare v3.11 is a full-featured, 32-bit network operating system that supports all key desktop operating systems – DOS, Windows, OS/2, UNIX®, and Macintosh – as well as the IBM SAA environment. NetWare v3.11 provides a high performance integration platform for businesses requiring a sophisticated enterprise-wide network computing solution in a multivendor environment.

NetWare v3.11 offers centralized network management, and is available from HP in 100- and 250-user versions, allowing organizations to standardize on a high performance networking solution regardless of their size.

NetWare v3.11 is ideal for:

- Customers who need multi-client support for office automation applications. These customers need to use the same or similar applications on DOS, Windows, Macintosh, OS/2, and UNIX workstations and still be able to share data files, printers, scanners, disk space, application software, and information.
- Customers who need support for corporate wide applications. To meet their business objectives, these customers must have a network reliable enough to guarantee the availability of key applications.
- Customers who want to standardize on one network operating system to meet the needs of remote office, workgroup, department, corporate, and enterprise-wide network users. This requires flexible pricing and the ability to design systems that vary in capacity, size, and applications.
- Customers who want to protect their investment in current hardware and software or who have outgrown their current system. NetWare v3.11 allows customers who have a significant installed base of host systems, applications, or LANs to protect these investments, providing an integration platform that ties existing and new services together. For customers who began with ELS, Advanced or

SFT NetWare, NetWare v3.11 provides increased capacity, support for additional desktop clients, and the ability to integrate additional communication protocols.

Highlights

- 32-bit, multitasking operating system that runs on 80386 and 80486 hardware.
- Supports DOS, Windows, Macintosh, OS/2 (SE and EE), and UNIX clients.
- Supports separate products that provide AFP, AppleTalk, NFS, OSI, FTAM, communication, and database services.
- Sold in 10-0 and 250-user versions.
- Supports Novell's NetWare Name Service.
- Provides the ability to manage remote servers from a central site.
- Allows users to share files, information, applications, printers, and other peripherals in a multi-client environment.
- Provides built-in internal routing services for IPX and TCP/IP networks.
- Provides a complete selection of LAN, disk, and backup services.
- Allows Novell, third parties, and customers to add new services as they are needed.
- Compatible with thousands of third-party applications and services.
- Designed to be easy to install and use.

Features

- Full 32-bit operating system that takes full advantage of the 80386 and 80486 processors
- 80486-aware. When NetWare v3.11 is installed on an 80486-based machine, special instructions are implemented that allow it to take advantage of 80486 features.
- Optimized to support distributed applications.
- Available in 100-user and 250-user versions.
- Fully compatible and interoperable with previous versions of NetWare.
- NetWare Loadable Module (NLM) architecture allows additional software components to be loaded and unloaded while the server is running. NLMs include drivers, utilities, and applications.
- NetWare v3.11 disk process ensures that volumes are mounted quickly, and enables developers to create drivers for WORM, CD-ROM, and removable media devices.
- Dynamic resource configuration feature automatically calculates internal system resources needed for optimum performance.
- Supports up to 4GB or RAM.
- Supports up to 32 TB of disk storage.
- Supports up to 64 volumes per server.
- Files can be up to 4GB and can span physical drives, enabling the server to store large databases and applications that once could be stored only on minicomputers or mainframes.
- Network volumes and files can span up to 1,024 physical disk drives.
- Interoperates with NetWare v2.x.
- Includes NetWare Remote Management Facility (RMF), enabling network supervisors to manage remote servers from their own workstations over LAN connections or phone lines.
- Supports NetWare Name Service (NNS), a separate product that simplifies network administration by allowing similar user environments to access multiple servers.
- Includes SBACKUP and NBACKUP, backup and restore utilities that provide DOS client-and server-based backup, and backup of multiple name space.
- Provides developers with tools to help them write applications optimized to run on the NetWare v3.11 platform. These tools include the NetWare CLIB, Btrieve v5.15, event notification, and more than 800 documented APIs.

Workstation Support

- Includes the DOS Client Shell v3.01, which includes extended and expanded memory options.
- Is fully compatible with Microsoft® Windows 3.0 and Quarterdeck's DESQview.
- Supports workstations running DOS 3.x, 4.x and 5.x.
- A preferred server option enables users to specify which default server they will be attached to when they log in. Users may attach up to 8 servers at a time.

- Includes the NetWare Requester for OS/2 v1.31, which enables OS/2 workstations to interoperate on a NetWare network. The NetWare requester for OS/2 supports OS/2 Standard and Extended Editions.
- The NetWare Requester for OS/2 supports server-based applications. Support for both DOS and OS/2 Named Pipes is included. (Support for OS/2 V.2 is also provided as an option).
- When used with the appropriate add-on services, NetWare v3.11 allows Apple Macintosh, NFS, and OSI FTAM clients to access NetWare services from their native environments.

Security

- Network access is based on user profiles assigned by the network supervisor. The five access levels are password, trustee, file, directory, and file rights.
- The MONITOR server application locks the console keyboard until a password is typed.
- Expiration dates and resource usage limits can be assigned to user accounts.
- System supervisors can limit the amount of disk storage available to a user. Storage limitations can be placed on specific directories as well.
- Allowable login days, time of day, physical locations, and number of incorrect login attempts can be limited for each user account.
- Half-hour security checks determine whether a user can log in (or is permitted to be logged in) during that time period, whether a user's account has expired or been disabled, and whether a user's account has run out of funds.
- Unauthorized or overdrawn user accounts are automatically logged out every half hour (following a five-minute warning).
- A resource accounting feature allows network supervisors to charge users for connection time, bytes read or written to disk, use of storage space on disks, or the number of requests made by a workstation. Rates can vary by the hour and by the day. Supervisors can assign credit limits and have the system monitor users account balances and log them off if they exceed their credit limits.

Reliability

- Read-after-write verification capabilities allow NetWare v3.11 to ensure that data is readable at the time it is written.
- Hot Fix provides disk media defect detection and correction. When a bad block is detected, the data is moved to a safe area of the disk and the bad block is marked as unusable.
- Duplicate directory structures and file allocation tables ensure data integrity.
- Disk mirroring allows NetWare v3.11 to maintain redundant disk drives on the same channel. If the primary disk fails, the secondary (mirror image) takes over automatically with no loss of data. NetWare v3.11 supports up to eight mirrored disks.
- Disk duplexing allows NetWare v3.11 to maintain redundant disk channels in a server. If a disk drive, controller, or host interface fails, automatic recovery and log entry occur without loss of operation or data.
- TTS (Transaction Tracking System) allows NetWare v3.11 to track changes to critical files. If a system failure occurs during such a transaction, NetWare v3.11 will back out of the transaction and leave the files as they were before the transaction began.
- A UPS (uninterruptible power supply) monitoring feature allows servers to monitor an attached uninterruptible power supply. When power failure occurs, NetWare v3.11 will notify all current users. After a configurable timeout, the system will log out any remaining users, close any open files, and shut itself down.

Application Support

- Includes server-based version of Btrieve v5.15 for database applications.
- Supports other programming interfaces, including resource accounting, queue management, network diagnostics, and security.
- Coexists with OS/2 distributed applications. When used with the NetWare Requester for OS/2, which is bundled with the operating system, NetWare 386 networks can support OS/2 server-based applications, such as the Microsoft/Sybase SQL

Server and Oracle Server for OS/2, running in applications servers.

Communications

- Provides the platform for NetWare communication Services products, Novell's LAN-to-host, LAN-to-LAN, and remote-to-LAN connectivity solution.
- Supports a variety of network hardware, including Ethernet, Token-Ring, Arcnet, and other familiar network adapters.
- Internal routing capability allows up to 16 network adapters to be installed per server, with fully transparent internetwork routing.
- Includes a source routing NLM that enables NetWare IPX packets to be routed through IBM source routing bridges.
- Includes NetBIOS support.
- Provides the TCP/IP transport protocol.

Product Requirements

Required Hardware

NetWare v3.11 requires a network server computer, workstations, and network adapters that have been properly installed and connected. In the server, NetWare v3.11 requires a minimum of 4 MB of RAM. More memory may be required, depending on the number of users, the load they put on the server, the number of NLMs loaded, and the size of the network hard disks. (More than 70 MB of disk storage requires additional memory.) NetWare v3.11's dynamic resource configuration feature notifies the network supervisor when more memory will improve server performance. To load the software, servers must be equipped with high-capacity floppy disk drives (5.25-inch, 1.2 MB or 3.5-inch, 1.44 MB). For a complete list of servers certified to work with NetWare v3.11, contact your HP Sales Representative or a Novell Gold or Platinum Reseller.

IBM PCs, XTs, ATs and compatibles, and all models of the IBM PS/2 family of computers can be used as network workstations as well as the Macintosh II family and the Macintosh SE, Plus, and 512Ke. Contact your HP Sales Representative or a Novell Gold or Platinum Reseller for an up-to-date list of compatible workstations.

The type of network adapter used depends on the type of computer used as a server or workstation. In 32-bit Micro Channel servers on Ethernet networks, Novell recommends using the NE/2-32. The 32-bit bus of the NE/2-32 allows users to gain the full performance potential of NetWare v3.11 by increasing the amount of data that can be moved on and off the network and into server memory. For Extended Industry Standard Architecture (EISA) servers on Ethernet networks, Novell recommends the NE3200, a 32-bit bus master adapter.

Following is a list of adapter drivers bundled with NetWare v3.11. Novell will provide additional drivers in future versions of NetWare v3.11. Third-party adapter manufacturers will also supply adapter drivers.

Server Drivers

ISA Bus
NE1000
NE2000
Novell Turbo RX-Net (Arcnet)
RPL, including source routing support
IBM Token-Ring (16Mbit/s and 4Mbit/s)
3Com 3C505
3Com 3C503
IBM PC Network Adapter II and PC Network Adapter II/A

Micro Channel Bus
Novell NE/2
Novell NE/2-32
RPL, including source routing support
IBM Token-Ring (16 Mbit/s and 4Mbit/s)
2Com 3C523 (twisted pair and thin coaxial)

EISA Bus
Novell NE3200

Workstation Open Data-Link Interface (ODI) Drivers

ISA Bus
NE1000
NE2000
Novell Turbo RX-Net (Arcnet)
IBM Token-Ring (16 Mbit/s and 4 Mbit/s, including RPL for IBM diskless workstation)
3Com 3C501

3Com 3C505
3Com 3C503
EXOS 205
IBM PC Network Adapter II/A

MicroChannel Bus
Novell NE/2
Novell NE/2-32
Novell RPL (for IBM diskless workstations – Token-Ring)
IBM Token-Ring (16 Mbit/s and 4Mbit/s)
EXOS 215T
3Com 3C523

EISA Bus
NE3200

Required Software

NetWare v3.11 contains all the software necessary to install and operate the Network server and connect up to 100 or 250 DOS, OS/2, or Windows workstations to the network, depending on the version purchased.

Options

The NetWare operating system can be used with every other product Novell provides. For example, NetWare functions as a platform for Novell's NetWare Communication Services products, which include NetWare for SAA, NetWare Communication Services Manager, and the NetWare 3270 LAN Workstations for DOS, Macintosh, and Windows. The NetWare Access Server, NetWare Link products, and NetWare SQL 386 also run with NetWare v3.11.

Add-on services can be purchased that enable Apple Macintosh, NFS, and OSI FTAM clients to connect directly to the NetWare v3.11 server. NetWare Name Service provides simplified internetwork administration by enabling the network supervisor to designate groups of servers, called domains. With NNS, users access may be more easily managed across multiple servers.

Users may need to purchase the Supplemental Driver Kit to use some network adapters. Novell supports a variety of network adapters, but only bundles drivers for the most widely used adapters with NetWare operating systems.

To purchase these options, contact a Novell Gold or Platinum Reseller.

Specifications

Logical users supported
– 100 or 250
Concurrent open
– 100,000
Directory entries per volume
– 2,097,152
Volumes per server
– 64
Logical drives per volume
– 32
Maximum disk storage capacity
– 32 TB*
Maximum RAM
– 2GB *
Maximum file size
– 4GB

* Maximums listed are individual limits. Users may not be able to use these specifications at maximum levels at all times. They may have to purchase additional equipment to achieve some of these maximums. Some maximums may not be available with current hardware technology. Advancements in current hardware technology may be required to achieve stated maximums.)

Novell-Certified Servers

For a complete list of certified servers, contact an HP Sales Representative or a Novell Authorized Reseller.

Installation and Support

Installation

Novell NetWare v3.11 is a customer installable product. However, the customer can purchase installation from HP if desired.

Hardware Support Services

Provides customers with standard hardware support for their HP 9000, HP 3000, HP 1000, and HP PC hardware.

HP Software Support Services

Software Product Materials Vectra PC – Entitles the customer to receive updated software and documentation for any revisions to the product up to but not including the next upgrade.

HP BasicLine Software Support – Provides customer with self-support through right-to-use updates and access to 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 proactive 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.

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 ongoing 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 networks. Please refer to the HP NetAssure data sheet for more information.

PCLAN – Provides Novell Customer 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

J2242A Master Copy Disk for Netware v3.11
J2242A UBD Manuals, Disks and 1 100-user server license
J2242A UD6 Manuals, Disks and 1 250-user server license
J2242A UCU Right-to-copy 1 100-user server license
J2242A UCV Right-to-copy 1 250-user server license

Customers may purchase either 100- or 250-user licenses. A minimum order of 20 units is required. Customers must order 1 and only 1 of option UBD if they are ordering 100-user servers and 1 and only 1 of option UD6 if they are ordering the 250-user servers. The remainder of the licenses must be ordered using options UCU or UCV. The total of all options must be 20 or more. Add-on orders must also be in units of 20 or more.

Customers will receive server and client software on both 3.5" and 5.25" discs.

Documentation

Novell NetWare 386 v3.11 Master Disk Program includes the following documentation:

Related Products

B1823A HP ARPA Services 2.1/Novell
D1819A HP Network Services 2.1/Novell
Various HP NewWave Office Products

HEWLETT PACKARD

HP ARPA Services 2.1/MS-DOS®
HP ARPA Services 2.1/MS-DOS for NetWare®

Technical Data

Product Numbers
D1812B and D1823A

With HP ARPA Services 2.1/MS-DOS and HP ARPA Services 2.1/MS-DOS for NetWare, 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. ARPA services, like UNIX, are de facto standards in the scientific and engineering communities and are becoming much more widespread in the commercial world. Both products allow users to save money by leveraging their investments and sharing resources. They also allow users to integrate DOS and UNIX systems from the same PC.

With HP ARPA Services 2.1/MS-DOS for NetWare 2.15C or above, a PC running MS-DOS and NetWare can have all of the functionality mentioned above, and will not have to reboot when moving between NetWare and HP ARPA Services. These products support the DOS environment as well as the new Windows 3.1 and HP NewWave 3.0 environments in all modes. ARPA services 2.1 is a component of NewWave Office 3.0.

Features and Benefits

- Full Integration with Microsoft® and HP LAN Manager for OS/2 and MS-DOS, HP LAN Manager/X and HP Network Services 2.1/MS-DOS.

  The HP ARPA Services 2.1/MS-DOS (D1812B) product will allow a PC user to use any of the HP PC Integration products without the need to reboot.

- Support of NetWare Clients without having to reboot.

  With HP ARPA Services 2.1/MS-DOS for NetWare (D1823A), all of the ARPA Services are available to any NetWare 2.15C and above clients without having to reboot. This allows users access to a wide variety of services with minimal effort. D1823A supports the following networks: StarLAN 10, Token Ring, 10BaseT (Ethertwist) and Ethernet.

- Windows 3.1 and NewWave 3.0 Support.

  This feature allows customers to run HP ARPA Services using Microsoft Windows 3.1. As a result, users can run more than one service at a time and can use windows applications, such as AdvanceLink for Windows.

  HP ARPA Services 2.1/MS-DOS provides full support of Windows 3.1 and HP NewWave 3.0. A Microsoft Windows sockets interface is

available to develop distributed Microsoft Windows or HP NewWave-based applications. The HP NetIPC interface is provided to support distributed office applications such as NewWave Mail and NewWave Access.

- 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 (on MPE XL and on MPE V using Wollongong WIN/TCP), Sun` and DEC` VAX are supported. You can append, rename and delete file, list, change, make and remove directories, check status, toggle switches and ask for help.

FTP Commands:

?	!	append
ascii	bell	bget
binary	bput	bye
cd	close	delete
debug	dir	drive
get	glob	hash
help	lapend	lcd
ldir	lls	lpwd
ls	mdelete	mdir
mget	mkdir	mls
mput	open	prompt
put	pwd	quit
quote	recv	remotehelp
rename	rmdir	send
sendport	show	slashflip
status	take	type
user	verbose	

- Virtual Terminal (TELNET, MIL-STD 1782).

  TELNET (Teletype Network Protocol) 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.

  The Kermit 3.0 Terminal emulator is included with ARPA 2.1 as a convenience to our users. Kermit is a public domain VT100 terminal emulator, and customers don't need to purchase another terminal emulator unless more functions are desired. Public domain programs are not supported by HP. Most host computers that support TELNET will also support this terminal.

  TELNET also supports HP AdvanceLink for DOS, HP AdvanceLink for Windows/NewWave, and compatible third party terminal emulators. Contact your local HP Sales Office for a list of compatible products.

- Berkeley Sockets Run-Time/Development Support.

  Berkeley Sockets run-time support together with the HP PC Sockets Developer's Kit 1.0 (D1827A), allow users to develop a program running on their PC that can communicate with a peer process running on another machine on the network. This allows application programmers to develop distributed applications. Sockets is one of the most popular multivendor industry standard application program interfaces (API).

  Many applications have been developed using this interface, including Informix, Oracle, RTI, Sybase, etc. Contact your local HP Sales Office for a list of compatible products.

- Network Interprocess Communication (NetIPC)

  The NetIPC application program interface is supported by HP ARPA Services 2.1/MS-DOS. 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. Applications supported include NewWave Office applications.

- 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 directories can be copied in this way. You must have a login and permission for remote command execution on each node. Remote shell (rsh) lets you execute a command on a remote UNIX host.

- Supports Industry-Standard TCP/IP Transport

  Standards allow users to interoperate with other systems. Having a widely accepted standard allows users to invest in systems best suited to their needs and protect existing investments.

- Internetting Support

  HP ARPA Services 2.1/MS-DOS and HP ARPA Services 2.1/MS-DOS for NetWare allow 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. PC Clients can operate on both Ethernet and Token Ring-based networks.

Product Requirements

Required Hardware

- A supported PC with 512k bytes of memory (plus memory needed for the terminal emulator or application) from the following list:
  - Original Vectra (A, A+, A++)
  - Vectra 286/12
  - Vectra 386/25
  - Vectra 486
  - Vectra CS
  - Vectra ES 12
  - Vectra ES 8
  - Vectra QS/16, 16S, 20
  - 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 PC
  - IBM PS/2 (50,50Z,60,70,80)
  - IBM PS/2 (25,30)
  - IBM PS/2 (30/286)
  - IBM XT
- One of the following interface cards to connect to the LAN:

AT Backplane - ThinLAN
- **HP 27250A** - HP ThinLAN PC Card
- **HP 27210A or B** - HP ThinLAN Card
- **3Com 3C501** - IE4, Etherlink
- **3Com 3C503** - IE6, Etherlink II
- **3Com 3C505** - EtherLink Plus
- **Western Digital WD8003E** - EtherCard Plus
- **Novell® NE 1000** - Note - (For D1823A only)
- **Novell NE 2000** - Note - (For D1823A only)

AT Backplane - StarLAN
- **Western Digital WD8003S** - StarCard Plus

AT Backplane - EtherTwist/StarLAN 10
- **HP 27245A** - HP EtherTwist PC Link
- **HP 27247A** - HP EtherTwist PC Link 16
- **HP 27236A** - StarLAN 10 PC Link
- **HP 27240A** - StarLAN 10 PC Link II

AT Backplane - Token Ring
- IBM Token Ring Adaptor
- IBM II Token Ring Adaptor II
- IBM 16/4 Token Ring Adaptor 4/16

MCA Backplane - ThinLAN
- **3Com 3C523** - Etherlink/MC
- **Western Digital WD8003ET/A** - EtherCard Plus
- **Novell NE 3200** - Note - (For D1823A only)

MCA Backplane - StarLAN
- **Western Digital WD8003S/A** - StarCard Plus

MCA Backplane-EtherTwist/StarLAN 10 Link
- **HP 27246A** - HP EtherTwist MCA Link
- **HP 27241A** - StarLAN 10 Micro Channel

MCA Backplane - Token Ring
- IBM Token Ring Adaptor/A
- IBM Token Ring Adaptor 4/16A

Note: HP has tested the interface cards listed above. Other Ethernet or Token Ring cards with NDIS drivers may or may not work. HP support is only for the cards listed above.

Required Software

- DOS version 3.1 or later

Compatible Software Versions

- NetWare Version 2.15C or later (for HP ARPA Services 2.1/MS-DOS for NetWare)
- HP AdvanceLink for Windows/NewWave (Version A.03.00 or greater), HP AdvanceLink for DOS or compatible third party product to provide terminal emulation.
- HP LAN Manager client version 1.1 or 1.2
- Microsoft LAN Manager client version 2.1
- HP Network Services 2.1 or later
- Microsoft Windows version 3.00a

Installation and Support

Installation

HP ARPA Services 2.1/MS-DOS is a customer installable product. However, the customer can purchase installation from HP if desired.

Hardware Support Services

Provides customers with standard hardware support for their HP 9000, HP 3000, HP 1000, 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 BasicLine Software Support – Provides customer with self-support through right-to-use updates and access to 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 proactive 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 re-wiring.

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 ongoing 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 your network. Please refer to the HP NetAssure data sheet for more information.

PCLAN (for D1823A only) – Provides Novell customer 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

D1812B HP ARPA Services 2.1/MS-DOS (at least **one** option **must** be ordered)

Options:

001	Software, Manuals and License for One User.
002	Right to Copy Software for 1 Additional User.
003	Right to Copy Software for 8 Additional Users.
004	Right to Copy Software for 32 Additional Users
005	Additional User Manual.

006 Upgrade from HP ARPA Services/Vectra (D1800A); Software, Manuals and License for One User.
007 Upgrade from HP ARPA Services/Vectra (D1800A); Right to Copy Software for 1 Additional User.
008 Upgrade from HP ARPA Services/Vectra (D1800A); Right to Copy Software for 8 Additional Users.
009 Upgrade from HP ARPA Services/Vectra (D1800A); Right to Copy Software for 32 Additional Users.
010 Upgrade from HP ARPA Services 2.0/MS-DOS.
011 Upgrade Right to Copy Software for 128 Additional Users.
012 Upgrade Right to Copy Software for 512 Additional Users.

HP Commercial PC Software Support Services

H2015A+H00 HP Response Line
H2016A+S00 Software Material Update Service

D1823A HP ARPA Services 2.1/MS-DOS for NetWare (at least one option must be ordered)

Options:

001 Software, Manuals and License for One User.
002 Right to Copy Software for 1 Additional User.
003 Right to Copy Software for 8 Additional Users.
004 Right to Copy Software for 32 Additional Users
005 Additional User Manual.
006 Upgrade from HP ARPA Services/Vectra (D1800A) or HP ARPA Services 2.0 – Manuals, software and license for 1 user
007 Upgrade from HP ARPA Services/Vectra (D1800A) or HP ARPA Services 2.0 – Right to Copy Software for 1 Additional User
008 Upgrade from HP ARPA Services/Vectra (D1800A) or HP ARPA Services 2.0 – Right to Copy Software for 8 Additional Users
009 Upgrade from HP ARPA Services/Vectra (D1800A) or HP ARPA Services 2.0 – Right to Copy Software for 32 Additional Users
011 Upgrade Right to Copy Software for 128 Additional Users.
012 Upgrade Right to Copy Software for 512 Additional Users.

HP Commercial PC Software Support Services

H2015A+H00 HP Response Line
H2016A+S00 Software Material Update Service

Documentation

HP ARPA Services 2.1/MS-DOS and HP ARPA Services 2.1/MS-DOS for NetWare include:

- D1812-90010 User's Guide: HP ARPA Services 2.1/MS-DOS
- D1812-90011 Installation and Tuning Guide: HP ARPA Services 2.1/MS-DOS
- D1812-90012 Errors and Troubleshooting Guide: HP ARPA Services 2.1/MS-DOS

Related Products

- **B1003A** HP LAN Manager/X for the HP 9000 Series 300
- **B1011A** HP LAN Manager/X for the HP 9000 Series 800
- **D1809B** HP LAN Manager for OS/2 and MS-DOS (5 User)
- **D1810B** HP LAN Manager for OS/2 and MS-DOS (Unlimited User)
- **D1811B** HP Network Services 2.1/MS-DOS
- **D1813A** HP PC Sockets Developer's Kit 1.0
- **D1815A** HP LAN Manager Developer's Kit for OS/2 and UNIX
- **68333F** HP AdvanceLink for DOS
- **D2104A** HP AdvanceLink for Windows
- Various HP OfficeShare LAN Products
- Various HP NewWave Office Products

HEWLETT PACKARD

HP Network Services 2.1/MS-DOS® (V B.03.00) HP Network Services 2.1/MS-DOS for NetWare® (V B.01.00)

Technical Data

Product Numbers
D1811B and D1819A

HP Network Services 2.1/MS-DOS (D1811B) and HP Network Services 2.1/MS-DOS for NetWare (D1819A) 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 HP's LAN Manager and NetWare solutions. They allow users to save money by leveraging existing investments in minicomputer hardware, software, and applications, while integrating the power and convenience of the PC.

HP Network Services 2.1/MS-DOS provides these services for HP LAN Manager 1.1, Microsoft® LanManage r2.1 clients, LAN Manager Clients, or standalone users. HP Network Services 2.1/MS-DOS for NetWare provides these services on a PC running NetWare 2.15C or above without having to reboot. Both products support the DOS environment as well as the new Windows 3.1 and HP NewWave 3.0 environments in all modes.

Features and Benefits

- Full Integration with HP LAN Manager and Microsoft LAN Management products and HP ARPA Services 2.1/MS-DOS and ARPA NetWare.

  The HP Network Services 2.1/MS-DOS (D1811B) product allows a PC user to use any of the HP PC Integration products without the need to reboot.

  The HP Network Services 2.1/MS-DOS for NetWare (D1819A), all of the NS services are available to any NetWare Client running NetWare 2.15C or above without having to reboot, allowing users access to a wide variety of services quickly and efficiently. D1819A supports the following networks: StarLAN 10, Token Ring, 10BaseT (Ethertwist) and Ethernet. This product replaces the NS LAN Gateway allowing users to directly connect to host systems.

- Windows 3.1 and HP NewWave 3.0 Support.

  HP Network Services 2.1/MS-DOS and HP Network Services 2.1/MS-DOS for NetWare are supported under Microsoft Windows 3.1 and HP NewWave 3.0.

  This feature allows customers to run HP Network Services using Microsoft Windows 3.1. As a result, users can run more than one service at a time and can use windows applications such as AdvanceLink for Windows.

- 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 (dscopy)

operation 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 3000 computers as if the PC were directly connected to the minicomputer.

  This terminal access uses HP AdvanceLink, AdvanceLink (required) for Windows/NewWave, or a compatible third party product to provide terminal emulation. HP AdvanceLink also provides a simple file transfer feature to the HP 3000.

- NewWave Office Support and Network Interprocess Communication (NetIPC)

  The NetIPC application program interface is fully supported by both HP Network Services 2.1/MS-DOS and HP Network Services 2.1/MS-DOS for NetWare. With this interface, a number of distributed applications (including NewWave Office Applications) can use the processor power of the PC and the HP 3000, HP 9000, or HP 1000.

- Internetting Support.

  HP Network Services 2.1/MS-DOS and HP Network Services 2.1/MS-DOS for NetWare allow 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. PC Clients can operate on both Ethernet and Token Ring-based networks.

- Supports-Industry Standard TCP/IP Transport.

  Standards allow users to interoperate with other systems. Having a widely accepted standard allows users to invest in systems best suited to their needs and protect existing investments.

- Berkeley Sockets Run Time/Development Support.

  Berkeley Sockets run time support together with the HP PC Sockets Developer's Kit 1.0 (D1827A), allows users to develop a program running on their PC that can communicate with a peer process running on another machine on the network. This allows application programmers to develop distributed applications. Sockets is one of the most popular multivendor industry standard application program interfaces (API). A Windows-based interface is provided to allow development of distributed Windows applications.

Many applications have been developed using this interface, including database applications such as Informix, Oracle, RTI, Sybase, etc. Contact your local HP Sales Office for a list of compatible products.

Note: D1827A is orderable by phoning 1-800-848-9283 or 303-353-7650 outside U.S.

Product Requirements

Required Hardware

- A supported PC with 640 Kbytes of memory (plus memory needed for the terminal emulator or application) from the following list:

  - Original HP Vectra (A, A+, A++)
  - HP Vectra 286/12
  - HP Vectra 386/25
  - HP Vectra 486
  - HP Vectra CS
  - HP Vectra ES 12
  - HP Vectra ES 8
  - 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 PC
  - IBM PS/2 (50,50Z,60,70,80)
  - IBM PS/2 (25,30)
  - IBM PS/2 (30/286)
  - IBM XT

- One of the following interface cards to connect to the LAN:

AT Backplane – ThinLAN
- HP 27250A – HP ThinLAN PC Card
- HP 27210A or B – HP ThinLAN Card
- 3Com 3C501 – IE4, Etherlink
- 3Com 3C503 – IE6 ,Etherlink II
- 3Com 3C505 – EtherLink Plus
- Western Digital WD8003E – EtherCard Plus
- Novell® NE 1000 – Note – (For D1819A only)
- Novell NE 2000 – Note – (For D1819A only)

AT Backplane – StarLAN
- Western Digital WD8003S – StarCard Plus

AT Backplane – EtherTwist/StarLAN 10
- HP 27245A – HP EtherTwist PC Link
- HP 27247A – HP EtherTwist PC Link 16
- HP 27236A – StarLAN 10 PC Link
- HP 27240A – StarLAN 10 PC Link II

AT Backplane – Token Ring
- IBM Token Ring Adaptor
- IBM II Token Ring Adaptor II
- IBM 16/4 Token Ring Adaptor 4/16

MCA Backplane – ThinLAN
- 3Com 3C523 – Etherlink/MC
- Western Digital WD8003ET/A – EtherCard Plus
- Novell NE 3200 – Note – (For D1819A only)

MCA Backplane – StarLAN
- Western Digital WD8003S/A – StarCard Plus

MCA Backplane-EtherTwist/ StarLAN 10
- HP 27246A – HP EtherTwist MCA Link
- HP 27241A – StarLAN 10 Micro Channel Link

MCA Backplane – Token Ring
- IBM Token Ring Adaptor/A
- IBM Token Ring Adaptor 4/16A

Note: HP has tested the interface cards listed above. Other Ethernet or Token Ring cards with NDIS drivers may or may not work. HP support is only for the cards listed above.

Required Software

- DOS version 3.1 to 5.X

Compatible Software Versions

- NetWare Version 2.15C or later (for HP Network Services 2.1/MS-DOS for NetWare)
- HP AdvanceLink for Windows/NewWave (Version A.03.00 or greater), HP AdvanceLink for DOS or compatible third party product to provide terminal emulation is required if using the VT function.
- HP LAN Manager client version 1.1 or 1.2
- HP ARPA Services 2.1 or later
- Microsoft LAN Manager Client 2.1
- We recommend that users who have a wish to use HP's PC networking products with Microsoft Windows use the Microsoft Windows 3.00a or 3.1 version.
- MS DOS 3.1 and above

Other Notes Compatible Software Versions

NS 2.1 does not support NFT and VT to a DEC VAX minicomputer (running Network Services for VAX, HP 50950A).

Installation and Support

Installation:

HP Network Services 2.1/MS-DOS 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 BasicLine Software Support – Provides customer with self-support through right-to-use updates and access to 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 proactive 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.

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.

PCLAN (for D1819A only) – 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

D1811B HP Network Services 2.1/MS-DOS. (at least **one** option **must** be ordered)

Options:

001	Software, Manuals and License for User.
002	Right to Copy Software for 1 Additional User.
003	Right to Copy Software for 8 Additional Users.
004	Right to Copy Software for 32 Additional Users
005	Additional User Manual.
006	Upgrade for 1 Additional User.
007	Upgrade Right to Copy Software for 1 Additional User.
008	Upgrade Right to Copy Software for 8 Additional Users.
009	Upgrade Right to Copy Software for 32 Additional Users.
010	Upgrade from HP Network Services 2.0/MS-DOS.
011	Upgrade Right to Copy Software for 128 Additional Users.
012	Upgrade Right to Copy Software for 512 Additional Users.

HP Commercial PC Software Support Services

H2015A+H00 HP Response Line
H2016A+S00 Software Material Update Service

D1819A HP Network Services 2.1/MS-DOS for NetWare (at least one option must be ordered)

Options:

001	Software, Manuals, and License for User.
002	Right to Copy Software for 1 Additional User.
003	Right to Copy Software for 8 Additional Users.
004	Right to Copy Software for 32 Additional Users
005	Additional User Manual.
006	Upgrade for User.
007	Upgrade Right to Copy Software for 1 Additional User.
008	Upgrade Right to Copy Software for 8 Additional Users.
009	Upgrade Right to Copy Software for 32 Additional Users.
011	Upgrade Right to Copy Software for 128 Additional Users.
012	Upgrade Right to Copy Software for 512 Additional Users.

HP Commercial PC Software Support Services

H2015A+H00 HP Response Line
H2016A+S00 Software Material Update Service

Documentation

HP Network Services 2.1/MS-DOS and HP Network Services 2.1/MS-DOS for NetWare include:

D1811-90010 User's Guide-HP Network Services 2.1/MS-DOS
D1811-90011 Installation and Tuning Guide: HP Network Services 2.1/MS-DOS
D1811-90012 Errors and Troubleshooting Guide: HP Network Services 2.1/MS-DOS

Related Products

B1003A HP LAN Manager/X for the HP 9000 Series 300
B1011A HP LAN Manager/X for the HP 9000 Series 800
D1812B HP ARPA Services 2.1/MS-DOS
D1827A opt. 001 HP PC Sockets Developer's Kit 1.0
D1827A opt. 002 HP LAN Manager Developer's Kit for OS/2 and UNIX®
68333F HP AdvanceLink for DOS
D2104B HP AdvanceLink for Windows/HP NewWave
Various HP NewWave Offices

HEWLETT PACKARD

HP NewWave Office – Information Distribution Services for the PC

Technical Data

PC integration with HP NewWave Mail and HP AdvanceMail

PC Information Distribution Services

HP NewWave Office software offers organizations unparalleled flexibility in distributing information. One of the key benefits of HP NewWave Office is its power to integrate PCs into the corporate information distribution network. There are two key elements which make that integration possible – HP NewWave Mail and HP AdvanceMail. These two software products allow dedicated PC users to communicate transparently with any other user either on the internal or external information network.

Choice of PC Client
HP NewWave Office gives you a choice of the type of client you use to integrate your PC users. You have the option of using the easy-to-use, graphical interface of HP NewWave or a standard MS-DOS® interface. Whichever client you choose, users get the same high level of integration to any of the HP NewWave Office servers.

Choice of Server
HP NewWave Office is available for three types of server – an HP 3000 with MPE, an HP 9000 with HP-UX and a 386 or 486 PC server with SCO UNIX®. HP AdvanceMail and HP NewWave Mail will connect to each of these servers and provide PC users with connections to HP's mail servers, HP OpenMail and HP DeskManager, as well as to others servers such as IBM's PROFS and DISOSS, servers using X.400, and the fax and telex networks.

HP NewWave Mail
HP NewWave Mail (version A.03.00) combines the intuitive, easy-to-use NewWave environment with powerful corporate communications capabilities. Wherever NewWave users need to communicate with others on the corporate network, HP NewWave Mail provides a fully integrated, transparent solution.

HP AdvanceMail
HP AdvanceMail (version A.04.0) is the MS-DOS information distribution service of HP NewWave Office for HP-UX and MPE. In addition, HP AdvanceMail now provides PC integration for HP OpenMail for SCO UNIX. HP AdvanceMail is for environments where the full power of NewWave is not required – for example for the sale representative using a portable PC with a standard memory and hardware configuration, HP AdvanceMail offers a simple, cost-effective solution.

HP NewWave Mail

Benefits of HP NewWave Mail

HP NewWave Mail ensures transparent integration of the NewWave workstation with the corporate electronic mail network by connecting either to an HP 3000 or to an HP 9000. Using these powerful servers, HP NewWave Mail users can send any New Wave object from a simple text note to a complex compound document.

The close integration of PC and server gives NewWave users the best of both worlds. They can use the power and ease of the NewWave advanced graphical interface on the PC, combined with communication and distribution capacity of HP's mail servers.

Getting the benefits of HP NewWave

HP NewWave is designed to increase user productivity in the office through a combination of functionality and ease of use. HP NewWave Mail looks and acts the same as other HP NewWave applications, so the user will quickly reap NewWave's productivity benefits when communicating with others.

Task automation

The HP NewWave Agent can record and perform tasks for you at any time. You can use the agent to automate your mailing tasks – for example to send and receive messages at specified times of the day.

NewWave and current wave coexist

For customers who already have HP DeskManager or HP AdvanceMail, adding HP NewWave to your network is simple. HP NewWave Mail, HP DeskManager, HP OpenMail and HP AdvanceMail users can all exchange information and built-in browsers and converters allow them to read, print, and even edit documents received on a terminal or on a PC. You can add NewWave and HP NewWave Mail to your network without sacrificing your existing investment in terminals and PCs.

Quick and easy connections

HP NewWave Mail connects users to the server quickly and easily whatever the connection method. LAN connections are very simple and where serial connections exist, either direct connections or via modem or X.25, HP NewWave Mail's built-in data communications software can handle complex logon procedures without user intervention.

HP NewWave Mail Features

HP NewWave Mail has the full set of mailing functions you expect from a leading supplier of information distribution software. These features include automatic background transfer of messages, full distribution list checking, and new mail notification.

Sending messages

Creating and sending messages is simple. Just dropping an object on the Out Tray creates a message. HP NewWave Mail prompts you for the names and then checks them immediately. You can set urgent priority or make the message private. You can choose to send messages immediately or later. Mail is always transferred in background so you can continue with other tasks.

Receiving messages

Messages arrive automatically in background in the In Tray. From the In Tray, you can read, print, edit, file, reply to, or forward messages. New mail notification informs you of new messages arriving. Objects are automatically converted to the format of choice. Filters route messages to the printer or the In Tray.

Filing

Messages and objects can be filed in folders in the HP NewWave filing cabinet or shared by other users on the network using object storage.

Agent tasks

Task automation will be provided in HP NewWave Mail with the support of keystroke record and playback. Actions performed using the mouse cannot be recorded in HP NewWave Mail.

On-line help

- Context sensitive help
- Help index

Customer support
Customers may purchase the following contractual support for HP NewWave Mail:

HP ResponseLine
H2015A option H00.
Software Material Update
HP2016A option S00.

Product Requirements

PC
HP Vectra, IBM AT, AT/2, Compaq 80286 or 80386 PC, or 100% compatible.

Memory
80286 standard, 80386 enhanced mode 640 Kbyte base and 2 Mbyte extended. (See HP NewWave 3.0 data sheet for full details P/N 5952-1565.)

Software
- MS-DOS 3.2, 3.3, or 4.01
- MS Windows 3.0a
- HP NewWave 3.0

Network
- Serial
  - RS-232
- HP ARPA Services 2.1
- HP Network Services 2.1

HP 3000
- Series 37 through 70, 9xx

Software
- MPE/V/E V Delta 4 or later
- MPE/XL version 1.2 or later
- HP DeskManager B.03.B0 or later

Network
- Serial
  - MPE/V ATP ports
  - MPE/XL DTC ports
- HP NS3000

HP 9000
- Series 320 through 370, 8xx, or 6xx

Software
- HP UX 7.0 or later
- HP OpenMail version A.00.01 or later

Network
- Serial
  - RS-232 serial port
- LAN
  - NS Services/9000
  - ARPA/Berkeley Services

Data communications
- RS-232
- CCITT with HP 2334/5 PAD
- HP 2334/5 multiplexer (other private and public X.25 connections are not supported).
- Hayes modem or compatible (COM3 and COM4 are supported on all external modems and HP internal modems.)

Ordering Information

D2103B HP NewWave Mail for HP DeskManager
D2109B HP NewWave Mail for HP OpenMail

Upgrades
D2103-60000 Single user upgrade
D2103-60001 5¼-inch disks
D2103-60004 Both media
D24338 User license upgrade

HP AdvanceMail

Benefits of HP AdvanceMail
HP AdvanceMail lets you create messages, read incoming messages, and print them without being connected to the server. This means that wherever connections are costly or time-consuming you can be independent of the server for everything, except sending or receiving mail.
HP AdvanceMail can help by providing transfer at preset times so you use mail when it is convenient and least expensive.

Quick and easy connections
HP AdvanceMail is ideal for PC users wherever they are and however they connect. You connect to the server using connection files configured in HP AdvanceMail. You simply choose between LAN or RS-232, modem or X.25 and HP AdvanceMail does the rest.

Protect and enhance your PC investment
You have made significant investment in your PC hardware and software.
HP AdvanceMail helps to protect and enhance that investment. It protects it by supporting most available PC applications. It enhances your investment by letting you integrate your applications into HP AdvanceMail so you can use your own PC word processor to create your mail messages.

Information on demand
The success of any business depends on the right information getting to the right people at the right time.
Important reports can be sent without user intervention. This means vital information gets to its destination quicker.

Your own electronic secretary
Sorting and filing mail is time-consuming. You (or your secretary) must dispose of junk mail, prioritize urgent messages, and file others away.
HP AdvanceMail's filtering facility can automate this process and save you, and your secretary, valuable time.

Commitment to standards
HP AdvanceMail is another example of Hewlett-Packard's commitment to standards in communications.
HP AdvanceMail supports RS-232 and CCITT X.25 communications. It also supports ThinLAN, StarLAN, and StarLAN 10 local area networks which are all based on OSI standards. X.400 messaging is fully supported.

HP AdvanceMail Features

Sending messages
- Create messages in the Out Tray
- Use prepared distribution lists
- Nicknames
- Integrate word processors
- Include unlimited PC files in messages
- Private & Urgent
- Acknowledgements
- X.400 addressing

Receiving messages
- Receive mail in the In Tray
- Forward or reply
- Browse WP documents
- Automatic file conversations
- Filters delete messages or deliver to In Tray, printer, Filing Cabinet, or MS-DOS

Mail transfer
- Transfer messages interactively
- Batch transfer at specified times

Filing
- File messages in filing cabinet
- Retrieve deleted messages from Waste Basket

Connections
- Built-in serial connections
- Multiple choice of connections
- Foreign connections to telex and fax, IBM's PROFS and DISOSS and X.400

Other Features
- Support for HP Mouse, Microsoft® or Microsoft-compatible two-button mouse
- SENDSPEC/RECVSPEC automate transmission of files from applications

Customer support
Customers may purchase the following contractual support for HP AdvanceMail.

HP ResponseLine
H2015A option H00
Software Material Update
H2106A option S00

Customer Education

P/N H2127A
HP AdvanceMail user training. Customers can attend this one-day basic training course.

P/N H2126A
HP AdvanceMail trainer's pack. Customers can purchase this pack for use by their own training staff.

Contact your HP Education Center or Sales Representative for details.

Product Requirements

PC
- HP Vectra, IBM XT, AT, AT/2

Memory
- 640 Kbyte recommended
- Free PC memory required
  - HP 3000 Serial 410 Kbyte
  - HP 3000 LAN 380 Kbyte
  - HP 9000 & SCO UNIX Serial 450 Kbyte
  - HP 9000 & SCO UNIX LAN 410-435 Kbyte

Software
- MS-DOS 3.1 or later
- MS Windows 2.11 or 3.0 (optional)

Network
- Serial
  - RS-232
- HP OfficeShare
  - ThinLAN or StarLAN interface card
  - HP OfficeShare B.00.00
- ARPA/Berkeley Sockets
  - ARPA Services 2.0 or
  - FTP PC/TCP Network software version 2.04 or Excelan LAN WorkPlace version 3.3 or later
- Named Pipes
  - HP LAN Manager for DOS (included with server software)

HP 3000
- Series 37 through 70, 9xx

Software
- MPE/V/E V Delta 2 or later
- MPE/XL version 1.0 or later
- HP DeskManager B.02.01

Network
- Serial
  - MPE/V ATP ports
  - MPE/XL DTC ports
- LAN
  - LAN IEEE 802.3
  - HP OfficeShare LAN/3000 interface card

HP 9000
- Series 320 to 370, 8xx or 6xx

Software
- HP UX 7.0 or later
- HP OpenMail version A.00.01 or later
- A.00.01 required for LAN Manager connections

Network
- Serial
  - RS-232 port
- LAN
  - ARPA Services/9000 or HP LAN Manager/X for HP 9000 version 1.0 or later or NS Services/9000

SCO UNIX Software
- SCO UNIX System V/386 version 3.2.1 or later
- HP OpenMail for SCO UNIX System V/386

Network
- Serial not available
- ARPA/Berkeley Sockets
  - HP LAN Manager/X for 386/486 or SCO/Lachman TCP/IP
- Named Pipes
  - HP LAN Manager/X for 386/486

Data communications
- RS-232
- CCITT with HP 2334/5 PAD
- HP 2334/5 multiplexer (other private and public X.25 connections are not supported.)
- Hayes modem or compatible (COM3 and COM4 are supported on all external modems and HP internal modems.)

Ordering Information

D21018 HP AdvanceMail

Options
AAA 5¼-inch option
AA8 3½-inch option
D2111A User license
B1613A 16-User license for HP OpenMail/386 only

Upgrades
D2101-60000 3½-inch disks
D2101-60001 5¼-inch disks
D2341 User license upgrade

Customers may upgrade from any previous version of HP AdvanceMail by returning master disks to the Software Distribution Center.

HEWLETT PACKARD

HP 10:10 LAN Bridge MB

Technical Data

Product Number
28673A

The HP 10:10 LAN Bridge MB provides interconnectivity and extendability between two local area networks (LANs). Connection of multiple isolated LANs into a single network can increase the productivity of a corporation's information system. To conserve network capacity (bandwidth), the HP bridge provides address filtering capabilities to isolate traffic and add security between work groups on two separate LANs. And because these bridges transfer data at "media speed," they can be used to divide a large LAN into logical subnets without being a "bottleneck" in the network. By segmenting a larger LAN into smaller work group clusters, a network administrator can more easily manage and troubleshoot the network.

Coupled with HP OpenView Resource Manager, the HP 10:10 LAN Bridge MB is capable of providing instrumentation-like functions across your network. This will eliminate the need for a LAN analyzer per segment. HP EASE (Embedded Advanced Sampling Environment) is a breakthrough technology that allows HP EtherTwist devices to do protocol analysis. This will identify top talkers, heavy users, errors, and communication pairs.

HP bridges use the spanning tree protocol developed by the IEEE 802.1 committee, which permits IEEE 802.3/Ethernet LANs to be bridged in an arbitrary topology that includes alternative or redundant paths. In the event of a primary link failure, a backup link would take over thereby ensuring continued data transmission between networks.

HP bridges are "plug and play" devices in any multivendor 802.3/Ethernet environment because they are protocol independent. The bridge sends and receives packets at the Media Access Control sublayer of the ISO Data Link layer. From the perspective of the end nodes that are exchanging data, the bridge is invisible to higher-level protocols. The bridge listens to all traffic between the two interconnected LAN segments and inspects the source and destination addresses to decide whether the packet must be forwarded.

Features and Benefits

- The HP 10:10 LAN Bridge MB can filter and forward data packets as fast as the network can operate; this is called "media-speed" operation. Ethernet/IEEE 802.3 is a 10-Mbit/s LAN which is equivalent to 14,880 64-byte packets per second. To avoid a bottleneck in the LAN, a bridge needs to filter packets from both 10-Mbit/s LANs (29,760 packets/second) and forward up to 10-Mbit/s (14,880 packets/second) between the two segments.
- HP bridges conserve network capacity (bandwidth) by isolating local traffic and only forwarding packets intended for the distant nodes.

- When maximum cable lengths are reached, HP bridges allow you to extend a subnet into a larger network.
- HP bridges are excellent devices for connecting LANs of different media types. For example, the corporate backbone may use fiber-optic or thick coaxial cable, and the smaller workstation subnet may use thin, coax, or twisted-pair cable. The HP bridge can connect these different media through the AUI and ThinLAN ports.
- HP bridges are easy-to-install, "plug and play" devices that also automatically learn the network topology. Additionally, bridges come preconfigured with a default configuration that will work optimally in most installations. Simply install it, attach it to the network, plug it in, and the bridging function starts automatically.
- Unlike repeaters, bridges do not propagate corrupt packets from one network to another. End-to-end data integrity is maintained.
- They work well in multivendor environments since they operate at the MAC sublayer of the ISO OSI model and are invisible to higher-level protocols.
- They automatically learn node addresses by examining network traffic.
- Use of the spanning tree algorithm developed by the IEEE 802.1 committee will support backup links between LANs in case of link failure.
- HP bridges can be mounted in a standard 19-inch equipment rack or on a wall using the detachable brackets that are included with every bridge.
- There are LED displays on the front and back of every HP bridge for easy recognition of the bridge's operating condition. The LEDs will indicate power, activity, fault, self-test, transmit, receive, and network and bridge failure.
- An easy-to-use console interface is provided for network administrators to gain access to the bridges for configuration, diagnostics, and troubleshooting, even when the network link is down. The RS-232 console port is used for terminal or modem connection.

Compatibility

The new HP 10:10 LAN Bridge MB can coexist in the same network with the existing HP 28647A/B and HP 28648A/B bridges. The IEEE spanning tree algorithm will work in multivendor network. However, in a redundant or parallel configuration, the same version of HP bridges must be used.

Console Interface

The HP bridges include an RS-232 console port for monitoring and control functions within the bridge. This easy-to-use interface allows network administrators to check bridge status, spanning tree configuration, network traffic statistics, and collisions; and to perform basic diagnostics. The console interface uses a common command set, similar to that of the HP EtherTwist Hub. New product updates to the bridge firmware can be downloaded through the console port for low-cost updates. HP bridges can be accessed using a terminal or terminal emulator connected to the console port directly or via modem.

Network Management

HP OpenView Interconnect Manager/DOS provides the ability to centrally monitor and control the HP 10:10 LAN Bridge MB and the HP Remote Bridge RB in an extended IEEE 802.3 or Ethernet LAN environment. HP OpenView Interconnect Manager/DOS provides facilities to monitor network traffic conditions, help identify and diagnose network problems, enhance network security, and increase network reliability by controlling bridges serving as redundant data paths.

Bridges are frequently used to interconnect and extend local area networks. They are in an excellent position to provide information about the network and its operation.
HP OpenView Interconnect Manager/DOS, as part of HP's comprehensive family of network management tools, provides a powerful and easy-to-use facility for HP bridge monitoring and control.

Environmental Characteristics

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

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

Physical Characteristics

Dimensions: 42.54 cm by 23.5 cm by 4.34 cm (16.75 in by 9.25 in by 1.71 in)

Weight: 2.72 kg (6.0 lbs)

Electrical Characteristics

ac Voltage	100-120 V	220-240 V
Current	0.5 A max	0.25 A max
Frequency	50/60 Hz	50/60 Hz

Ordering Information

The HP 28673A includes: Bridge assembly, power cord, rack/wall mount kit, and installation manual.

The HP Bridge Troubleshooting Kit (HP 28689B) includes the following loopback connectors: (2) AUI, BNC, V.35, and RS-232/DB-25.

Warranty

HP 28673A 10:10 LAN Bridge MB is warranted for one year against defects. Check with your local Hewlett-Packard Sales Office or authorized HP LAN Dealer for more information.

HEWLETT PACKARD

HP 10:10 LAN Bridge LB

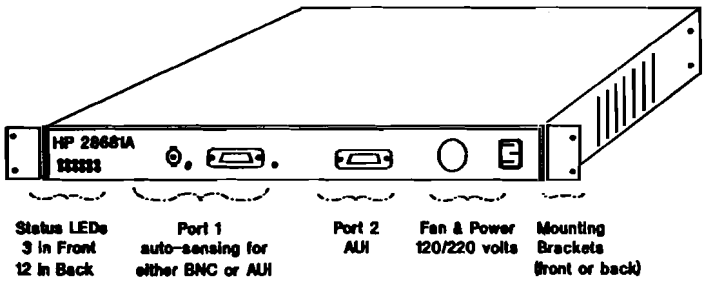
Technical Data

Product Number
28681A

The HP 10:10 LAN Bridge LB is a low-cost LAN extender for any Ethernet/IEEE 802.3 network. For nearly the same price of a repeater, use the HP 10:10 LAN Bridge LB and get the additional benefits of a high-performance, filtering bridge. By connecting multiple local networks into a single integrated communications system, the HP Bridge will improve the performance of a LAN by reducing traffic. Since the HP bridges are protocol independent, they can be used in conjunction with any other vendor's Ethernet/IEEE 802.3 devices.

Use the HP 10:10 LAN Bridge LB for:

- Isolating local traffic by filtering on MAC-addresses
- Reducing network problems by not forwarding bad packets
- Extending a LAN beyond the maximum cable distances
- Connecting different cable medias (coaxial, fiber-optic, and twisted-pair)
- Reducing the repeater "hopcount" and staying within budget
- Accessing Subnet without burdening the network server



Features and Benefits

The HP 10:10 LAN Bridge LB is easy to install by simply connecting to the network and a power source. The bridge is a "plug-n-play" device that is self-configuring.

The HP 10:10 LAN Bridge LB can filter and forward data packets close to the maximum speed at which the network can operate, and is called "near media-speed." Ethernet/IEEE 802.3 is a 10 Mbit/s LAN, which is equivalent to 14,880 64-byte packets per second. In order to avoid a bottleneck in the LAN, a bridge needs to filter packets from both LANs and forward all traffic intended for the segment without delay. Actual LANs will not operate at the theoretical maximum, but it is common to have traffic bursts at 85 percent of bandwidth. This HP bridge can filter and forward in excess of these bursts.

Unlike a repeater, the HP 10:10 LAN Bridge LB is a "MAC-Layer" device that saves network capacity by isolating local traffic and only forwarding packets intended for the distant nodes. The HP bridge automatically learns node addresses by examining network traffic. These MAC-addresses are stored for a period of 300 seconds (the default) in a table that is used for forwarding decisions. The table can hold 256 addresses, which is large enough for networks with more than 256 stations. A node address with low activity will eventually time-out, thus making room for the more active stations. Since only a finite number of stations can participate on the LAN due to the bandwidth available, it is not necessary to have excessively large table sizes.

When maximum cable lengths are reached, bridges allow you to extend a subnet into a larger network. Bridges are excellent devices for connecting LANs of different media type. For example, the corporate backbone may use fiber-optic or thick coax, and the smaller workstation subnet may use thin coax or twisted-pair. The HP bridge can connect these different media through the AUI and ThinLAN port.

End-to-end data integrity is maintained by the bridge because they do not propagate corrupt packets from one network to another. Repeaters will pass any packet through, while the bridge will perform a check (CRC/FCS) of the packet to determine the packet's integrity.

Multivendor environments are common. Since the HP Bridge operates at the MAC sublayer of the IEEE ISO model, it is transparent to higher-level protocols and can be used with any other vendor's Ethernet/802.3 products.

No other vendor offers as many different mounting configurations as the HP 10:10 LAN Bridge LB. Using the detachable brackets that are included, you can mount the HP bridge in a standard 19-inch teleco rack (four different ways), on a wall (four different ways), or on a shelf/table with the rubber mounting pads that are also included. Since the bridge is only 1¾ inch in height, it takes up very little space as well.

There are 15 status LED displays on the bridge for easy recognition of the operating condition. Three of the LEDs are located on the front of the bridge to indicate line-on (power), activity, and fault. On the back panel are 12 LEDs: power, self-test, fault, and two LEDs (port 1 and 2) for network failure, transmit, receive, transmission aborted, ThinLAN enabled, and AUI enabled.

The IEEE Spanning Tree protocol is not supported on the HP "LB" version bridge, but it can be used in a network that has other bridges using spanning tree in a redundant configuration. Network management and a console port are also not included; for these features order the HP 28673A 10:10 LAN Bridge MB.

Environmental Characteristics

Operating Temperature: 0°C to 55°C (32°F to 131°F)
Relative Humidity: 5% to 95% at 40°C (104°F) noncondensing

Physical Characteristics

Dimensions: 42.5 cm by 23.5 cm by 4.3 cm (16.8 in by 9.3 in by 1.7 in)
Weight: 2.72 kg (6.0 lb)

Electrical Characteristics

ac Voltage	100-120 V	220-240 V
Current	0.5 A max	0.25 A max
Frequency	50/60 Hz	50/60 Hz

Regulatory Classifications:
(Emissions)
FCC part 15 Class A
CISPR-22 Class A
EN 55022 Class A
VCCI Class 1
FT 1046/84 (VDE-B)

Ordering Information

The HP 28681A includes:
Bridge assembly, power cord, rack/wall mount kit, and installation manual.

The HP Bridge Troubleshooting Kit (HP 28689B) includes the following loopback connectors: (2) AUI, BNC, V.35, and RS-232/DB-25

Warranty

HP 28681A 10:10 LAN Bridge LB is warranted for one year against defects.

HEWLETT PACKARD

HP EtherTwist Hub Plus and Hub Plus/48

Technical Data

Part Numbers
28688B and 28699A

The HP EtherTwist hubs are Type 10BASE-T multiport repeaters for use in twisted-pair LANs. These hubs deliver industry-leading price/performance in both large and small networks. They offer network management, and they support growing topologies with flexible backbone connections.

The HP EtherTwist Hub Plus and Hub Plus/48 are designed for networks that require LAN-based network management. They provide 12 and 48 twisted-pair ports, respectively.

The EtherTwist hubs are part of the HP EtherTwist family of network components. These LAN components – hubs, bridges, adapter cards, and transceivers – provide your network with high performance in a low-cost hardware solution. Easily racked together and connected with a thin coaxial cable between their integrated BNC ports, the hubs, bridges, and routers merge with each another along a virtual extended backplane. This gives you full cardcage-like functionality without the expense and limitations of a cardcage design. Using only a few different hardware components, each designed for optimum price/performance, you can build a network that ranges from a few nodes to thousands.

Features

- Provides 12 twisted-pair ports (Hub Plus) or 48 ports (Hub Plus/48).
- Complies with IEEE 802.3 Type 10BASE-T standard.
- Supports 100 meters of cable to each PC adapter card or twisted-pair transceiver. Greater distances are possible with low-loss cable.
- Allows choice of 50-pin or 8-pin connections. You can connect a 25-pair bundle (50-pin Telco connector) or individual 4-pair cables with modular RJ-45 plugs (using an optional 12-port modular adapter, HP 28638A).
- Supports both IEEE 802.3 and Ethernet 1.0 and 2.0 standards.
- Includes BNC and AUI ports for simultaneous connection to both thin coaxial cable and (via transceiver) thick coaxial, fiber-optic, or twisted-pair cable.
- Isolates network faults by automatically segmenting ports disturbing the network.
- Includes LEDs for a quick visual check of individual link status, port segmentation, collisions, activity, and power.
- Provides console (RS-232) port for out-of-band management, which allows users to read network statistics and configure ports in the hub. This port connects to a terminal or terminal emulator either directly or via modem.
- Is transparent to network operating system software.
- Supports fully existing HP StarLAN 10 networks.
- Supports SNMP/IP-based network management.
- Includes link test diagnostics to perform loopback test on any path through the network.
- Mounts on wall (flat or on end) or mount in racks with cables facing front or back.

- Supports a redundant link so one port can back up another for intra link connections

Flexible Cabling

The EtherTwist hubs provide flexible connections for both subnets and backbones. The twisted-pair ports let you take advantage of twisted-pair LAN cabling, with its ease of installation and administration. Twisted-pair connections are made through a 50-pin Telco connector on the back of the hub (4 on a Hub Plus/48). This allows you to make a single connection using a 25-pair bundle (typically running to a cross-connect block). Or you can attach a 12-port modular adapter (HP 28638A purchased separately), which breaks out the 50-pin connector to 12 modular (RJ-45) jacks; these provide the connections for 4-pair cables that serve individual stations on the network.

You can make backbone connections to the hub using the integrated ThinLAN (BNC) port for thin coax, and the AUI port for thick coax or optical fiber. Both the ThinLAN and AUI ports can be connected at the same time. You can connect multiple hubs to a thin coaxial "backplane," which in turn can be connected to another backbone via the AUI port.

In addition, you can cascade hubs with twisted-pair cabling, using either a direct connection between twisted-pair ports on each hub, or using a twisted-pair to AUI connection through a twisted-pair transceiver (HP 28685B).

Compatibility to Meet Your Changing Needs

HP's EtherTwist hubs are fully compliant with the 10BASE-T standard. HP has done extensive compatibility testing with other 10BASE-T equipment on the market today, giving you the confidence you need to build a multivendor network that best fits your business requirements. In addition, the HP EtherTwist hubs are completely backward-compatible with HP StarLAN 10 adapter cards, transceivers, and hubs through configuration of the link integrity signal (link beat).

Maximum Reliability Through Fault Isolation

An HP EtherTwist hub automatically identifies any segment disturbing the network and disconnects it from the rest of the network (autosegmentation), ensuring network integrity. Once the problem is corrected, the hub automatically reconnects the segment.

Control of Your Network with Hub Management

The HP EtherTwist Hub Plus and Hub Plus/48 support SNMP/IP and can communicate over the LAN with HP OpenView Hub Manager for DOS (HP 28686D) and HP OpenView Interconnect Manager for HP-UX. From a single network management station, a network administrator can monitor and control any Hub Plus on the network. Hub Manager continuously updates the OpenView Windows graphical network map to display the current state of the network, and notifies the network administrator of network events. Configuring, monitoring, and controlling the network is made easy with the HP OpenView device managers and the HP EtherTwist Hub Pluses.

Coupled with HP OpenView Resource Manager, the HP Hub Pluses are capable of providing instrumentation-like functions across your network. This will eliminate the need for a LAN analyzer per segment. HP EASE (Embedded Advanced Sampling Environment) is a breakthrough technology that allows HP EtherTwist devices to do protocol analysis. This will identify top talkers, heavy users, errors, and communication pairs.

HP WireTest and Cabling

HP EtherTwist local area networks use twisted-pair cabling (ordinary telephone wire). Two pairs of 22, 24, or 26 AWG unshielded twisted-pair wire are required for each connection. Shielded twisted-pair wire can also be used.

The HP WireTest Service is available to qualify your existing telephone cabling for use in a Type 10BASE-T network. Contact your local HP Sales and Support Office or your HP Authorized LAN Dealer for information and availability of this service. If you have a large network and wish to do your own testing, you can purchase the HP 28687A Wire Test Instrument.

Specifications

Environmental Characteristics

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

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

Physical and Electrical Characteristics:
HP EtherTwist Hub Plus

Dimensions: 42.55 cm by 23.50 cm by 4.37 cm (16.75 in by 9.25 in by 1.72 in)

Weight: 2.72 kg (6.0 lb)

Power Consumption:

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

HP EtherTwist Hub Plus/48

Dimensions: 42.55 cm by 23.50 cm by 8.87 cm (16.75 in by 9.25 in by 3.49 in)

Weight: 3.77 kg (8.3 lb)

Power Consumption:

ac Voltage:	100-120	200-240 V
Current:	0.6 A max	0.5 A max
Frequency:	50/60 Hz	50/60 Hz

Standards

Emissions:
VDE 0871 Level A
VCCI Class 1
FCC Part 15 Class A

Safety:
UL 1950
IEC 950/EN60950
CSA 220
CSA 950

Radiated Emission Immunity: IEC 801-2.3.4

Warranty

The HP 28688B and HP 28699A EtherTwist Hub Pluses are warranted for one year against defects. Check with your local Hewlett-Packard Sales and Support Office or your authorized HP LAN Dealer for more information.

Ordering Information

HP 28688B EtherTwist Hub Plus
HP 28699A EtherTwist Hub Plus/48
HP 28638A Modular Adapter
HP 28689B Troubleshooting Kit

HEWLETT PACKARD

HP EtherTwist Hub/8

Technical Data

Product Number
28691A

The HP 28691A EtherTwist Hub/8 is a 10Base-T multiport repeater that includes eight twisted-pair ports and one thin coaxial (BNC) port. The Hub/8 repeats and retimes signals, handles collision management, and monitors individual link status. In addition, the hub automatically segments individual ports disturbing the network and reconnects them when the problems are cleared.

The Hub/8 can be used in small networks with just Hub/8s. In addition, it may be cascaded from other hubs such as the HP EtherTwist Hub Plus to add more nodes in an office.

Highlights

Low-Cost LAN Infrastructure: The HP EtherTwist Hub/8 gives you a low connection cost that used to be possible only with ArcNet and thin coax, while delivering the speed and reliability of 10Base-T (Ethernet on twisted-pair cabling).

Simple Plug-and-Play Operation: The Hub/8 is designed to simplify the installation and startup of your LAN. Twisted-pair cable plugs directly into the RJ-45 ports, and coaxial backbone cable can be connected to the integrated BNC port. No configuration or special setup is required, which allows you to start up your LAN in minutes.

Topology Flexibility: Hub/8s can stand alone to support up to eight users or be combined to support larger networks in various configurations. Hubs can be connected using the BNC port with thin coaxial backbone cable, or cascaded with twisted-pair cable. Either way gives you growth paths for the future.

Features

- Provides eight twisted-pair ports using 8-pin modular (RJ-45) plugs and one thin coaxial (BNC) port.
- Includes self-test for fault isolation
- Supports up to 100 meters of cable (typically) between hub and twisted-pair transceiver or PC adapter card; greater distances are possible with low-loss cable.
- Includes LEDs for Port Status, Collisions, Activity, Fault, and Power, providing quick hub status checks and troubleshooting.
- Can be wall mounted or stacked on a table top.
- Operates transparently to network operating system software.
- Supports both IEEE 802.3 and Ethernet.
- Provides auto-segmentation of ports for fault isolation and improved network integrity.
- Detects wiring polarity faults on the twisted-pair cable and automatically switches polarity to compensate for the wiring error.
- Supports multi-hub configurations using either a thin coaxial backbone between BNC ports or twisted-pair cascading between twisted-pair ports.

- Supports voice and data signals in the same cable bundle.
- Installs in minutes.

Flexible Topology

The EtherTwist Hub/8s can be connected to one another by cascading with twisted-pair cables (crossover required) or daisy-chained on thin coaxial cable. The Hub/8 can be added easily to an existing ThinLAN network by plugging on to BNC port. This allows you to grow your network with a minimum of effort.

Compatibility to Meet Your Changing Needs

HP's EtherTwist hubs are fully compliant with the 10Base-T standard. Hewlett-Packard has done extensive compatibility testing with other 10Base-T equipment on the market today, giving you the confidence you need to build a multivendor network that best fits your business requirements.

Maximum Reliability Through Fault Isolation

An HP EtherTwist hub automatically identifies any segment disturbing the network and disconnects it from the rest of the network (autosegmentation), ensuring network integrity. Once the problem is corrected, the hub automatically reconnects the segment.

HP WireTest and Cabling

HP EtherTwist LANs use twisted-pair cabling (ordinary telephone wire). Two pairs of 22, 24, or 26 AWG unshielded twisted-pair wire are required for each connection. Shielded twisted-pair wire can also be used.

The HP WireTest Service is available to qualify your existing telephone cabling for use in a Type 10Base-T network. Contact your local HP Sales and Support Office or your HP Authorized LAN Dealer for information and availability of this service. If you have a large network and wish to do your own testing, you can purchase the HP 28687A Wire Test Instrument.

Specifications

Environmental Characteristics

Operating Temperature:
5°C to 40°C (41°F to 104°F)

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

Physical and Electrical 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 lb)

Power Consumption:

AC Voltage:	100-120 V	200-240 V
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 between 90 and 240 volts.

Standards
Communications:
IEEE 802.3 Type 10Base-T
IEEE 802.3 Type 10Base2

Safety:
UL 1950
CSA 220
CSA 950
Verified to IEC 950 / EN 60950
Emissions:
FCC Part 15 Class A
CISPR-22 Class A / EN 55022
VCCI Class 1
Immunity:
ESD:
IEC 801-2 Level 3 (10 kV)
EN 55101-2
Radiated Emissions:
IEC 801-3 Level 2 (3 V/m)
EN 55101-3

Warranty

The HP 28691A EtherTwist Hub/8 is warranted for two years against defects.

Ordering Information

HP 28691A EtherTwist Hub/8 includes hub, wall mount kit, "T" connector, and manual.

HEWLETT PACKARD

HP EtherTwist Transceiver Family

Technical Data

Product Numbers
28685B, 28683A, and 28641B

The HP family of transceivers provides quick and easy connection between your LAN cabling and the attachment unit interface (AUI) port of your system or network device. These transceivers allow you to connect your AUI device to twisted-pair, fiber-optic, or thin coaxial LAN cable. They send and receive data, detect collisions on the network, and protect the network's reliability by monitoring malfunctions between the AUI and the transceiver. For maximum flexibility, the transceivers all support both IEEE 802.3 and Ethernet protocols. LEDs provide a quick visual assessment of the status of your network.

Use the EtherTwist transceiver to connect your AUI device to Type 10BASE-T twisted-pair LAN cabling. Use the fiber-optic transceiver to connect your AUI device to fiber-optic LAN cabling. Use the ThinLAN transceiver to connect your AUI device to thin coaxial LAN cabling.

These transceivers are part of the HP EtherTwist family of network components. These LAN components – adapter cards, transceivers, hubs, and bridges – work together to provide a high-performance, low-cost hardware foundation for your network.

Features

- Provides an AUI connector for attachment to an AUI device. The transceiver attaches to the device's AUI port directly or via an AUI cable.
- Supports both IEEE 802.3 and Ethernet Version 1.0 and 2.0 devices.
- Provides a compact, space-saving design.
- Allows quick and easy installation by the user.

Features of Individual Transceivers

HP 28685B EtherTwist Transceiver

- Provides compatibility with IEEE 802.3 Type 10BASE-T networks as well as with HP StarLAN 10 networks.
- Connects to twisted-pair cable via 8-pin modular (RJ-45) jack.
- Supports 22, 24, or 26 AWG unshielded twisted-pair cable. Shielded cable can also be used.
- Supports 100 meters of twisted-pair cable to any AUI-compatible device. Uses low-loss cable and/or connects to another HP 28685B Transceiver with the long-cable switch on, which enables cabling distances of over 100 meters.
- Provides user-selectable switches for link beat and SQE test, loopback test, and long cable functions.
- Provides six LEDs for quick indication of power, collision detection, polarity, transmission activity, receive activity, and link status.

HP 28683A Fiber-Optic Transceiver

- Provides compatibility with IEEE 802.3 FOIRL standard.
- Connects to fiber-optic cable via two ST connectors (Tx and Rx).
- Supports both 62.5/125-micrometer and 50/125-micrometer fiber-optic cable.
- Supports up to 2 km of fiber-optic cable distance (with less than or equal to 9 dB cable attenuation).
- Can be used in both point-to-point configurations and in star configurations with the HP 28682A Fiber-Optic Hub Plus.
- 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.

HP 28641B ThinLAN Transceiver

- Provides compatibility with IEEE 802.3 Type 10BASE2 networks.
- Connects to thin coaxial cable via ThinLAN (BNC) port.
- Provides user-selectable SQE test switch.
- Provides LED power indicator for quick notification that transceiver is functioning.

Cabling Versatility

With the HP transceivers, you can easily connect devices that have AUI ports to twisted-pair, fiber-optic, or thin coaxial LAN cable. This adds versatility to your existing AUI devices. For instance, you can use an EtherTwist transceiver to connect the AUI port of a workstation's Ethernet card to a twisted-pair network. You can use a ThinLAN transceiver to connect a thin coaxial LAN cable to the AUI port of an HP 10:10 LAN Bridge. Or you can connect a fiber-optic transceiver to the AUI port of an HP Fiber-Optic Hub Plus to give the hub an additional fiber-optic port.

Compact Size

The HP transceivers are about the size of a one inch stack of business cards. This compact design allows you to use these transceivers in places where larger, bulkier transceivers could never fit. For instance, you can connect a transceiver directly to the AUI port on a system's LAN adapter card or to the AUI port on an EtherTwist hub. This not only saves you money on cables, but it also eliminates an additional source of potential failure in your cabling scheme. But if you need the extra distance, the HP transceivers can also be connected using up to 50 meters of AUI cable.

Specifications

Hardware Compatibility

The HP 28685B EtherTwist Transceiver, the HP 28683A Fiber-Optic Transceiver, and the HP 28641B ThinLAN Transceiver are each designed to provide an AUI connection for LAN devices that are compatible with the IEEE 802.3 or Ethernet Version 1.0 or 2.0 standards.

Software Compatibility

The HP transceivers are transparent to network operating systems.

Standard Adherence

IEEE 802.3 Type 10Base-T,
IEEE 802.3 FOIRL,
IEEE 802.3 Type 10Base2

VDE level B, VCCI Class 2, FTZ 1046/84, FCC part 15 Class A , CISPR-22 level B

UL 1950, IEC 950/EN60950, CSA 220, CSA 950

Warranty

The HP 28685B EtherTwist Transceiver, the HP 28683A Fiber-Optic Transceiver, and the HP 28641B ThinLAN Transceiver are warranted for one year against defects. Check with your local HP Sales and Support Office or your authorized HP LAN Dealer for more information.

Ordering Information

HP 28685A EtherTwist Transceiver

HP 28683A Fiber-Optic Transceiver

HP 28641B ThinLAN Transceiver

Characteristics

	HP 28685B	HP 28683A	HP 28641B
Environmental:			
Operating Temperature	0°C to +55°C (32°F to +131°F)		
Relative Humidity	5% to 95% at 40°C (104°F) noncondensing		
Electrical:			
Voltage Requirements	9.0–15.75 V	10.5–15.75 V	10.2–15.75 V
Power Consumption	1.0 W typical 2.6 W maximum	1.8 W typical 2.4 W maximum	2.0 W typical 2.6 W maximum
Physical:			
Connectors	– Standard IEEE 802.3 AUI 15–pin – Modular 8–pin (Tx/Rx)	– Standard IEEE 802.3 AUI 15–pin – ST fiber–optic	– Standard IEEE 802.3 AUI 15–pin – BNC
Switches Enable/Disable	– SQE Test – Link Beat – Loopback Test	– SQE Test – Loopback Test	– SQE Test
LEDs	Pwr, Tx, Rx Act, Polarity, Link Beat	Pwr, Light Status, Collision	Power
Dimensions	6.85 cm by 4.34 cm by 2.41 cm (2.70 in by 1.71 in by 0.95 in)	9.52 cm by 4.34 cm by 2.41 cm (3.75 in by 1.71 in by 0.95 in)	
Weight	57 grams (2.0 oz)	75 grams (2.6 oz)	85 grams (3.0 oz)

Optical Characteristics for HP 28683A Fiber-Optic Transceiver

	62.5/125 μm fiber	50/125 μm fiber
Optical Receiver	–30 dBm typical –27 dBm minimum	–30 dBm typical –27 dBm minimum
Optical Transmitter	–12 dBm typical –17 dBm minimum	–12 dBm typical –17 dBm minimum
Optical Budget	10 dB	6 dB
Wavelength	820 nm	820 nm

HEWLETT PACKARD

HP ThinLAN Hub Plus

Technical Data

Part Number 28692A

The HP 28692A ThinLAN Hub Plus is a 10-Mbit/s multiport repeater used to interconnect personal computers and other network devices over thin coaxial cable local area networks (thinLANs) that comply with the IEEE 802.3 Type 10Base2 standard. The HP ThinLAN Hub Plus repeats data received from an attached LAN segment to all other segments attached to the other hub ports. The HP ThinLAN Hub Plus extends your network by connecting thinLAN segments in a star topology. Attached to each thinLAN segment can be hubs, bridges, and routers, or PCs and computers.

Coupled with HP OpenView Resource Manager, ThinLAN Hub Pluses are capable of providing instrumentation-like functions across your network. This will eliminate the need for a LAN analyzer per segment. HP EASE (Embedded Advanced Sampling Environment) is a breakthrough technology that allows HP EtherTwist devices to do protocol analyses. This will identify top talkers, heavy users, errors, and communication pairs.

Features

- Provides nine thinLAN coaxial ports using BNC connectors and one AUI port. The AUI port allows simultaneous connection to thin or thick coaxial, fiber-optic, or twisted-pair cable via a transceiver.
- Is compatible with the IEEE 802.3 Type 10Base2 standard.
- Supports 10-Mbit/s link speed.
- Supports both IEEE 802.3 and Ethernet.
- Provides cable fault detection.
- Isolates network faults by automatically segmenting ports disturbing the network.
- Includes LEDs for a quick visual check of port status, collisions, activity, and power.
- Provides console (RS-232) port, which allows users to read network statistics and configure ports in the hub. This port connects to a terminal or terminal emulator either directly or via a modem.
- Includes diagnostics for checking port functionality and loopback test for troubleshooting cable problems.
- Is transparent to network operating system software.
- Supports SNMP/IP- and IPX-based network management. Specifically, the hub can be managed from a central network management station using HP OpenView Hub Manager (HP 28686D) or HP OpenView Interconnect Manager/DOS (HP 27256D).
- Mounts in a standard 19-inch rack with cables facing front or back, on a wall (flat or on end), or on any horizontal surface like a shelf or table. Since the hub is only 3½ inches high (two rack spaces), it takes up very little space in any mounting configuration.

Functional Description

The HP ThinLAN Hub Plus is a multiport repeater. Data signals that come into the hub from any of its ports are automatically regenerated and transmitted to all the other hub ports. The hub regenerates the data without interpreting the contents, so it can be used in either IEEE 802.3 or Ethernet networks and with any upper-level protocol.

The hub also performs collision detection. A collision occurs when two or more network devices try to transmit at the same time. When the hub detects this, it stops repeating either of the transmissions and starts transmitting a jamming signal. The jamming signal tells the transmitting devices that a collision has occurred. The colliding devices then stop transmitting for a random amount of time before attempting to retransmit the data. Once the collision condition is removed, the hub stops transmitting the jamming signal, and normal operation is restored.

The HP ThinLAN Hub Plus will automatically disable (autosegment) a port if the port experiences excessive collisions (greater than 30 consecutive collisions). The port will automatically return to operation if the excessive collision condition goes away.

Functional Specifications

Environmental Characteristics

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

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

Physical and Electrical 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 lb)

Power Consumption:

ac Voltage:	100-120 V	200-240 V
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 between 90 and 240 volts.

Standards

Communications:
IEEE 802.3 Type 10Base2

Safety:
UL 1950
CSA 950
Verified to IEC 950/EN 60950

Emissions:
FCC Part 15 Class A
CISPR-22 Class B
EN 55022 Class B
VCCI Class 2

Immunity:
ESD:
IEC 801-2 Level 3 (10 kV)
EN 55101-2
Radiated Emissions:
IEC 801-3 Level 2 (3 V/m)
EN 55101-3

Ordering Information

HP 28692A ThinLAN Hub Plus

Warranty

The HP 28692A ThinLAN Hub Plus is warranted for one year against defects.

HEWLETT PACKARD

HP Fiber-Optic Hub Plus

Technical Data

Product Number
28682A

The HP Fiber-Optic Hub Plus is a multiport, fiber-optic repeater for use in Ethernet and IEEE 802.3 local area networks. It is a "plug and play" 8-port hub that gives you a fully manageable, scalable, and flexible networking solution for 10-Mbit/s fiber-optic connections. The HP Fiber-Optic Hub Plus conforms to the IEEE 802.3 FOIRL standard for fiber-optic inter-repeater links.

The HP Fiber-Optic Hub Plus is well suited to both backbone applications and direct system connections. Choose fiber-optic networking for high data security, noise immunity, long distance, and future expansion. Choose the HP Fiber-Optic Hub Plus for HP reliability and the confidence you need for your network applications.

The HP Fiber-Optic Hub Plus is part of the HP EtherTwist family of network components. These LAN components – hubs, bridges, adapter cards, and transceivers – provide your network with high performance in a low-cost hardware solution. Easily racked together and connected with a thin coaxial cable between their integrated BNC ports, the hubs merge with one another along a virtual extended backplane. This gives you full cardcage-like functionality without the expense and limitations of a cardcage design. Using only a few different hardware components, each designed for optimum price/performance, you can build a network that ranges from a few nodes to thousands.

Features

- Provides eight fiber-optic ports using ST connectors. The built-in AUI port can be converted into a ninth fiber-optic port using a fiber-optic transceiver (HP 28683A).
- Complies with IEEE 802.3 FOIRL standard.
- Supports 10-Mbit/s link speed.
- Supports both 62.5/125 μm and 50/125 μm optical fiber.
- Supports 1 km of fiber-optic cable. Greater distances are possible depending on network configuration.
- Includes BNC and AUI ports for simultaneous connection to both thin coaxial cable and (via transceiver) thick coaxial, fiber-optic, or twisted-pair cable.
- Supports both IEEE 802.3 and Ethernet 1.0 and 2.0 standards.
- Isolates network faults by automatically segmenting ports disturbing the network.
- Includes LEDs for a quick visual check of port status, collisions, activity, and power.
- Provides console (RS-232) port, which allows users to read network statistics and configure ports in the hub. This port connects to a terminal or terminal emulator either directly or via modem.
- Includes diagnostics for checking port functionality and loopback test for trouble-shooting cable problems.
- Is transparent to network operating system software.

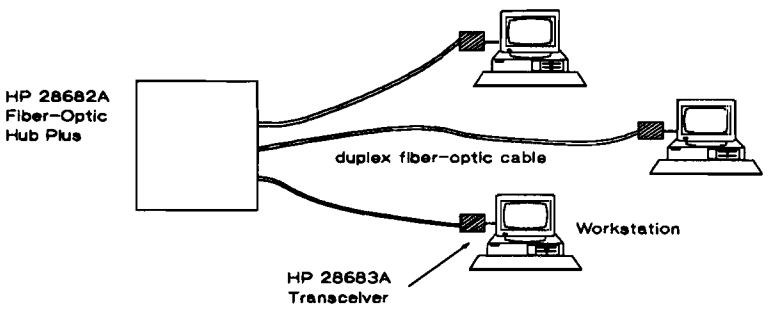
- Follows simple design rules for maximum topological flexibility.
- Supports SNMP/IP-based network management. Specifically, the hub can be managed from a centralized network management station on the LAN using HP OpenView Hub Manager (HP 28686D).
- Mounts on wall (flat or on end) or mounts in 19-inch Telco rack with cables facing front or back.

Fiber-Optic LAN Solutions

Networking applications for fiber-optic cabling have evolved from primary uses as a backbone between buildings in a campus setting to include building backbones and, with increasing frequency, direct connection to systems at the desk.

Backbone applications
Acting as an active star repeater, the HP Fiber-Optic Hub Plus is ideal for use in campus or building backbones. By supporting eight fiber-optic segments of up to 1 km, backbones from a single hub can span a 2-km distance. To increase the segment count, one more fiber-optic port can be added to the hub by simply plugging an HP Fiber-Optic Transceiver into the AUI port. Alternatively, more hubs can be added by multi-dropping them from a coaxial backbone cable.

System connections
A fiber-optic connection can be made directly to a system through a fiber-optic transceiver (HP 28683A) attached to the AUI port of the system's LAN adapter card. Each fiber-optic port on the HP Fiber-Optic Hub Plus will support one node. The hub's AUI port can be transformed into an additional fiber-optic port by attaching a fiber-optic transceiver. For larger networks, multiple hubs can be multi-dropped or cascaded to increase the port count.



Fiber-Optic Star Configuration

Flexible Cabling

HP's versatile hardware architecture provides the HP Fiber-Optic Hub Plus with flexible connections to both subnets and backbones. You can multi-drop several hubs on a thin coaxial "backplane" via their ThinLAN (BNC) ports. In addition, you can cascade hubs with fiber-optic cabling using either a direct connection between fiber-optic ports on each hub or using a fiber-optic to AUI connection through a fiber-optic transceiver (HP 28683A).

Maximum Reliability Through Diagnostics and Fault Isolation

To ensure network integrity for critical backbone applications, an HP Fiber-Optic Hub Plus automatically identifies any segment disturbing the network and disconnects it from the rest of the network (autosegmentation). Once the problem is corrected, the hub automatically reconnects the segment.

Visual diagnostic LEDs on the hub aid in troubleshooting the network. Status LEDs indicate power, data activity, faults, and collisions; and port LEDs indicate normally functioning ports. If a port has been autosegmented, its status is communicated via a flashing port LED and a fault LED.

Control of Your Network With Hub Management

The HP Fiber-Optic Hub Plus supports SNMP/IP and can communicate over the LAN with HP OpenView Hub Manager for DOS (HP 28686D). From a single network management station, a network administrator can monitor and control any hub – an HP EtherTwist Hub Plus or an HP Fiber-Optic Hub Plus – on the network. The HP OpenView Bridge Manager product allows similar monitoring and control of HP bridges on the network. These device manager programs continuously update HP OpenView Windows' graphical network map to display the current state of the network and notify the network administrator of network events. Configuring, monitoring, and controlling the entire network is made easy with the HP OpenView network managers.

Basic hub management features are also available through the hub's out-of-band console (RS-232) port either locally or remotely via modem. Management features available through the console port include enabling and disabling of ports, reading of port status and counters, link test, hub reset, loopback test, and Internet protocol (IP) configuration.

Coupled with HP OpenView Resource Manager, HP Fiber-Optic Hubs are capable of providing instrumentation-like functions across your network. This will eliminate the need for a LAN analyzer per segment. HP EASE (Embedded Advanced Sampling Environment) is a breakthrough technology that allows HP EtherTwist devices to do protocol analysis. This will identify top talkers, heavy users, errors, communications pairs.

Specifications

Environmental Characteristics

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

Optical Characteristics for 62.5/125 μm Fiber
Wavelength: 820 nm
Optical budget: 10 dB
Transmitter power:
- 12 dBm nominal
- 17 dBm minimum

Receiver sensitivity:
- 30 dBm nominal
- 27 dBm minimum

Optical Characteristics for 50/125 μm Fiber
Wavelength: 820 nm
Optical budget: 6 dB
Transmitter power:
-16.5 dBm nominal,
-21 dBm minimum
Receiver sensitivity:
-30 dBm nominal,
-27 dBm minimum

Physical and Electrical Characteristics

Dimensions: 42.55 cm by 23.50 cm by 4.37 cm (16.75 in by 9.25 in by 1.72 in)
Weight: 2.72 kg (6.0 lb)

Power Consumption:

ac Voltage	100-120 V	220-240 V
Current	0.5 A max	0.4 A max
Frequency	50/60 Hz	50/60 Hz

Standards

Communications:
IEEE 802.3 FOIRL
IEEE 802.3 Type 10BASE2

Emissions:
FTZ 1046/84
VCCI Class 1
FCC Part 15 Class A
CISPR-22 Level A

Safety:
UL 1950
IEC 950/EN60950
CSA 220
CSA 950

Radiated Emission Immunity: IEC 801-2.3.4

Warranty

The HP 28682A Fiber-Optic Hub Plus is warranted for one year against defects. Check with your local Hewlett-Packard Sales and Support Office or your Authorized HP LAN Dealer for more information.

Ordering Information

HP 28682A Fiber-Optic Hub Plus

HEWLETT PACKARD

HP StarLAN-to-10 Mbit/s Bridge

Technical Data

HP LAN Interconnectivity Product Number 28647B

The HP StarLAN-to-10 Mbit/s Bridge strengthens HP AdvanceNet's offering of scalable, flexible networking solutions. The bridge provides a versatility to connect an HP StarLAN 1 Mbit/s local area network (LAN) to a 10 Mbit/s ThinLAN, ThickLAN, or StarLAN 10 LAN. This capability allows the interconnectivity and extensibility required when planning and designing a network. In order to utilize the network bandwidth more efficiently, the bridge provides address filtering capabilities which isolate traffic and add security between workgroups. The StarLAN-to-10 Mbit/s Bridge is protocol independent and operates in both IEEE 802.3 and Ethernet environments.

A new feature of the StarLAN-to-10 Mbit/s Bridge enhances network reliability. An protocol developed by the IEEE 802.1 committee, the Spanning Tree Protocol, permits IEEE 802 LANs to be bridged in an arbitrary topology that includes alternate or redundant paths.

In the event of a primary link failure, a backup link would immediately take over, thereby ensuring continued data transmission between networks. The Spanning Tree Protocol is also beneficial in detecting and preventing illegal network configurations involving data loops.

Features

- Address filtering to provide traffic isolation, added network security, and improved performance in large networks, or high transmission networks
- Extends the network for establishment of large LANs
- Interconnects IEEE 802.3 and Ethernet networks
- Transparent to network nodes and software, preserving your software investment
- Supports arbitrary network topologies to provide alternate paths and redundancy in the case of link or component failures
- Can be centrally monitored and controlled by HP OpenView BridgeManager (HP 28653A)

Functional Description

The HP StarLAN-to-10 Mbit/s Bridge sends and receives packets at the MAC layer which is a sublayer of the ISO Data Link Layer. From the perspective of the end nodes which are exchanging data, the bridge is transparent to the software in the Logical Link Control (LLC) sublayer and the higher layers of the ISO model.

The bridge listens to all traffic between the two interconnected LAN segments and inspects the source and destination addresses to decide whether the traffic must be forwarded. Up to 512 addresses can be stored in the bridge.

At power-on all HP StarLAN-to-10 Mbit/s Bridges and HP 10 Mbit/s-to-10 Mbit/s LAN Bridges (HP 28648B) are configured into a spanning tree topology, which ensures at most one path between any two end nodes on the network. All bridges are initially placed into either a primary or backup mode. Each backup bridge monitors a primary link, ready to take responsibility for data transmission in the case of component failure. No initial configuration or user intervention is required for spanning tree operation.

Compatibility

- Compatible with HP's IEEE 802.3 LANs
- Compatible with multivendor environments that conform to IEEE 802.3 or Ethernet standards

Network Configurations

- Networks can be extended with up to eight bridges between any two nodes. The segments interconnected can be extended additionally by using repeaters between bridges.
- Redundant or alternate paths are permitted.
- An HP ThinMAU (28641A) with integrated AUI cable can be extended up to 16 meters with additional AUI cables.
- An HP ThickMAU (30241A) can be used with up to 50 meters of thick AUI cable.

Network Management

HP OpenView BridgeManager (HP 28653A) provides centralized monitoring and control of all HP StarLAN-to-10 Mbit/s Bridges and HP 10 Mbit/s-to-10 Mbit/s LAN Bridges (HP 28648B) in an extended LAN. Capabilities include configuration, collection and logging of network performance data, selective address filtering for enhanced network security, detection and notification of network error conditions, and control of spanning tree parameters to explicitly assign primary and backup bridges.

Functional Specifications

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

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

Dimensions: 32.5 cm (12.8 in) by 32.5 cm (12.8 in) by 10.4 cm (4.1 in)

Weight: 5.45 kg (12 lbs)

Power Consumption: 55 watts (max)

HP 28647B does not have any special power requirements, provided the installation site meets Environmental Class A specifications (office environment). Should the site not meet these specifications, you will need to upgrade your site to meet all warranty and service contract agreements. Your local HP Sales and Support Office can help you determine your site's status.

Ordering Information

The HP 28647B Bridge includes one bridge box with:

5062-3319 Bridge Mother Board
5062-3321 StarLAN Bridge Port Card
5062-3323 10-Mbit/s Bridge Port Card
5001-5602 Wall Mounting Bracket (2)
0624-0029 ¾-inch Wood Screws (4)
0515-0913 Machine Screws (4)
28647-90003 Installation Manual

HP 28647B Options:

240	Adds one HP ThickMAU (30241A), Tap, and AUI cable
242	Adds one ThinMAU (28641A)

Note: The LAN Bridge (HP 28647B) is intended to be customer installable. Therefore, a customer who would like to have the bridge installed by HP must contract installation service from their local sales office or project center.

HEWLETT PACKARD

Telebit T2500 Modem

Technical Data

For HP 9000 Workstations
Order Number
TBIT-0T2500

The Telebit T2500 Modem is the fastest dial-up modem that offers complete compatibility with HP-UX workstations. The T2500 supports UNIX® UUCP protocol. It is ideally suited for high speed, error-free, data transfer operations by using the revolutionary multicarrier modulation schemed called Packetized Ensemble Protocol (PEP). Using the PEP data communications protocol, the modem can transmit or receive asynchronous data at speeds of up to 18,000 bps over dial-up telephone lines, or up to 19,200 bps with data compression. It has been tested for compatibility with HP9000 Series 300, 400, 700, and 800 workstations.

- Fully supports HP-UX. Compatibility has been verified by HP
- Dial-up asynchronous connections with error-free throughput at speeds up to 18,000 using PEP protocol and 19,200 bps with Lempel-Ziv data compression
- PEP maximizes throughput by allowing minimal data fallback rate of less than 100 bits/second while other modems drop all the way back from 9600 to 4800 bps in one step
- When in PEP mode, the Telebit T2500 modem provides integrated support for UNIX UUCP file transfer protocol achieving throughputs faster than any other asynchronous dial-up modem
- PEP modulation allows the T2500 modem to maintain connections where conventional modems fail
- Fully compliant CCITT V.42 error-control protocol support for error-free transmission. Provides data compression capabilities of up to 4:1 with V.42bis and MNP 5
- Full asynchronous and synchronous compatibility with dial- up V.32 and PEP modems
- Remote configuration and management capability permits configuring and testing of remote modems from a central site, eliminating expense of on-site technicians

Configurations

The tested configurations include:

- Modem connected directly to the workstation's high-speed RS-232 port, asynchronous, PEP mode transmission
- Modem connected to the workstation via DIO RS-232 multiplexers, asynchronous, PEP mode transmission
- Modem connected to the workstation via RS-232 splitter, asynchronous, PEP mode transmission

HP Hardware Supported:

- HP9000 Series 400
- HP9000 Series 700
- HP9000 Series 800
- HP 4-channel DIO-I Mux (p/n 98642A)
- HP 8-chanel DIO-II Mux (p/n 98638A)
- One-to-Three RS-232 splitter (p/n K2292)

Product Specifications

Data Device Interface

Data Format: Serial, binary, asynchronous, synchronous
Physical Connector: RS-232 serial port
Interface Speeds: 300, 1200, 2400, 4800, 9600, 19.2K bps
Protocol Support:
- Asynchronous: UNIX UUCP, Kermit, Xmodem, Ymodem
- Synchronous: IBM SNA/SDLC

Telephone Line Interface

Data Rates:
- PEP: up to 18,000 bps with PEP or 19.2K bps with data compression
- V.32: 4800, 9600 bps; 9600 with Trellis-Coded Modulation (TCM)
- Low Speeds: 300, 1200, and 2400 bps

Physical Connector: RJ11
Line Type: Dial-up, or two-wire unconditioned leased line
Compatibility:
- Any PEP modem
- CCITT V.32 (9600 bps TCM, 9600 bps, and 4800 bps)
- CCITT V.22bis (2400 bps)
- CCITT V.22 (1200 bps)
- CCITT V.21 (300 bps)
- Bell 212A (1200 bps)
- Bell 103J (300 bps)

Echo Cancellation: Near- and far-end echo cancellation for V.32 modualtion
Operation:
- PEP: Adaptive Duplex (virtual full duplex)
- V.32 and Low Speeds: Asynchronous/synchronous full duplex Error Control PEP: 16-bit CRC V.32 and Low Speeds:V.42 includes CCITT LAP-M and MNP Classes 2-4

Data Compression
- PEP: Telebit Lempel-Ziv
- V.32 and Low Speeds: V.42bis and MNP Class 5

Diagnostics: power-on self-test, internal self-test, local digital loopback, local analog loopback, and remote digital loopback
Receiver Sensitivity
- PEP:-45dBm
- V.32 and Low Speeds:-43dBm

Transmit Level: -9 dBm default; 0 to -12 dBm seletable
Frequency Offset: +-7 Hz tolerance

General Operations

Dialing Command Set: Conventional and Enhanced V.25bis and IBM 4941
Control Switches
- Front Panel: A/B configuration select TALK/DATA select
- Rear Panel: Power ON/OFF

Power Requirements: 115VAC +10%, -15%, 60Hz at 0.55 Amp. max.
Temperature Operating: 50° to 120° F, 10° to 50° C
Storage: -40° to 149° F, -40° to 65° C

Physical Characteristics

Height: 2.4" (6.1 cm)
Width: 8.5" (21.6 cm)
Depth: 13.0" (33.0 cm)
Weight: 2.8 lbs (1.27 Kg)
Regulatory Compliance FCC Class A UL Listed CSA Certified

Warranty: 2 years

Ordering Information

TBIT-0T2500 Telebit T2500 Standalone Modem

Technical Information

Technical Information Guide (TIG) is available from LDC, P/N 5091-2453EUS.

For post-sales, contact Telebit at: 800-TELEBIT

HEWLETT PACKARD

Codex 3380
19.2 Kbps Data Modem

Technical Data

For HP Computer and Networking Systems
Product Number
CODX-3380A/B

The Codex 3380 data modem provides unrivaled modem performance at aggregate point-to-point data rates of 19.2, 16.8, 14.4, 12.0, and 9.6 Kbps. It can be used to directly connect remote devices to a central computer, or it can be used with HP2335A multiplexer to connect remote terminals or printers to the central computers via leased line. The Technical Information Guide (TIG) will show how this modem can be configured and connected to work with HP systems.

- 19.2, 16.8, 14.4, 12.0, and 9.6 Kbps, full-duplex, asynchronous/synchronous, four-wire leased line modem
- Codex pioneered Trellis Coded Modulation (TCM) provides greater data integrity at speeds from 19.2 Kbps to 9.6 Kbps
- Circuit Quality Monitoring System (CQMS) allows users to anticipate and isolate network problem areas
- Adaptive Rate System (ARS) continuously optimizes line utilization at speeds between 19.2 and 9.6 Kbps by automatically adjusting the modem's main channel transmission speed in response to prevailing line conditions
- Automatic Dial Restore Option maintains network uptime
- Intelligent front panel offers the capability to monitor, test, and configure both local and remote modems from the local site
- Fully tested and qualified to be compatible with HP systems

Functional Description

The Codex 3380 was tested and qualified to be compatible with HP computers and networking systems. Among the tested configurations include direct link from central host computer to remote site via the modem over four-wire leased line, and from central site to remote site via Codex 3380 and HP 2335A multiplexer over four-wire leased line. Refer to the Technical Information Guide (TIG) for more technical information on how to configure the modem with HP systems and other considerations.

HP Hardware Supported

Codex 3380 will function with the following HP products:

- HP 3000
- HP 9000
- HP 2335A mux
- SNA Modem Link
- Point-to-point Modem Link

EIA Status Indicators:

- TD (Transmit Data)
- RD (Receive Data)
- RTS (Request To Send)
- CD (Data Carrier Detect)

Control Panel Tests

- Self Test
- Modem Check
- BER Test
- Digital Loopback
- Terminal Loopback
- Audio Loopback

Specifications

Operation: Full-duplex, asynchronous/synchronous, point-to-point four-wire leased line modem.

Data Rates: 19.2, 16.8, 14.4, 12.0, 9.6 Kbps

Customer Interface: EIA 232

Transmitter Output:
Selectable 0 to -15 dBm

Line Requirements: 3002 D1 conditioned lines

Line Interface: Leased Line – JM8
Dial Restoral: RJ11 or RJ45 data jack

Dimensions:
Width: 8.5 in
Height: 3 in
Depth: 16 in
Weight: 8 lbs

Power Requirements: 115 Volts AC, 35 watts maximum

Operating Temperature: 0° to 50°C (32° to 122° F)

Storage Temperature: -40° to 70°C (-40° to 158° F)

Relative Humidity: 5% to 95% non-condensing

Safety approval: UL, CSA, FCC part 68

Ordering Information

CODX-3380A Codex 3380 19.2 Kbps Data Modem
CODX-3380B Codex 3380 19.2 Kbps Data Modem with Dial Restoral option

Technical Support

Provided by Codex at (800) 544-0062

Technical Information
Refer to Technical Information Guide (TIG). (LDC order number: 5091-0836EUS)

HEWLETT PACKARD

Codex 3500 DSU/CSU

Technical Data

For HP Remote Bridge and Multiplexer
Product Number
CODX-3500

Codex 3500 combines the functionality of multiple digi-tal transmission devices into a single, high compact unit. It supports digital transmission requirements in a broad range of operating environments, from 2.4 Kbps to 56 Kbps. It can be con-nected with HP2335A multi-plexer, HP remote bridge, or HP router to transmit data via DDS facili-ties from central sites to re-mote sites. The Technical In-formation Guide (TIG) will show how this DSU/CSU can be configured and connected to work with HP systems.

- Versatile, cost-efficient DSU/CSU that can meet a wide range of digital transmission speeds and applications
- Combines all data rates in a single unit; supports 2.4, 4.8, 9.6, 19.2, and 56 Kbps
- Unique rate adaption function permits use of lower priced digital services
- Enables diagnostic testing of local and remote units in both point-to-point and multipoint configurations
- Integral timing buffer reduces data errors caused by timing variations between different digital services
- Supports asynchronous to synchronous conversion up to 19.2 Kbps
- Fully tested and qualified to be compatible with HP networking systems

Functional Description

The Codex 3500 was tested and qualified to be compatible with HP computers and networking systems. Among the tested configurations include the link from central host computer to remote site via the combination of HP remote bridge and DSU/CSU over DDS, the link from central site to remote site via the combination of HP router and DSU/CSU over DDS, and from central site to remote site via HP 2335A multiplexer and DSU/CSU over DDS. Refer to the Technical Information Guide (TIG) for more technical information on how to configure the modem with HP systems and other considerations.

Note: To connect the DSU/CSU to HP remote bridge, a DB25(M) to V.35(M) DTE cable is needed (order number: CODX-77999). To connect the DSU/CSU to HP router, a DB25(M) to V.35(F) DTE cable is needed (order number: CODX-48523).

HP Hardware Supported

DSU/CSU will function with the following HP products:

- HP 3000
- HP 9000
- HP 2335A mux
- HP 28674A Remote Bridge
- HP Router

Control Panel Tests

- Self Test
- BER Test
- Digital Loopback
- Terminal Loopback
- Remote Loopback

Specifications

Operation: Full-duplex, asynchronous/synchronous, point-to-point or multipoint DSU/CSU

Data Rates: 56 Kbps, 19.2, 9.6, 4.8, 2.4 Kbps with DDS-I

Customer Interface: User selectable EIA 232 or V.35. 25-pin interface connector

Line Requirements:
DATAPHONE Digital Service DDS-I

Line Interface: RJ48 modular

Dimensions:

Width:	6.6 in
Height:	2.3 in
Depth:	9.6 in
Weight:	2.5 lbs

Power Requirements:
115 Volts AC, 60 Hz, 10 watts maximum

Operating Temperature:
0° to 50°C (32° to 122°F)

Storage Temperature:
-40° to 70°C (-40° to 158°F)

Relative Humidity:
5% to 95% non-condensing

Safety approval:
UL approved, FCC Class A

Ordering Information

CODX-3500 Codex 3500 Standalone DSU/CSU
CODX-77999 DB25(M) to V.35(M) cable (for HP remote bridge)
CODX-48523 DB25(M) to V.35(F) cable (for HP router)

Technical Support

Provided by Codex at (800) 544-0062

Technical Information
Refer to Technical Information Guide (TIG). (LDC order number: 5091-0837EUS)

HEWLETT PACKARD

HP 2335A-X.25/84 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.

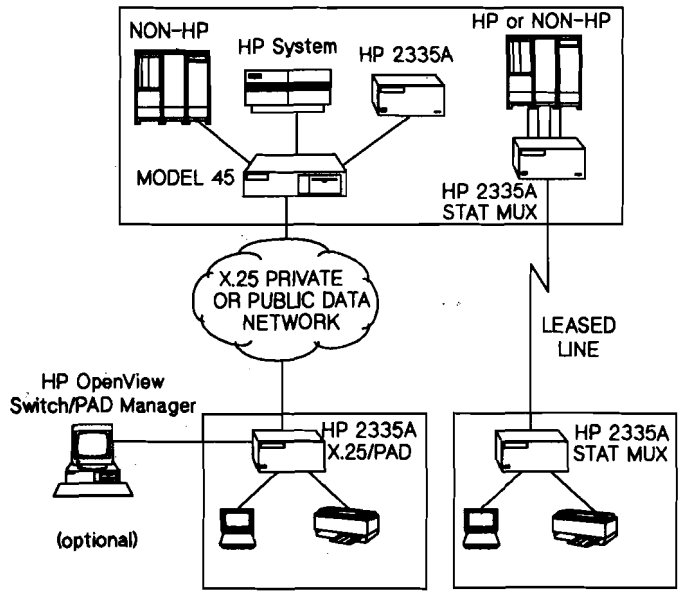
The HP 2335A operates as an X.25 Packet Assembler/ Disassembler (X.25 PAD) for asynchronous device connection to a public or private X.25 network, or it can be used in statistical multiplexer configuration over a leased line. It provides full X.25/84 functionality.

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

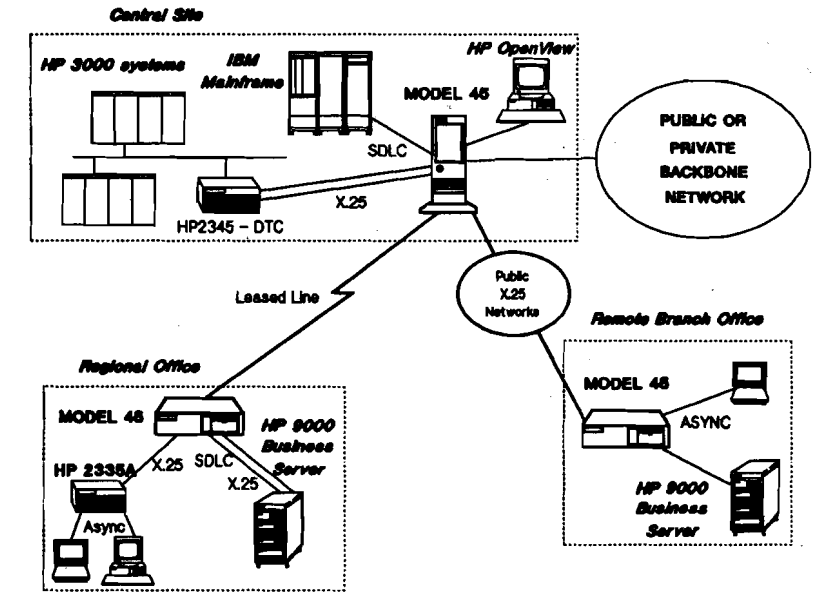
HP Model 45–Multiprotocol X.25 Switching Concentrator

Technical Data

Product Numbers
J2000A, J2001A

The Model 45 is a combined X.25 switching node and a multiprotocol PAD. It connects HP and non-HP systems together, as well as concentrates devices with different protocols.

The Model 45 can operate as a stand-alone switch; also multiple Model 45s can be interconnected to form a small network. It can also provide very cost-effective multiprotocol access to large backbones such as public or private packet networks.



Features and Benefits

- Simple entry-level solution for X.25 multivendor networking.
- Reduced communication and equipment costs (concentration of multiple X.25, SNA/SDLC, and asynchronous lines, on one or more X.25 access lines).
- Flexible connection to public X.25 data networks (Telenet, Transpac, PSS, Datex-P, Venus-P, etc.) or private X.25 networks.
- Switching and protocol conversion can be software-defined on an individual port basis providing flexibility and easy reconfiguration.
- Operates in both standalone and feeder node environments.
- In standalone environments: remote or local control, configuration and monitoring of port, node and link parameters from ANSI terminal/PC monitor. Alarms, node, and network events can be displayed on the console or printed out on a line printer attached to the local Model 45, or to a central Model 45.

- In backbone environments: centralized control and configuration from the HP OpenView Switch/PAD Manager station.
- Alternate leased line backup over public or private data networks.

Functional Description

The Model 45 is a combined X.25 switching node and multiprotocol PAD supporting X.25, SNA/SDLC, and asynchronous protocols. It consists of one or more 4 port multiprotocol Line Processor (LP) cards and an optional 4 port Asynchronous Expansion (AE) card. Individual ports on an LP card can be configured for any of the supported protocols (X.25, SNA/SDLC, and asynchronous). The optional AE card only supports the asynchronous protocol.

The Model 45 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, an attached PC monitor and keyboard, or the HP OpenView Network Management.

It can also be interconnected with other Model 45s to form a small network linking the systems and terminals at distributed customer sites.

X.25 Switching

The Model 45 provides an integral X.25 communication interface and packet switching capability. Any or all of the ports on an LP card can be configured as X.25 access or switching ports. The route taken by an X.25 packet entering the switch is defined by a routing table configured by the operator. Alternative paths can be defined to be used in the event that the primary path is unavailable or fails. The Model 45 also offers a Hunt Group feature that allows load leveling across several ports.

The SNA PAD

The Model 45 features an integral SNA/SDLC PAD that enables communication between remote SNA Control Units and an SNA host processor over an X.25 network. Configurable PAD types include the TPAD and the HPAD for any port of a 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 and IBM host or compatible computers with the NPSI software, or connection to the X.25 network through an SNA HPAD.

The SNA/SDLC Host PAD, or SNA HPAD, acts as a gateway between SNA host computers and an X.25 network. It offers communication between SNA host computers and remote SNA computing devices having X.25/QLLC support or connected to the X.25 network through an SNA TPAD.

Both the 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.

The Asynchronous PAD

The Model 45 features an integral asynchronous PAD that 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 LP card can be configured as an asynchronous PAD port. In addition, one optional AE card can be configured per switch to provide up to four asynchronous PAD ports.

Network Management

In standalone and small network environments, the Model 45 can be managed locally via an attached PC monitor and keyboard, which can, in turn, be used to control remote Model 45s. The alternative is to use an ANSI terminal connected locally to the COM1 port, or remotely via a PAD. The Model 45 has a menu-driven user interface to perform online control, configuration, node monitoring, and statistics management operations. The Model 45 also features an online help facility.

A printer can be connected to the parallel port of the Model 45 to display alarms and network events and facilitate online monitoring and control of the network. A single printer can be used to collect all the events generated by the Model 45s connected to the network.

An HP OpenView network management software running on an HP OpenView PC is also available to manage small networks based on Model 45s and HP 2334A/HP 2335As. It provides easy-to-use monitoring and control functions using a standard OpenView graphical interface.

For more information, please refer to the "HP OpenView Switch/PAD Manager" and "HP OpenView DTC Manager" data sheets.

Functional Specifications

Desktop Package (Max. 12 ports):

- 4-8 synchronous/asynchronous RS-232-C (CCITT V.24/V.28) ports.
- 4 optional asynchronous only RS-232-C (CCITT V.24/V.28) ports.
- Power: 134 W continuous; 176 W peak; 90-132 V or 198-264 V; 47/63 Hz.
- Cabinet Dimensions: 42.5 cm × 39 cm × 16 cm high.

Tower Package (Max. 20 ports):

- 4-20 synchronous/asynchronous RS-232-C (CCITT V.24/V.28) ports, or
- 4-16 synchronous/asynchronous RS-232-C (CCITT V.24/V.28) ports plus 4 optional asynchronous only RS-232-C ports.
- Power: 200 W continuous; 330 W peak; 90-132 V or 198-264 V; 47/63 Hz.
- Cabinet Dimensions: 21 cm × 50 cm × 60 cm high.

General Specifications

- Up to 4 configurable ports per LP card.
- RS-232-C (CCITT V.24/V.28) interface.
- Maximum aggregate throughput = 256 Kbps per LP card.
- Supports Switched Virtual Circuits (SVC) and Permanent Virtual Circuits (PVC).
- Supports up to 2048 simultaneous VCs.
- Up to 300 entries per database file.
- Alarm and Event displaying and printing to a local or a remote printer, with time stamp, node and port IDs, type of events (link up/down, node restarting, PVC up/down, restart indication).
- Transfer file function for files up to 256K.X.25 Interface
- Compatible with CCITT X.25 Nov. 1984 (Level 2). X.25 ports operate as DTE or DCE (provides clocking).
- Line speeds up to 64 Kbps on each synchronous port.
- Maximum packet size = 256 bytes.
- X.25 Facilities Supported:
  - Transparent to the User Facilities Field.
  - Complete Facility Field can be changed when acting as a Gateway (address translation facility).
- Monitoring, configuration, and control functions available locally or remotely through an X.25 call to the logical command port.

SNA/SDLC Interface:

- Up to 64K per port for frames up to 280 bytes.
- Up to 9600 per port for frames greater than 280 bytes with all other LP ports at up to 19200 bps.
- SNA/SDLC ports can operate as DTE or DCE (provides clocking).
- Data link control: IBM SDLC full-duplex mode at level 1 and half-duplex at level 2.
- Configurable SDLC frame size.
- Maximum frame size is 4105 bytes.
- Configurable station addresses.

- Point-to-Point operation for TPAD connections.
- Support of NRZ or NRZI.
- Autocall on both HPAD and TPAD, 1 VC per port.
- Supports 4 modes:
  - HPAD
  - TPAD
  - NPAD (Host-to-Host)
  - XPAD (Transparent mode)
- QLLC/NPSI compatible for TPAD/HPAD connections.

Safety Approvals

- UL 478
- IEC 380/435/950
- CSA C22.2 No 220
- BS 6301RFI (Radio Frequency Interference) Approvals
- FCC Part 15, Subpart J, Class A
- FTZ 1046/84
- VCCI Class 1
- EN 55022 Class A
- SABS

Environmental Characteristics

Temperature:
Operating: 0°C to 40°C
Desktop Package: 0°C to 30°C (Class C2)
Tower Package Storage: –40°C to 70°C

Altitude:
Operating: 0 ft to 15,000 ft (0 to 4,600 meters)
Storage: 0 ft to 50,000 ft (0 to 15,200 meters)

Relative Humidity:
Operating: 15% to 95% at 40°C
Storage: 90% to 24 hrs at 65°C

Certified Public Networks

Certified:

Country	PDN
Spain	Iberpac
Germany	Datex-P
Italy	Itapac
Holland	Datanet1
Belgium	DCS
Finland	Datapak
Taiwan	Pacnet
Luxembourg	Luxpac
Norway	Datapak
USA	Telenet
	CompuServe

Currently in Progress:

Japan	Venus-P
UK	PSS
South Africa	Saponet
Hong Kong	Datapak
Austria	Datex-P
Malaysia	MAYPAC

Self-Certification:

France	Transpac
Switzerland	Telepac
Canada	Datapac
Australia	Austpac
Denmark	Datapak
Singapore	Telepac
South Korea	Dacom-Net
New Zealand	Pacnet
Hong Kong	Intelpak

Please check with your local HP organization to confirm latest approval information.

Ordering Information

HP J2000A 4 Port Switch – Desktop Package (includes multiprotocol LP card, X.25, Async, and SNA/SDLC software and manuals)
HP J2001A 4 Port Switch – Tower Package (includes multiprotocol LP card, X.25, Async, and SNA/SDLC software and manuals)
HP J2004A Additional 4 Port Multiprotocol LP Card (X.25, Async, and SNA/SDLC)
HP J2006A Optional 4 Port Async Expansion Card (includes required quadrivial cable); one per node maximum
HP J2007A Monitor/Keyboard Package (includes monitor, MMVA card and keyboard)
HP J2008A Quadrivial Cable – 4 DTE connectors
HP J2009A Quadrivial Cable – 2 DTE + 2 DCE connectors
HP J2010A Quadrivial Cable – 4 DCE connectors
HP J2011A Quadrivial Cable – 3 DTE + 1 DCE connectors
HP J2012A Quadrivial Cable – 1 DTE + 3 DCE connectors

HEWLETT PACKARD

HP ISDN Server
HP ISDN Link/MS-DOS®

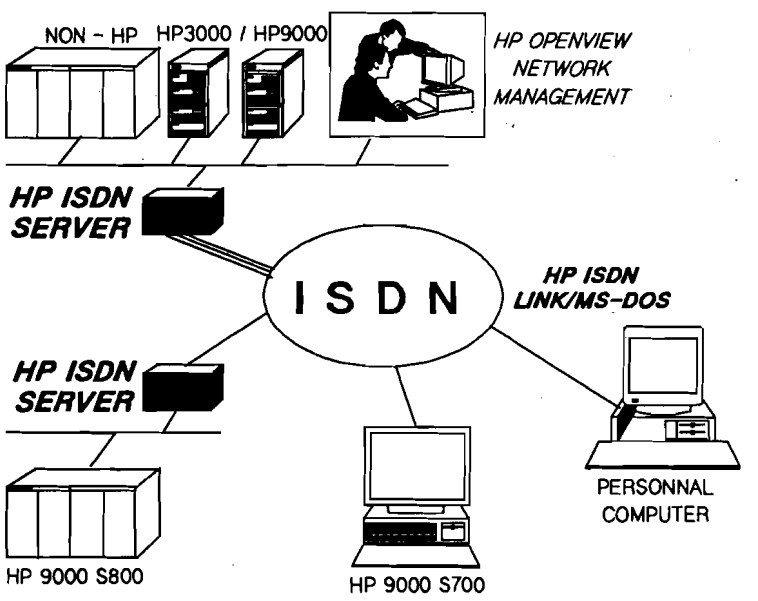
Technical Data

Product Numbers
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 ISDN Link/S700

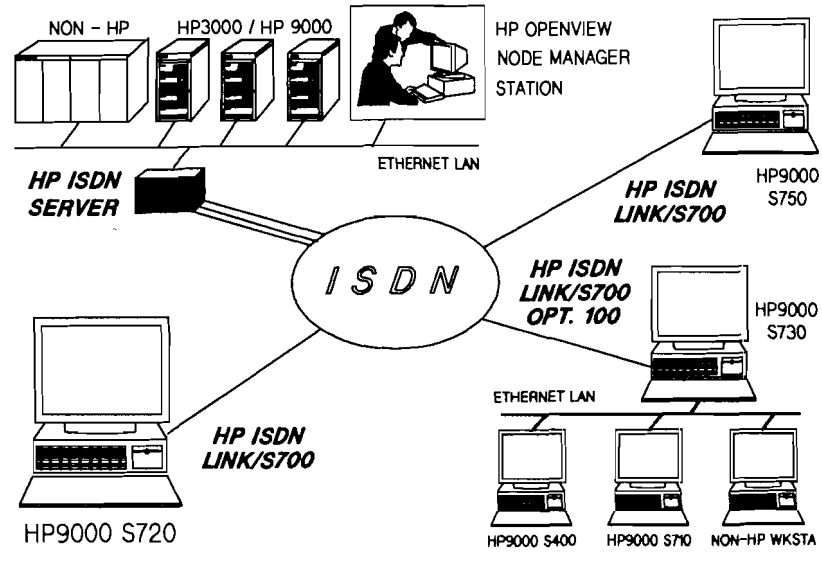
Technical Data

For HP 9000 Series S700
Product Number
J2104A

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.

ISDN circuit switching provides users with several advantages:

- Possible cost-savings for datacommunication (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.



HP ISDN Link/S700

The HP ISDN Link/S700 product for the HP 9000 Series 700 provides a network connection on the HP 9000 S700 to public or private ISDN networks.

This product allows HP S700-to-HP S700, as well as HP S700 to HP ISDN Server (P/N J2101A), communications over ISDN networks, through the use of the de facto standard TCP/IP. The HP 9000 S700 workstation connected to the ISDN network can communicate with any HP or non-HP system that implements the TCP/IP protocol and is connected to a LAN equipped with an HP ISDN Server. Also, when ordered with option 099, the HP 9000 S700 workstation equipped with an ISDN Link

can act as a nondedicated IP router for the other HP or non-HP stations attached to the LAN.

Major Benefits

1. **Minimum 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 S700 workstations, equipped with the HP ISDN Link/S700, 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.

2. **Transparency for the enduser**
   Because the ISDN Link/S700 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 setup and call clearing are also entirely automated based on the contents of the configuration files.

3. **Flexible bandwith allocation**
   One or two 64 kbps B channels can be allocated for a single ISDN communication between two HP 9000 S700 workstations or between one HP 9000 S700 workstation and one HP ISDN Server. File transfers can therefore be performed at up to 128 kb/s.

4. **Network security**
   A list of authorized ISDN callers can be configured for the HP 9000 S700 workstation, and calls from unauthorized callers are refused.

5. **Centralized management through HP OpenView Node Manager**
   The HP ISDN Link/S700 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/S700 includes all the necessary hardware and software to connect an HP S700 workstation to the ISDN and run TCP/IP based networking software such as ARPA Services, Berkeley Sockets, LAN Manager, or HP's Network Services. These networking software products are not part of the HP ISDN Link/S700 product and are either provided with the HP S700 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 option must be purchased to allow the HP ISDN Link/S700 to act as a local, non-dedicated, IP router/gateway for the workstations and computers connected to the LAN.

The HP ISDN Link/S700 is fully compatible with the HP ISDN Server (J2101A). When multiple, distributed HP 9000 S700 workstations need to access a central site over an ISDN network, it is recommended to use the HP ISDN Server to act as a call concentrator for the remote stations to access the computers on the central site LAN. For more information about the HP ISDN Server (Product reference : J2101A), please contact your local HP Sales Representative.

ISDN Certifications

Certification of the HP ISDN Link/S700 will be available through an extension of the existing certications obtained for the J2100A product reference.

At the time this document is printed, the status of ISDN certifications is the following for the J2000A and HP S700 workstations :

France:	VN2 in progress
US:	AT&T's 5ESS in progress NT's DMS100: in progress
Germany:	1TR6 in progress
UK:	BTNR1 in progress
Italy:	in progress
Belgium:	in progress
Japan:	Available for S720 & S730, in progress for S750
Australia:	in progress

For more information about the status of certifications in these countries, as well as in nonlisted countries, please contact your HP Sales Engineer.

Supported Hardware and Software

Hardware : At the time this document is printed, the HP ISDN Link/S700 is supported on the HP S720, S730 and S750 workstations. Only one BRI card is supported per S700 workstation. Note that for use in the HP 9000 S720, the EISA extender option must be ordered with the S720 workstation.

Software : Operating system HP-UX 8.05 or later (8.3, ...) Any HP-UX application using the standard TCP/IP protocol

Warranty

Warranty is 1 year (code 5C).

Physical Characteristics

Dimensions : 35.3 cm x 12.7 cm (14 in. x 5 in.)
Operating Temperature: 10x to 40x C (50x to 104x F)
Power consumption: 17 W maximum.

Installation Policy

The customer is responsible for the installation of the HP ISDN Link/S700 product. Before installing the product, the customer should obtain and verify the correct operation of the ISDN line.

Ordering Information

J2104A HP ISDN Link/S700 plug-in ISA/EISA card RJ45 cable and User Guide included.

Options:

AAH	Software on Digital Audio Tape (DAT)
AAU	CD-ROM certificate
099	Software upgrade to use S700 as a non-dedicated IP router/gateway to ISDN for locally attached computers

Note: Only one HP ISDN Link/S700 can be installed per HP S700 workstation. S720 workstations need the EISA extender option to host the ISDN card.

HEWLETT PACKARD

HP Router ER

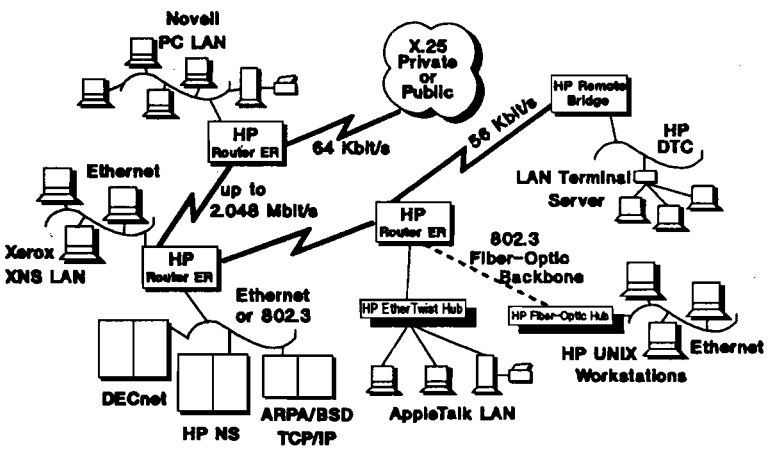
Technical Data

Product Number
27285A

The HP Router ER expands HP's multisite networking by offering a high-performance, multiprotocol router that can also function as a bridge. Using the same form-factor as HP EtherTwist hubs and bridges, this 4-port router becomes an addition to the HP modular, "rack 'n' stack" family. The HP Router ER can connect two local Ethernet/IEEE 802.3 networks to two synchronous WAN links, each at speeds up to 2.048 Mbits/s.

The standard configuration of the HP Router ER supports all of the popular routing protocols, such as TCP/IP, DECnet IV, Novell® IPX, Xerox XNS, and AppleTalk II. The router can also connect to X.25 networks or function as a learning bridge with the IEEE Spanning Tree protocol. By including all of these protocols, HP saves the end user time and money by not having to either purchase separately or download each different routing protocol. One product number, one price, and one configuration gives all the functionality to interconnect multiple local and wide area networks.

With the HP Router ER, organizations can create "multisite" LANs that offer transparent support for basic network services such as electronic mail and high-speed file transfers. Using the router to create subnets puts the router in an excellent location to provide management of the network. Monitoring traffic levels, identifying faults, and controlling basic and advanced network parameters are just a few of the router's capabilities. In addition, the standards-based SNMP management information base (MIB) supported by the HP Router ER allows for integration with many network management systems, including the best available UNIX®-based manager, HP OpenView Interconnect Manager/UX (HP 27360A, 27361A).



Features

- Provides concurrent multiprotocol routing and bridging for maximum flexibility in supporting the connection of different multivendor devices on the network. Routing Protocols: TCP/IP, DECnet IV, Xerox XNS, Novell IPX, and AppleTalk II.
- Operates at layer two of the OSI reference model (Data Link, MAC-Layer), transparent to upper layer protocols by configuring the device as a multiport bridge with the IEEE 802.1 Spanning Tree Protocol.
- Uses load balancing between multiple WAN links of equal bandwidth to best utilize the expensive leased lines that connect the geographically dispersed routers.
- Supports complex network topologies with this router, which will dynamically select the best path through a network of bridges and routers with multiple remote connections. The router will also automatically reroute traffic in the event of equipment or link failure.
- Supports two Ethernet/IEEE 802.3 LAN connections via the standard AUI ports.
- Supports two synchronous WAN connections via the HP universal interface ports with the appropriate 5-meter interface cable (RS-232, RS-422/449, V.35, X.21). Wide area link speeds between 19.2 Kbits/s to 2.048 Mbits/s are possible. Any of the following interfaces commonly found on the popular DSU/CSUs can be used: X.21, RS-232, RS-422/449, or V.35. The HP Router ER will automatically sense which specific interface cable is connected.
- Provides network security and isolation by allowing user-configurable traffic filtering based on type of service, protocol, subnet address, and/or network node addresses.
- Transfers data through public data networks (PDNs) using the X.25 protocol.
- Has standards-based network management using the Simple Network Management Protocol (SNMP). This protocol is supported by HP OpenView Interconnect Manager/UX (HP 27360A, HP 27361A) or HP Interconnect Manager/DOS (HP 27256D).
- Includes timezone and daylight savings time feature for greater accuracy of logging events. Choosing your appropriate timezone is possible through the use of the configuration editor.
- Simplifies initial configuration of the HP Router ER by the addition of a "Quick-Config." option on the terminal console menu. Through a short series of questions, the router's basic parameters can be set. The split screen will display the current configuration and provide context-sensitive help.
- Provides full support for Ethernet/802.3 networks. Physical connection to Ethernet LANs is provided via (two) standard transceiver (AUI) ports.
- Employs a Motorola 68020 (25 MHz) processor, and a multibus architecture for excellent LAN-to-LAN performance, even in multiprotocol networks with high traffic loads.
- Supports the TFTP protocol, which allows new versions of the operating system software to be downloaded remotely over the network.

HP Router ER Performance

	Packets per Second (using 64-byte packets)
Ethernet Learning Bridge	11,900
IP Routing over Ethernet	9,000
IP Routing over 802.3	8,300
DECnet IV Routing over Ethernet	6,600
Novell IPX Routing over Ethernet	6,200
AppleTalk Routing over Ethernet	7,500

Specifications

Environmental Characteristics

Operating Temperature:
0°C to 55°C (32°F to 131°F)
Relative Operating Humidity:
15% to 80% at 40°C (104°F) noncondensing

Physical Characteristics
Dimensions (without brackets): 42.54 cm by 23.50 cm by 4.34 cm (16.76 in by 9.25 in by 1.72 in)

Electrical Characteristics

ac Voltage	100-120 V	220-240 V
Current	0.60 A	0.45 A
Frequency	50/60 Hz	50/60 Hz

The HP Router ER can be configured to support either voltage range shown above.

Safety Approvals
- UL 1950
- CSA 950
- Verified to IEC 950/EN60950

Electromagnetic Specifications
Emissions:
- FCC Part 15, Class A
- FTZ-1046/84 VDE Level B
- VCCI Class 1
- CISPR-22 Class B

Immunity:
- ESD (8KV), IEC 801-2 Level 3
- Radiated (3V/M) IEC 801-3 Level 2

Console Cable:
- Terminal: HP 13242G or HP 40245G, 5-m 25-pin D RS-232 Male–Male
- PC: HP 24542G 5-m RS-232, 25-pin D Male–9-pin D Male
- Modem: HP 13242M, HP 13242N, or HP 17355M, 5-m 25-pin D RS-232 Male–Male

Installation

The HP 27285A Router ER is designed to be customer installable in accordance with the instructions provided with each product. Customers who would like to have HP install the products must contract installation services from their local HP Sales and Support Office.

Warranty

HP 27285A Router ER is warranted for one year against defects. Check with your local Hewlett-Packard Sales Office or HP-authorized LAN dealer for more information.

HEWLETT PACKARD

HP Router TR

Technical Data

Product Number 27286A

The HP 27286A Router TR is a high-performance, multiprotocol router for connection of Ethernet, token ring, and wide area networks. Using the same form factor as the HP EtherTwist hubs and bridges, this 4-port router is the newest addition to the HP modular "rack-and-stack" family. The HP Router TR connects to one local Ethernet/IEEE 802.3 network, one token ring 4/16-Mbit/s network, and up to two synchronous WAN links, each at speeds up to 2.048 Mbits/s. The port configuration on the HP Router TR is ideal for internetworking different network types.

Coupled with HP OpenView Resource Manager, the HP Router TR is capable of providing instrumentation-like functions across your network. This will eliminate the need for a LAN analyzer per segment. HP EASE (Embedded Advanced Sampling Environment) is a breakthrough technology that allows HP EtherTwist devices to do protocol analysis. This will identify top talkers, heavy users, errors, and communication pairs.

Highlights

- ***Concurrent Multiprotocol Routing:*** The standard configuration of the HP Router TR supports concurrent operation of five popular routing protocols: TCP/IP (RIP/OSPF), DECnet IV, Novell® IPX, Xerox XNS, and AppleTalk II. For packets that cannot be routed, the HP Router TR can function as a MAC-layer bridge with the IEEE Spanning Tree Protocol on the Ethernet port and Source Routing Protocol on the token ring port. Bridging is possible only between one of the local ports and the WAN ports. The router comes standard with X.25 software for configuring one or both WAN ports. The router's port configuration allows connection to two local area networks (one Ethernet and one token ring) and two wide area networks.
- ***High Performance:*** The Router TR employs a Motorola 68020 (25 MHz) processor, a multiple-bus architecture, and the FASTMAC software from MADGE Networks, Ltd., for excellent Ethernet-to-token ring routing performance, even in multiprotocol networks with high traffic loads. Approximately 5,500 (64-byte) packets per second can be forwarded between the two LANs.
- ***Ease of Use:*** Despite the inherent complexities of routing, the HP Router TR approaches the level of "plug-and-play" operation. The "Quick-Config" utility on 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. Extensive router management is available through the router's console port or via Telnet (remote terminal) access over the network. The HP Interconnect Manager

applications offer both a DOS and UNIX® version for control of the router's SNMP parameters.

Features

- Provides concurrent multiprotocol routing between all ports and bridging for each LAN and WAN port for maximum flexibility in supporting the connection of different multivendor devices on the network.
- Offers five standard routing protocols: TCP/IP (RIP/OSPF), DECnet IV, Xerox XNS, Novell IPX, and AppleTalk II.
- Operates concurrently as a bridge between the LAN and WAN ports. The IEEE 802.1 Spanning Tree Protocol can be used on the Ethernet LAN port and IEEE Source Routing can be used on the token ring port.
- Transfers data through X.25 public data networks (PDN) and defense data networks (DDN) on both WAN ports. The X.25 software is included as a standard feature at no additional cost.
- Allows load balancing between two WAN links of equal bandwidth for best use of leased lines between multiple remote routers.
- Supports two synchronous WAN connections via the HP universal interface ports with the appropriate 5-meter interface cable (RS-232, RS-422/449, V.35, or X.21). The HP Router TR automatically senses which interface cable is connected. Wide area link speeds between 19.2 Kbits/s and 2.048 Mbits/s are possible.
- Provides support of synchronous pass-through to allow certain IBM SNA traffic to use common internet services.
- Supports BOOTP relay agent for initializing from a preset configuration held in a server.
- Allows remote software updates via TFTP, allowing the vehicle to download a new software version over the LAN to multiple routers.
- Provides network security and isolation by allowing user-configurable traffic filtering based on type of service, protocol, subnet address, and/or network node addresses.
- Offers standards-based network management using the Simple Network Management Protocol (SNMP). This protocol is supported by HP's OpenView Interconnect Manager, both UNIX and DOS versions (HP 27360A, 27361A, and 27256D). In addition, router management is available through the router's console (RS-232) port and via Telnet (remote terminal) access over the network.
- Allows for easy configuration using the "Quick-Config" option on the terminal menu. A complete configuration editor is available for detailed tuning of the router's configuration.
- Mounts in a standard 19-inch equipment rack, using only one 1.75-inch rack space. All necessary mounting hardware is included.
- Includes computer-based tutorial (CBT) on 5.25-inch media to provide a self-paced training overview of router operation. HP is the only router vendor supplying valuable training with all units, at no cost.

Specifications

Environmental Characteristics

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

Physical Characteristics (without brackets)

Dimensions: 42.54 cm by 23.50 cm by 4.34 cm (16.75 in by 9.25 in by 1.72 in)
Weight: 2.72 kg (6.0 lb)

Electrical Characteristics

ac Voltage	100-120 V	220-240 V
Current	0.9 A	0.6 A
Frequency	50/60 Hz	50/60 Hz

The HP Router TR has an autoranging power supply that will adjust to any voltage between 90 and 240 volts.

Standards

Communications:
- IEEE 802.3 Ethernet Version 1.0 and 2.0
- IEEE 802.1 Spanning Tree Protocol Version 9
- RS-232-C on the console port

Emissions:
- FCC Part 15 Class A
- FTZ-1046/84 (VDE Level B)
- VCCI Class 2
- CISPR-22 EN 55022 Class B

Immunity:
- ESD: IEC 801-2 Level 3 (10 kV), EN 55101-3
- Radiated Emissions: IEC 801-2 Level 3 (3V/m), EN 55101-3

Safety Approvals:
- UL 1950
- CSA 950
- Verified to IEC 950/EN60950

Ordering Information

The WAN (synchronous) interface cable must be ordered separately. Choose the appropriate cable listed below and place the order with HP's Support Material Organization (SMO). This adapter cable must be ordered for each synchronous port to provide the physical interface connection to the DSU/CSU.
- 28606-63008 V.35 Synchronous Port
- 28606-63006 RS-232 Synchronous Port
- 28606-63005 RS-449/422 Synchronous Port
- 28606-63001 X.21 Synchronous Port

Warranty

HP 27286A Router TR is warranted for one year against defects.

HEWLETT PACKARD

HP Remote Bridge RB

Technical Data

Product Number
28674B

The HP Remote Bridge RB can connect one local and one remote 802.3/Ethernet LAN to form a single, integrated communications network across geographically dispersed sites. An HP Universal Interface with appropriate 5-meter interface cable to an external DSU/CSU provides access to common services, such as T1, 64-Kbit/s and 56-Kbit/s Digital Data Services. The HP Remote Bridge RB is a "learning bridge" that filters each packet from the local and remote segments. This will improve the throughput of the wide area link by forwarding only the necessary traffic, thus conserving bandwidth. Since the HP bridges are protocol-independent and "media speed," they can be used in a multivendor environment without causing a network "bottleneck."

Coupled with HP OpenView Resource Manager, the HP Remote Bridge RB is capable of providing instrumentation-like functions across your network. This will eliminate the need for a LAN analyzer per segment. HP EASE (Embedded Advanced Sampling Environment) is a breakthrough technology that allows HP EtherTwist devices to do protocol analysis. This will identify top talkers, heavy users, errors, and communication pairs.

The bridge sends and receives packets at the Media Access Control layer, which is a sublayer of the ISO Data Link layer. From the perspective of the end nodes that are exchanging data, the bridge is invisible to higher-level protocols. The bridge listens to all traffic between the two interconnected LAN segments and inspects the source and destination addresses to decide whether the packet must be forwarded.

Features and Benefits

- The HP Remote Bridge RB can filter and forward data packets as fast as the network can operate; this is called "media-speed" operation. Ethernet/IEEE 802.3 is a 10-Mbit/s LAN, which is equivalent to 14,880 64-byte packets per second. To avoid a bottleneck in the LAN, a bridge needs to filter 100 percent of the packets from the local 10-Mbit/s LAN and remote link (56 Kbit/s, 64 Kbit/s, or T-1).
- The bridge conserves network capacity (bandwidth) by isolating local traffic and only forwarding packets intended for the distant nodes.
- HP Remote Bridge RBs allow connection of geographically distant LANs to form one global network. With decreasing costs of wide area links and an increasing need to improve information systems, the low-cost HP bridge is an ideal solution.

- HP bridges are easy-to-install, "plug and play" devices that are also self-configuring. An external DSU/CSU is required.
- Critical remote links require the high quality of HP bridges.
- Unlike repeaters, bridges do not propagate corrupt packets from one network to another. End-to-end data integrity is maintained.
- HP bridges are excellent devices for connecting LANs of different media types. For example, the corporate backbone may use fiber-optic or thick coaxial cable, and the smaller workstation subnet may use thin, coax, or twisted-pair cable. The HP Remote Bridge RB can connect these different media through the AUI and thinLAN ports.
- HP bridges allow for multivendor environments, since they operate at the MAC sublayer of the ISO OSI model and are invisible to higher-level protocols.
- HP bridges are "learning bridges." They automatically learn node addresses by examining network traffic.
- There are LED displays on the front and back of every HP bridge for easy recognition of the bridge's operating condition. The LEDs will indicate power, activity, fault, self-test, transmit, receive, network, and bridge failure.
- HP bridges use the spanning tree algorithm developed by the IEEE 802.1 committee to support backup links between LANs in case of link failure. The "spanning tree" algorithm permits IEEE 802.3/Ethernet LANs be bridged in an arbitrary topology that includes alternative or redundant paths. In the event of a primary link failure, a backup link would take over thereby ensuring continued data transmission between networks. Both the HP 10:10 LAN Bridge MB and the HP Remote Bridge RB utilize this algorithm to enhance network reliability.
- HP bridges can be mounted in a standard 19-inch equipment rack or on a wall using the detachable brackets that are included with every bridge.

Console Interface

The HP Remote Bridge RB includes an RS-232 console port for monitoring and control functions within the bridge. This easy-to-use interface allows network administrators to check bridge status, spanning tree configuration, network traffic statistics, and collisions; and to perform basic diagnostics. The console interface uses a common command set, similar to that of the HP EtherTwist Hub. New product updates to the bridge firmware can be downloaded through the console port for low-cost updates. The HP Remote Bridge RBs can be accessed using a terminal or terminal emulator connected to the console port directly or via modem.

Network Management

HP OpenView Interconnect Manager/DOS provides the ability to centrally monitor and control the HP 10:10 LAN Bridge MB and the HP Remote Bridge RB in an extended IEEE 802.3 or Ethernet LAN environment.

HP OpenView Interconnect Manager/DOS provides facilities to monitor network traffic conditions, help identify and diagnose network problems, enhance network security, and increase network reliability by controlling bridges serving as redundant data paths.

Bridges are frequently used to interconnect and extend local area networks. They are in an excellent position to provide information about the network and its operation.
HP OpenView Interconnect Manager/DOS, as part of HP's comprehensive family of network management tools, provides a powerful and easy-to-use facility for HP bridge monitoring and control.

Environmental Characteristics

Operating Temperature: 0°C to 55°C (32°F to 131°F)
Relative Humidity: 5% to 95% at 40°C (104°F) noncondensing

Physical Characteristics

Dimensions: 42.54 cm by 23.5 cm by 4.34 cm (16.75 in by 9.25 in by 1.71 in)
Weight: 2.72 kg (6.0 lb)

Electrical Characteristics

ac Voltage	100-120 V	220-240 V
Current	0.5 A max	0.25 A max
Frequency	50/60 Hz	50/60 Hz

Ordering Information

The HP 28674B includes:
Bridge assembly, power cord, rack/wall mount kit, and installation manual.
Options:
001: V.35
002: RS-232
003: X.21
004: RS-422

The HP Bridge Troubleshooting Kit (HP 28689B) includes the following loopback connectors: (2) AUI, BNC, V.35, and RS-232/DB-25

Warranty

HP 28674B Remote Bridge RB is warranted for one year against defects. Check with your local Hewlett-Packard Sales Office or authorized HP LAN Dealer for more information.

HEWLETT PACKARD

HP Router CR

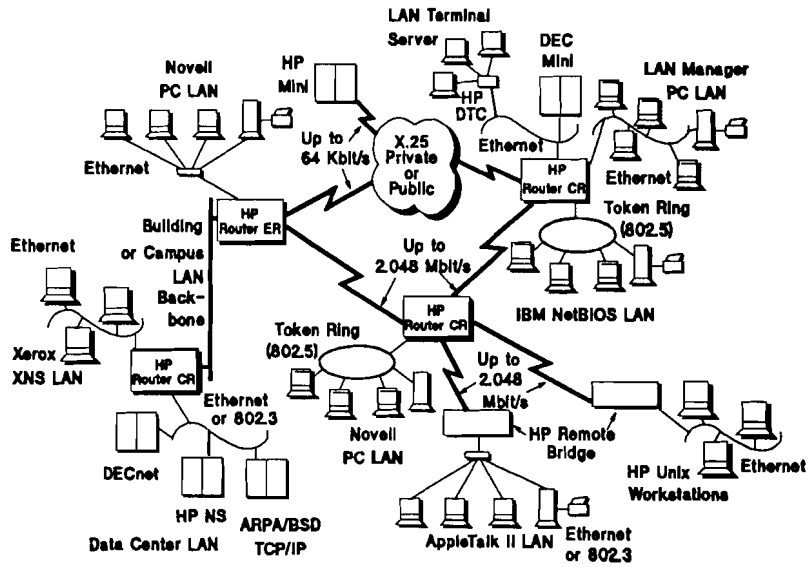
Technical Data

Product Numbers
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.

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

- 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

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

Applied Computerized Telephony (ACT)

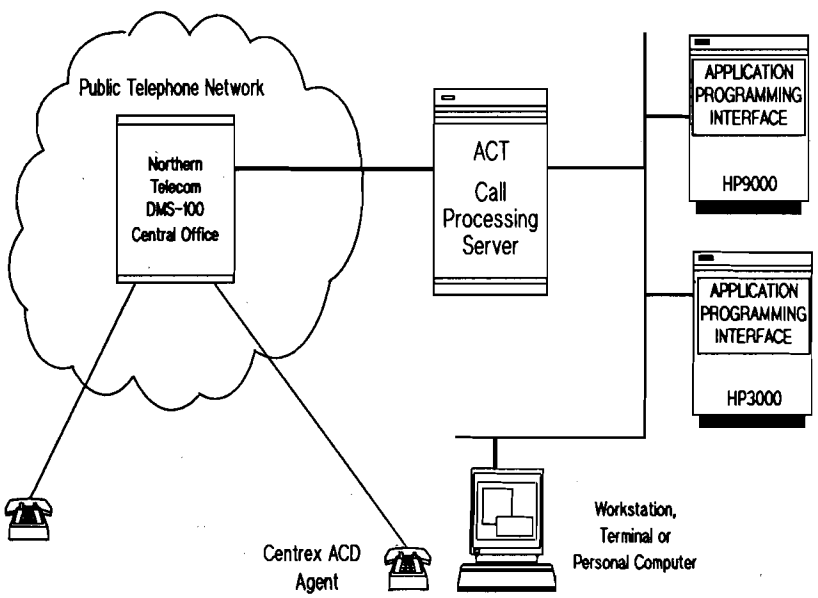
Technical Data

HP 32045A ACT-CP Server
HP 32046A ACT API-HP 9000
HP 32077A ACT API-HP 3000

ACT Call Processing Products for Northern Telecom DMS-100 Central Office Switches

A new generation of applications to leverage the integration of voice and data technologies is now available for Centrex users. The advanced call processing capabilities of digital Central Office switches can now be combined with the open applications environments of Hewlett-Packard computers via intelligent switch-to-computer interfaces. The resulting increases in productivity and revenues are benefits especially suited to telephone intensive environments such as customer service/support and telemarketing.

Hewlett-Packard integrates the voice and data environments with the Applied Computerized Telephony (ACT) Call Processing products. The ACT Call Processing Server is a server that interfaces and manages communications between Central Office switches and Hewlett-Packard computers. ACT Application Programming Interfaces (APIs) facilitate the integration of the new ACT capabilities into new and existing computer applications.



Features

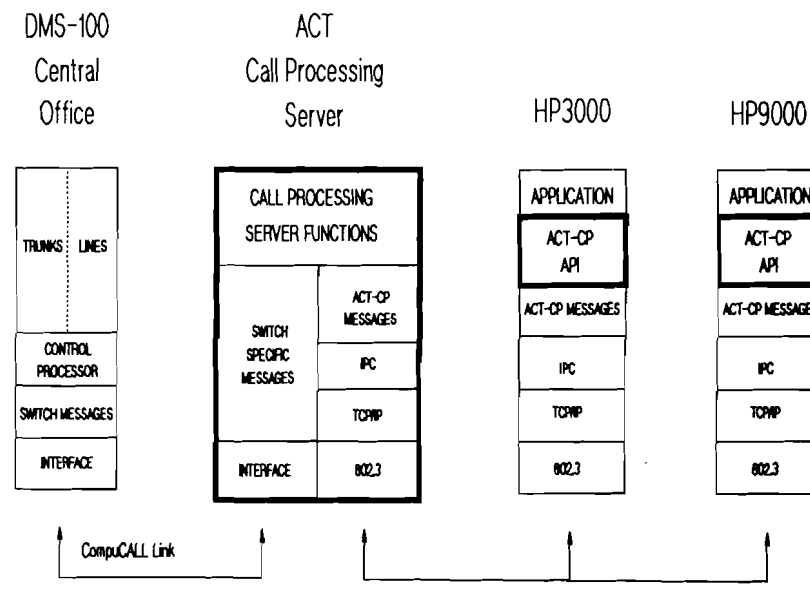
Applications, HP 3000 and HP 9000 computer-based, can utilize the ACT Call Processing Server and an ACT Applications Programming Interface (API) to provide the following types of capabilities:

Inbound Call Information

Information passed through the public telephone network allows the caller's voice call and associated data screen to be presented simultaneously to an agent. The caller's telephone number and the number that 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 enables the automatic delivery of a telephone call and product-specific data to a terminal or workstation simultaneously as the telephone rings.

Computerized Call Processing

Commands passed from computer applications instruct the switch to perform call processing functions such as make a call, disconnect a call, forward a call. This allows application controlled call routing, based on inbound 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, and 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 tool set that customers can use to enhance the capabilities of their existing applications. This tool set has also been used by numerous independent software vendors who offer custom applications for specific industries. Software vendors with applications for the financial services, distribution, customer service and catalog sales industries have applications that utilize ACT. For a complete list of these software vendors who have ACT compatible products contact your local HP Sales Office.

Functional Description

Command and status information is passed between HP computers and The DMS-100 Central Office over the CompuCALL Link, an intelligent messaging interface. Computer applications use the ACT Call Processing Server and APIs to originate, answer, and manipulate telephone calls.

Various telephone switch manufacturers provide messaging interfaces on their switches. Customer premise switches, known as Private Branch Exchanges (PBXs) and Central Offices (COs) are being

equipped with these switch-to-computer interfaces. Standards committees are currently working to evolve these interfaces into a single industry standard. Northern Telecom's CompuCALL Link, interface is modeled after the SCAI (switch-to-computer applications interface) standard. Hewlett-Packard will adhere to these industry standards as they are developed.

The Call Processing Server connects to the telephone switch via the CompuCALL Link and invokes the required function as requested by the client applications. The server tracks telephone call status information in the switch and session status information in the computer applications, and makes the logical association between the telephone call and terminal session at the desktop.

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 HP 9000 and HP 3000 computers 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 server 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.

ACT Call Processing Server

The HP 32045A ACT Call Processing Server manages sessions between multiple computer applications and the call processing features of the switch. Information received from the switch, such as the telephone number of the incoming caller or station status is passed over to specific computer applications. ACT messages originating from computer applications are converted to CompuCALL messages in order to invoke the required functions on the switch, for example, to make a call or redirect a call.

The HP 32045A ACT Call Processing Server has been architected to interface Northern Telecom's DMS-100 Central Office switch. Other HP Technical Data sheets describe additional telephony 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 also shields the programmer from the complex PBX dependent communication procedures and protocols. The APIs consist of sets of callable subroutines, such as Make Call, Connect Call, Route Inbound Call, Redirect Call, Hold Call, Answer Call, Event Monitor, and Drop Call. The APIs facilitate application development by providing an easy-to-use set of callable intrinsics for the application developers, shielding them from needing to understand the detailed workings of the telephony switch. The APIs also protect your application investment by buffering the application from changes in switch interfaces.

This is significant in circumstances where the one application is used with different manufacturers' switches. APIs allow the same application to be used, with both central office-based services and with customer premise equipment (CPE) PBXs.

ACT Product Requirements

Central Office

HP 32045A Option 101 is the ACT Call Processing Server designed to interface with the Northern Telecom DMS-100 Central Office switch or SL-100 Private Branch Exchange. The DMS-100 must be equipped with CompuCALL Link interface. These services are typically available under Centrex type service offerings from your local telephone company. For specific product information, contact your local operating telephone company.

Application Platform

The computer requirements include the appropriate ACT API software and ThinLAN interface for server communications.

On HP 3000 computer systems, order the HP 3000 LANLink, which includes the necessary TCP/IP and Net/IPC software.

On HP 9000 computer systems, Berkeley Sockets is required along with the appropriate LAN link for the 300, 400, 700 or 800 Series processor.

Consult your local HP Sales and Service Office for specific requirements for your system.

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 technical environment. We 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 or services 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 need to use the ACT technology.

ACT Project Management

Successfully implementing the infrastructure for an ACT application requires careful planning and coordination of people, equipment and, time from computer vendors, software applications providers, local operating telephone companie,s and/or long distance service 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

The first step in creating an effective voice/data application is to design it properly. ACT-trained HP personnel will work with your application program developers to assist them in creating a new ACT application, or in modifying an existing application to meet the needs of the users. Where appropriate, HP can develop a phased implementation plan where the simpler aspects of ACT, such as using the originating caller's telephone number to automatically retrieve customer file information, can be initially implemented. Later, as user needs evolve and ACT programming expertise develops, more advanced ACT capabilities, such as high volume outbound calling, can be integrated into the application.

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, local operating telephone companies, and/or long distance service providers. ACT Ongoing Support will provide you with fault isolation and problem management within your multivendor ACT installation.

All HP ACT Consulting Services are subject to local availability.

Ordering Information

ACT Components Summary

- **HP 32045A**
  ACT Call Processing Server for NT DMS-100 Central Office
  101 Preconfigured Server
- **HP 32046A**
  HP 9000 ACT Call Processing API
  AHO For Tier 1 SPUs
  AEL For Tier 2 SPUs
  AE5 For Tier 3 SPUs
  AE6 For Tier 4 SPUs
  AEN For Tier 5 SPUs
  AEP For Tier 6 SPUs
  AH1 For Tier 7 SPUs
  AEQ Series 300 Processors
  AHL Series 400/700 Processors
- **HP32077A**
  HP 3000 ACT Call Processing API
  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

Product Support

Software Support

Response Line

- **ACT Server** (H2087A+H00)
  #101 Northern Telecom PBX
- **HP3000 APIs**
  #200 Low-End MPE XL
  #201 Mid-Range MPE XL
  #202 High-End MPE XL
- **HP9000 APIs**
  #300 Series 300/400
  #301 Low-End S800
  #302 Mid-Range S800
  #303 High-End S800

Basic Line

- **ACT Server** (H2088A+L00)
  #101 Northern Telecom PBX

Hardware Support

- **Priority Plus (24 Hours)**
  ACT Server (32044A+02G)
- **Priority (8 a.m.–9 p.m.)**
  ACT Server (32044A+02A)
- **Next Day (8 a.m.–5 p.m.)**
  ACT Server (32044A+02C)
- **Scheduled**
  ACT Server (32044A+02L)
- **Installation**
  ACT Server (32044A+17A)
  HP3000 API (32077A+17A)
  HP9000 API (32046A+17A)
- **Software Update Service**
  ACT Server (H2089A+S00)
  #101 Northern Telecom PBX
  #AA0 1/4-inch Tape

Multivendor Network Support

- **NetAssure**
  ACT Server (32044A+16B)
  Northern Telecom PBX (50052P)

Consulting

- **ACT Assessment**
  HP ConsultLine (H2355A Module N)
- **ACT Project Management**
  HP ConsultLine (H2355A Module 9)
- **Application Assistance**
  HP ConsultLine (H2405A Module N)

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HEWLETT PACKARD

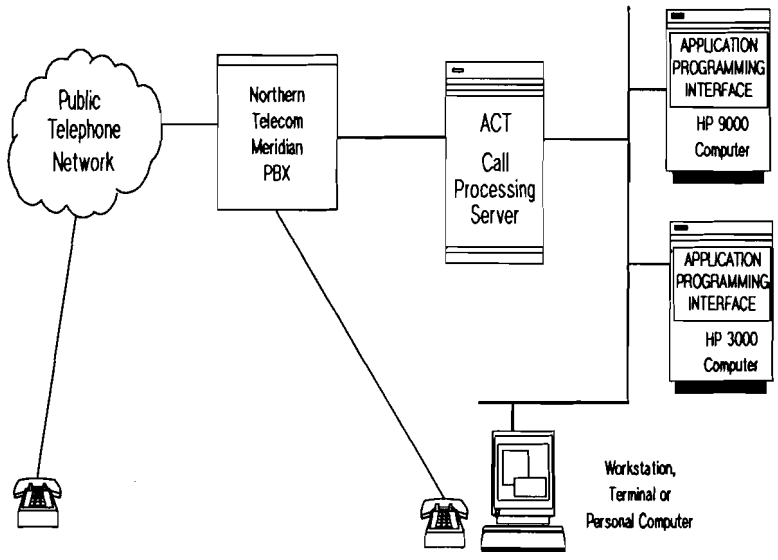
Applied Computerized Telephony (ACT)

Technical Data

HP 32044A ACT-CP Serve
HP 32046A ACT API-HP 9
HP 32077A ACT API-HP 3

ACT Call Processing Products for NT Meridian 1 Private Branch Exchange

An exciting new generation of applications leverage the integration of voice and data technologies to increase productivity and revenues. The advanced call processing capabilities of Northern Telecom Meridian 1 PBX can now be combined with the open application environment of HP computers via intelligent computer-to-PBX interfaces. The resulting benefits are especially suited to telephone intensive environments such as customer service/support and telemarketing. Hewlett-Packard addresses these customer needs with the Applied Computerized Telephony (ACT) Call Processing products. The ACT Call Processing Server is a server that interfaces and manages communications between the PBX and HP computers. ACT Application Programming Interfaces (APIs) facilitate the integration of the new ACT capabilities into new and existing computer applications.



Features

Applications, both HP 3000 and HP 9000 computer-based, utilize the ACT Call Processing Server and an ACT Applications Programming Interface (API) to provide the following types of capabilities:

Inbound Call Information

Information passed from the telephone network to the PBX, such as the originating caller's telephone number and the number that was called, 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 called), and 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

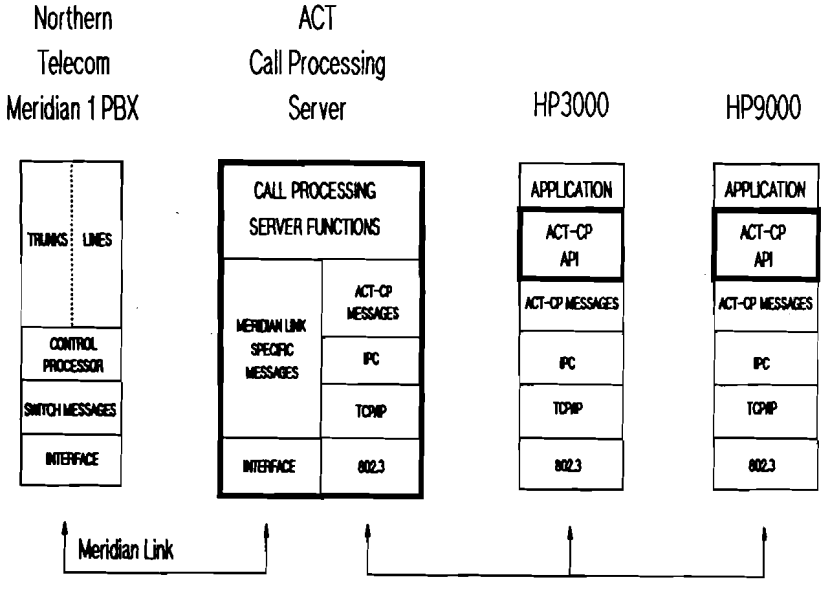
Commands passed from computer applications instruct the PBX to perform call processing functions, such as make a call, disconnect a call, or transfer a call. This allows intelligent call routing based on inbound call information, and automated dialing from numbers in a computer database.

Outbound Calling

ACT increases productivity in outbound calling environments. With automated dialing applications, agents go from call to call, and avoid manually dialing numbers and listening to busy signals and unanswered ringing. This results in substantial increases in agent productivity.

Industry-Specific Applications

ACT provides a toolset that customers can use to enhance the capabilities of their existing applications. This toolset has also been used by numerous independent software vendors who offer custom applications for specific industries. Software vendors with applications for the financial services, distribution, customer service, and catalog sales industries have applications that utilize ACT. For a complete list of these software vendors who have ACT compatible products contact your local HP Sales Office.



Functional Description

Command and status information is passed between HP computers and the PBX 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 PBX and invokes the required function as requested by the client applications. The server tracks telephone call status information in the PBX, session status information in the computer applications, and makes the logical association between the telephone call and terminal session at the desktop.

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 HP 9000 and HP 3000 computers to facilitate applications development. The

APIs format application requests into ACT messages and communicate with the PBX via the ACT Call Processing Server. The server 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 PBX. Various telephone switch manufacturers provide proprietary messaging interfaces on their switches. Customer premise switches, known as Private Branch Exchanges (PBXs) and Central Offices (COs) are being equipped with these switch-to-computer interfaces. Standards committees are currently working to evolve these proprietary interfaces into a single industry standard. Hewlett-Packard will adhere to these standards as they are developed.

ACT Call Processing Server

The HP 32044A ACT Call Processing Server manages sessions between multiple computer applications and the call processing features of the PBX. Information received from the PBX, 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 PBX specific messages in order to invoke the required functions, for example to make a call or transfer a call.

The HP 32044A ACT Call Processing Server has been architected to interface with the Northern Telecom Meridian 1 line of PBX's. Other HP Technical Data sheets describe additional telephony 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 also shields the programmer from the complex PBX dependent communication procedures and protocols. The APIs consist of sets of callable subroutines, such as Make Call, Connect Call, Hold Call, Conference Call, Answer Call, Event Monitor, and Drop Call. The APIs facilitate application development by providing an easy to use set of callable intrinsics for the application developers, shielding them from the detailed workings of a specific vendor's PBX. The APIs also protect your application investment by buffering the application from minor technical changes in PBX interfaces.

ACT Product Requirements

PBX

HP 32044A Option 101 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 and Automatic Call Distribution (ACD) software. For specific PBX application configuration requirements, Northern Telecom or an authorized distributor should be consulted.

Application Platform

The computer requirements include the appropriate ACT API software and ThinLAN interface for server communications.

On HP 3000 systems, order the HP 36923A ThinLAN 3000 Network Link, which includes the necessary TCP/IP and Net/IPC software.

On HP 9000 systems, Berkeley Sockets is required along with the appropriate LAN link for the 300, 400, 700 or 800 Series processors.

Consult your local HP Sales and Service Office for specific requirements for your system.

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 is available. These ACT Consulting services include:

ACT Assessment

HP will work with you to determine the best way to use ACT in your specific 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.

ACT Project Management

Successfully implementing the infrastructure for an ACT Application requires careful 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 that is required for your ACT installation.

ACT Application Assistance

The first step in creating an effective voice/data application is to design it properly. ACT trained HP personnel will work with your application program developers to assist them in creating a new ACT application, or in modifying an existing application. HP can develop a phased implementation plan where the simpler aspects of ACT, such as using the originating caller's telephone number to automatically retrieve customer file information, can be initially implemented. Later, more advanced ACT capabilities, such as high volume outbound calling, can be integrated into the application.

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 subject to local availability.

Ordering Information

ACT Components Summary

- **HP 32044A**
  ACT Call Processing Server for Northern Telecom Meridian PBX
  101 Preconfigured Server
- **HP 32046A**
  HP 9000 ACT Call Processing API
  AHO For Tier 1 SPUs
  AEL For Tier 2 SPUs
  AE5 For Tier 3 SPUs
  AE6 For Tier 4 SPUs
  AEN For Tier 5 SPUs
  AEP For Tier 6 SPUs
  AH1 For Tier 7 SPUs
  AEQ Series 300 Processors
  AHL Series 400/700 Processors
- **HP 32077A**
  HP 3000 ACT Call Processing API
  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

Product Support

Software Support

Response Line

- **ACT Server** (H2087A+H00)
  # 101 Northern Telecom PBX
- **HP 3000 APIs**
  #200 Low-End MPE XL
  #201 Mid-Range MPE XL
  #202 High-End MPE XL
- **HP 9000 APIs**
  #300 Series 300/400
  #301 Low-End S800
  #302 Mid-Range S800
  #303 High-End S800

Basic Line

- **ACT Server** (H2088A+L00)
  #101 Northern Telecom PBX

Hardware Support

- **Priority Plus (24 Hours)**
  ACT Server (32044A+02G)
- **Priority (8 a.m.–9 p.m.)**
  ACT Server (32044A+02A)
- **Next Day (8 a.m.–5 p.m.)**
  ACT Server (32044A+02C)
- **Scheduled**
  ACT Server (32044A+02L)
- **Installation**
  ACT Server (32044A+17A)
  HP3000 API (32077A+17A)
  HP9000 API (32046A+17A)
- **Software Update Service**
  ACT Server (H2089A+S00)
  #101 Northern Telecom PBX
  #AA0 1/4-inch Tape

Multivendor Network Support

- **NetAssure**
  ACT Server (32044A+16B)
  Northern Telecom PBX
  (50052P)

Consulting

- **ACT Assessment**
  HP ConsultLine
  (H2355A Module N)
- **ACT Project Management**
  HP ConsultLine
  (H2355A Module 9)
- **Application Assistance**
  HP ConsultLine
  (H2405A Module N)

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HEWLETT PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products – ACT Support Summary

ACT Assessment	ACT Project Management	ACT Application Assistance	ACT Technical Training	ACT Ongoing Support

Hewlett-Packard offers a full range of technical consulting services for the Applied Computerized Telephony program. The ACT installation can be achieved easily through the assistance offered with the ACT Consulting Services available.

A successful ACT installation requires coordination with the provider of the telephone switch, public network service, application, computers, and the associated networking. Each component may be handled by different personnel at your location. Tight coordination of these elements result in a smooth and efficient implementation of ACT. Hewlett-Packard can achieve this result with the ACT Consulting Services, which can be specifically tailored for your environment.

These ACT Consulting Services include:

ACT Assessment
HP will work with your telecom operation, MIS staff, and other suppliers to assess your current environment and outline the equipment necessary for a successful installation of ACT.

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 work with the application developer to determine the extent ACT will integrate into your application and if needed, will assist the program developer to implement ACT into your application.

ACT Technical Training
HP will offer technical training for the individuals responsible for implementing and maintaining an ACT installation. The student will learn how ACT is implemented in new or existing applications.

ACT On-Going Support
HP will provide you with fault isolation and problem management among the different vendors used in your ACT installation.

Additional Information
Refer to the individual ACT data sheets for additional information. Contact your local sales office for more details.

HEWLETT PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products – ACT Assessment

ACT Assessment | **ACT Project Management** | **ACT Application Assistance** | **ACT Technical Training** | **ACT Ongoin Suppor**

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 H2355A Module N Custom Network Consulting. Contact your HP Sales Representative for local availability.

HEWLETT PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products – ACT Project Management

ACT Assessment	**ACT Project Management**	ACT Application Assistance	ACT Technical Training	ACT Ongoing Support

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 H2355A Module 9 Project Management Network Consulting. To obtain additional information and availability, contact your HP Sales Representative.

HEWLETT PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products – ACT Application Assistance

ACT Assessment	ACT Project Management	ACT Application Assistance	ACT Technical Training	ACT Ongoin Suppor

HP will assist you in modifying your application to work with the ACT APIs (Application Programming Interfaces). 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 evalua-tion, 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 H2405A Module N Custom Information Management Network Consulting. To obtain additional information and availability, contact your HP Sales Representative.

HEWLETT PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products – ACT Technical Training

ACT Assessment	ACT Project Management	ACT Application Assistance	ACT Technical Training	ACT Ongoing Support

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 APIs (Application Program-ming Interfaces) 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 the 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
- Telephony Environment
- PBX and Centrex Overview
- Telephone Environment Lab
- ACT API Introduction

Day 2
- ACT API Labs
- Installation/Configuration
- Design Introduction
- Application Design Labs
- ACT Consulting Services

Day 3
- API Programming Lecture
- 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 provide the following functionality using ACT APIs:

- Make, Answer, Transfer, and Drop a call using a computer keyboard
- Display information about the call, using caller and calling number identifiers.

Ordering Information
Ordered under training number SE3044. Contact your local sales office for more information on the dates of the next ACT Technical training class, or to determine class availability.

HEWLETT PACKARD

Applied Computerized Telephony (ACT)

Technical Data

Support Products – ACT Ongoing Support

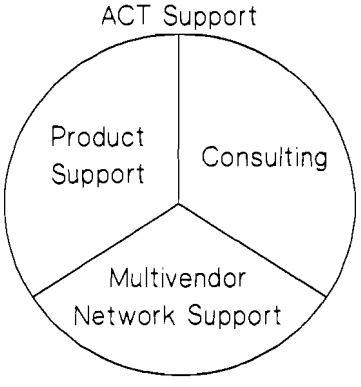
ACT Assessment	ACT Project Management	ACT Application Assistance	ACT Technical Training	ACT Ongoing Support

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 Ongoing 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
- Multivendor Network Support
- Consulting



Product Support

ACT product support is handled in the same fashion as other HP products by separating the support for:

- Software Support
- Hardware Support
- Installation
- Software Update Service

Software Support
This support product covers the software involved with the ACT Server software and ACT APIs (Application Programming Interfaces).

- **Response Line:** HP will provide phone assistance to help resolve ACT related problems. This service also provides read/write access to a product update database.
- **Basic Line:** HP provides the license to use software in an environment with multiple ACT Servers. This service also

provides read-only access to a product update database.

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.

Installation
The ACT Server is considered customer installable; you may choose however, to have HP install and configure the ACT server.

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

Product Support

Software Support
Response Line
- **ACT Server** (H2087A+H00)
  #101 Northern Telecom PBX
- **HP 3000 APIs**
  #200 Low-End MPE-XL
  #201 Mid-Range MPE-XL
  #202 High-End MPE-XL
- **HP 9000 APIs**
  #300 Series 300/400
  #301 Low-End S800
  #302 Mid-Range S800
  #303 High-End S800

Basic Line
- **ACT Server** (H2088A+L00)
  #101 Northern Telecom PBX

Hardware Support
- **Priority Plus (24 Hours)**
  ACT Server (32044A+02G)
- **Priority (8 a.m.–9 p.m.)**
  ACT Server (32044A+02A)
- **Next Day (8 a.m.–5 p.m.)**
  ACT Server (32044A+02C)
  Scheduled
  ACT Server (32044A+02L)

Installation
- ACT Server (32044A+17A))
- HP3000 API (32077A+17A)
- HP9000 API (32046A+17A)

Software Update Service
- ACT Server (H2089A+S00)
  #101 Northern Telecom PBX
  #AA0 1/4-inch Tape

Multivendor Network Support

NetAssure
- ACT Server (32044A+16B)
- Northern Telecom PBX (50052P)

Consulting

ACT Assessment
- HP ConsultLine (H2355A Module N)

ACT Project Management
- HP ConsultLine (H2355A Module 9)

Application Assistance
- HP ConsultLine (H2405A Module N)

HEWLETT PACKARD

HP OpenView Network Management Server

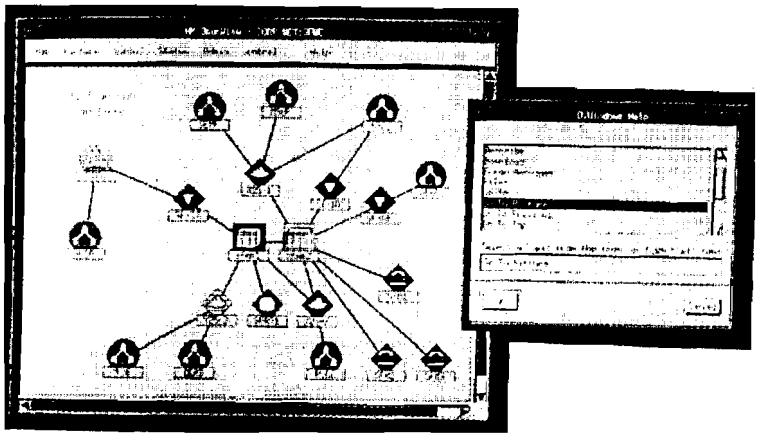
Technical Data

HP OpenView Network Management Product Numbers 36985A-36994A

Welcome to HP OpenView

HP OpenView is a complete family of Hewlett-Packard tools and services for managing local- and wide-area multivendor networks. HP OpenView is the result of Hewlett-Packard's long-recognized expertise in providing multivendor networking solutions, test and measurement equipment, and worldwide support which is ranked second to none.

Hewlett-Packard's proven quality delivers the reliability needed to manage today's mission-critical asset, the information network. As a predominant supplier of workstations and a leading innovator in RISC-based computing, Hewlett-Packard's scalable family of network management solutions provide tools to manage small workgroups as well as global data and voice networks. All this is possible through the consistent application of industry and international standards.

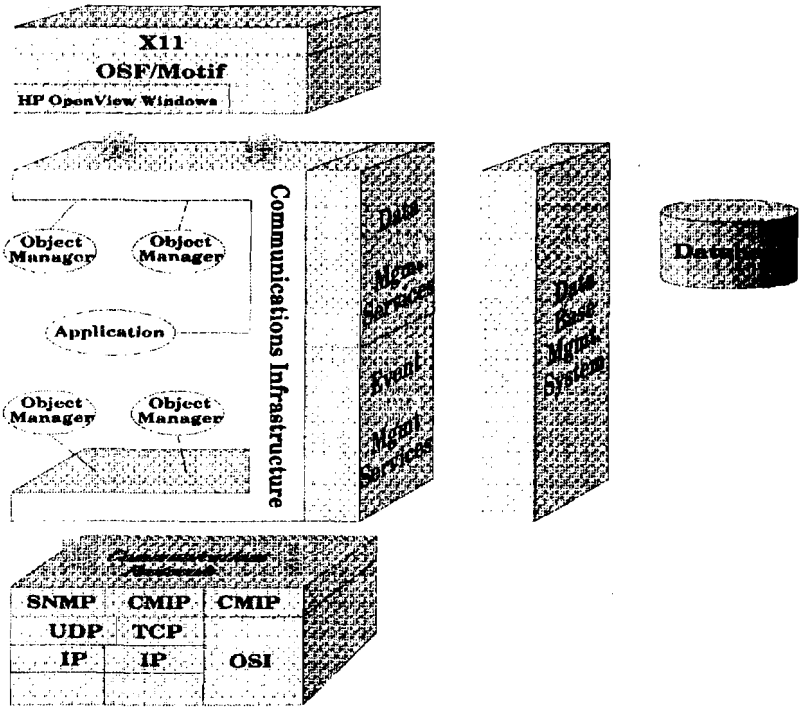


The Need for Integration

Network downtime directly impacts a company's bottom line. As networks become more complex and geographically dispersed, organizations face a growing need for effective network management.

Corporate management recognizes the strategic value of timely, reliable, and cost-effective dissemination of information. Faced with budget constraints, lack of staff resources, and skill limitations, network managers are being asked to quickly assimilate increasingly complex technology. The almost unbounded choice of connectivity options has led to complexity and fragmentation in managing networks. Integrated network management solutions provide an economical alternative to the increasing confusion caused by the proliferation of stand-alone, proprietary network management systems.

No single vendor can supply a complete solution to manage the complexities of integrated data-and-voice networks. Network managers at different levels in an organization and with multi-functional requirements all share a common need for a window into their sprawling networks. HP OpenView offers the tools and support to seamlessly integrate network management functions, simplifying the task of planning, operating, and expanding today's networks. The HP OpenView NM Server integrates network information from multiple network management systems, including the HP OpenView PC-based products. The HP OpenView Server meets users' needs for independence and corporate requirements for multivendor integration.



The Hewlett-Packard Approach to Multi-Vendor Network Management

HP OpenView Architecture

Some vendors started with a set of disparate products and, almost as an afterthought, built an architecture around them. Hewlett-Packard's OpenView Architecture was designed as the foundation for an open, modular, distributed solution to today's and tomorrow's network management problems. Derived from the OSI Management Framework and optimized to include TCP/IP networks, the HP OpenView Architecture provides a model for the creation of an object-oriented solution. Perhaps the most important contribution of this model is the building block concept for management. HP's OpenView Architecture decomposes the problem of managing networks into three major components: User Interfaces, Management Applications, and Management Services. User Interfaces are client-based; Management Applications and Services are server-based and are accessed transparently by the user. Client and server software can run on the same or distributed systems. Open access to these services provides scalable, integrated solutions for the ever-changing network management environment. This approach protects investments in applications and provides the foundation for the incorporation of emerging technologies.

The Object-Oriented Approach

An object-oriented approach is key to providing comprehensive solutions to the network management problem. Today people need to integrate the management of individual components. Tomorrow's technologies, such as rule based systems, can be incorporated on top of existing functionality to protect today's application investment.

The power of the object-oriented technology is evident in the HP OpenView architecture and implementation. HP leveraged the OSI approach to object definition and extended its use from lower level network elements to management services. Dramatic productivity improvements are realized by treating the entire network and the network management system as a collection of objects to be manipulated by applications and management services.

Using Standards to Innovate
Hewlett-Packard leads the industry in its commitment to networking standards by contributing to and implementing standards in both the TCP/IP and OSI domains. To simplify migration from TCP/IP to OSI networks, HP supports the coexistence of tools to manage both networking solutions. The results of this work are now realized in the HP OpenView NM Server, which gives users a choice of protocols and Management Information Bases (MIBs). HP's implementation of these standards enables transparent access to the server-based functionality.

The HP OpenView NM Server Features and Benefits

An open application development environment
At the core of the solution is the HP OpenView NM Server, an open application development environment. Software developers use this application development environment, with its fully documented and supported set of Application Programming Interfaces (APIs), to create comprehensive network management applications. These applications leverage the services provided by the NM Server and other applications or management services. The use of common APIs protects the applications as emerging technologies and standards are incorporated within this development environment.

The HP OpenView NM Server is made up of several key components: HP OpenView Windows and the Communications Infrastructure which gives access to Event Management Services, Data Management Services, and Communication Protocols. Developers focus on network management applications and have easy access to these shared resources to increase productivity.

HP OpenView Windows Integrating Graphical User Interface
The advanced graphical user interface uses OSF/Motif, which is derived from HP's technical contribution to the Open Software Foundation. Through this interface, the network manager is given an open view of the network and seamless integration of management functions regardless of vendor or network element type. The operator simply selects the device on the graphical map and executes commands through pull-down menus that are managed by HP OpenView Windows.

For the application developer, HP OpenView Windows provides a consistent user interface to all network management applications on the NM Servers. This consistency promotes ease of use, minimizes learning time and reduces the need for costly training of operations staff.

HP OpenView Windows dynamically creates and displays a network map that represents the actual network topology. Status changes in the network are displayed through changing colors on the network map. The network manager can directly manipulate the network and its components and display the attributes of the component through the consistent user interface. Multiple windows can be opened to monitor and control different parts of the network allowing the manager to see the

interaction among several components of the network, even when network management applications are from different vendors or are distributed throughout the network.

Event Management Services
Network events include component failure, component state change, and security violation. Through event management services, data related to events are collected and forwarded to the appropriate applications and events are logged. Event Management Services provide the information to do, for example, performance analysis and history reporting. This service frees the application developers from the details of event tracking and logging. From HP OpenView Windows, the network manager can select the event log and access event information across the entire network. Report writing applications can be developed to access this information.

Distributed capability through a powerful infrastructure
The HP OpenView NM Server offers a powerful Communications Infrastructure with a well-defined API for distributed applications. Applications need only refer to services, local or distributed, by name; the Communications Infrastructure manages the directory of names and addresses.

Location transparency provides flexibility, not only in the design of applications, but also in the deployment of network management systems throughout a company. HP OpenView gives you the freedom to organize your network management according to the needs and structure of your organization, instead of making your organizational structure fit into a rigid network management configuration.

Extensible standard-based MIB
Applications access data from a single logical repository through the use of documented interfaces. This eliminates inconsistency in the definition of objects in the network. Each application is spared the effort of independently storing and maintaining the data it needs. As data changes, all applications have immediate access to the new values. This function is provided by one of the management services of the HP OpenView Architecture, Data Management Services.

Through the Communications Infrastructure API, the application developer is protected from needing to know about different file and database systems and even the type and location of the actual storage mechanism. Applications can be written without the need to develop a data storage subsystem.

In addition, guidelines are provided on how to programmatically download data into any SQL database for easy generation of reports.

Data Management Services support the current definition of the Internet MIB and are extensible to include any other objects and standards. A key feature of Data Management Services is the notion of metadata. Metadata is a self-describing database representation of all MIB information. In other words, metadata is data about data. Along with standard MIBs, new objects and attributes can be easily added to the system through a metadata compiler. This metadata compiler takes simple information about the object and integrates this information into the MIB. Without rewriting applications, new types of objects can be managed by adding the information to the MIB.

Communication Protocols
The HP OpenView NM Server currently supports SNMP and CMOT, the two industry-standard network management protocols for TCP/IP networks. The communication services are accessed through the Communications Infrastructure API, which means that SNMP, CMOT, and later CMIP over OSI are accessible through one, common interface. This eliminates the need to change application interfaces as standards evolve.

The HP OpenView Architecture building block approach provides protection for the application investment today and smooth migration to OSI.

Putting the solution to work
The HP OpenView NM Server provides the architectural foundation, the standards-based openness and technical innovation to solve pressing multivendor network management problems today. In addition, Hewlett-Packard provides application developers with comprehensive support to translate technical innovations into productivity gains and high value solutions to network management users.

HP OpenView NM Server Support Services

For programmers and analysts who develop network management applications, HP offers consulting, training, and support. In addition to the standard support services that have earned Hewlett-Packard a number one ranking in overall support customer satisfaction, HP provides tailored training and consulting services for network management application development.

Technical Evaluation Guide
The HP OpenView NM Server Technical Evaluation Guide contains detailed technical information to further expand on the capabilities provided by the HP OpenView NM Server. This guide will allow a development team to quickly assess the benefits of developing applications with the HP OpenView NM Server.

Developer Training
Training on the use of the HP OpenView NM Server for the development of network management applications will be available through HP's Customer Training Centers. In addition to design and consulting, in-depth training is provided to take advantage of the HP OpenView NM Server development environment.

Network Management Application Design & Consulting
This service is provided to assist in the design of network management applications. Hewlett-Packard's design expertise increases your use of the power in the HP OpenView NM Server and shortens the learning cycle to develop object-oriented solutions.

Ongoing Support
HP has extensive experience in bringing emerging technology products to market. This experience has been leveraged to provide the highest levels of responsiveness and technical expertise.

Ordering Information

Configuration Information
The HP OpenView NM Server runs on the HP 9000 Series 300 and 400 (workstations) and Series 800 and 600 (multi-user) HP-UX systems and supports high-resolution bit-mapped color displays. User input is with keyboard and mouse. For hardware and software configuration, contact your HP sales representative.

Product	Product Number	
	Series 300, 400	Series 600, 800
HP OpenView NM Server Developer Software	36985A	36987A
HP OpenView NM Server End User Software	36990A	36992A

Specification Summary	
User Interface	OSF/Motif/X11 based high-resolution graphics.
Infrastructure	Common API to access all management services.
Communication Protocols	SNMP and CMOT. CMIP over OSI later through same API.
Event Management Services	Common collection, forwarding, and logging of network events.
Data Management Services	Supports IETF MIB (RFC 1066). Based on OSI SMI.
Application Integration	Multiple, concurrent application integration through object registration, graphical display, and common MIB.

Ordering Information

For network management application developers: The HP OpenView NM Server Developer software includes documentation and code samples for application development. One copy is necessary for each user who will be accessing the software.

For resale to network management application end-users: The HP OpenView NM Server End User software is necessary for each system that will be executing applications created with the HP OpenView NM Server Developer software.

For additional information, contact your Hewlett-Packard sales representative or refer to the HP OpenView NM Server Technical Evaluation Guide (5952-1125).

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HP OpenView Windows/DOS Development Products

Technical Data

HP OpenView Network/Systems Manager Product Numbers D1825A, D1826A, and D1828A

Need for the Management of Networks and Systems

Networks, and the devices and systems connected by networks, are critical to the success of today's organizations. Managing these resources is also critical to organizational success. As networks and systems become more complex and geographically dispersed, organizations face growing difficulties in managing networks and systems effectively and efficiently.

Welcome to HP OpenView

HP OpenView solves the need for the integrated management of distributed computing resources. It is a complete family of cohesive products and services for administrators and developers. HP OpenView is based on multivendor, multiplatform, multiprotocol, industry standards. The solution is HP OpenView.

With HP OpenView, management applications from all vendors can provide to their customers effective management of the highest quality based on industry standards.

HP OpenView Windows/DOS

HP OpenView Windows/DOS is a comprehensive management environment for the DOS and Microsoft® Windows® world. HP OpenView Windows/DOS is a family of coordinated products. It is a complete Developer's Kit for developers of network and system management applications. It is a comprehensive set of developer support services that lives up to HP's outstanding support reputation. It is also attractively priced run-time licenses for developers to include with the developer's applications.

Benefits to Application Users

HP OpenView Windows/DOS provides administrators with ease of learning and ease of management. It also protects existing and future investments through the support of multivendor standards.

Benefits to Application Developers

HP OpenView Windows/DOS is particularly attractive to developers that need:

- A low-cost solution
- A solution to be sold through the retail channel
- A solution to manage PCs or PC networks.

With HP OpenView Windows/DOS, developers will greatly reduce their development costs and will bring their management applications to market faster.

Features for Application Users

Today's organizations need networking. They need print and file servers. They need hubs, bridges, routers, modems, switches, widgets, and gizmos. But they don't just want to buy these things; they need to use them everyday, forever. To ensure that they will be available when needed, organizations need to manage these valuable resources.

Management applications that have been developed using HP OpenView Windows/DOS have a number of features that make those applications much more attractive to the people that make purchasing decisions. HP OpenView Windows/DOS is the leading multivendor management platform today because the market is demanding the features that it has to offer. A management application that uses HP OpenView Windows/DOS has a substantial advantage in today's market.

Microsoft Windows Based

HP OpenView Windows/DOS is based on Microsoft Windows. Microsoft Windows is the most widely accepted user interface for PCs. Microsoft Windows provides an effective point-and-click user interface. With Microsoft Windows, multiple applications can run at the same time allowing for efficient manager multitasking. The Microsoft Windows environment permits management applications to run in the background while doing other work. Microsoft Windows also manages the PC's memory usage, permitting larger and more sophisticated applications.

Network/System Map

HP OpenView Windows/DOS provides an integrated network and/or system map. The map can have a number of submaps representing many levels of network or system resolution and different locations. Each submap can be superimposed on a background image. This image can represent a country, a city, a floor plan of an office, or the back panel of a network device, complete with lights and switches.

Moving between submaps is very quick and efficient using the point-and-click user interface. Point-and-click, along with the integrated network/system map, is one of the most important features for efficient management. With point-and-click and a map, an administrator can quickly isolate the cause of network or system fault.

HP OpenView Windows/DOS provides map drawing tools to allow an administrator or the developer's application to draw the network/system map. A large number of device icons are provided. Developers can create custom icons for their devices. HP provides a registration service to prevent conflicts between icons.

Standard Graphical User Interface

In addition to the Microsoft Windows-based interface, HP OpenView Windows/DOS has further defined a standard graphical user interface (GUI). This interface defines or provides guidelines for menus, icons, dialog boxes, buttons, error messages and a Microsoft Windows-based help. Alarms are logged and displayed constantly.

With these GUI standards, a user can easily switch between management applications without having to relearn the user interface.

Multiple Management Application Integration

With a standard GUI and an integrated map, HP OpenView Windows/DOS makes multiapplication, multivendor management possible. Different management applications from different vendors can run at the same time within the same PC and share the same map (and submaps).

A map or submap can contain devices and systems from a number of vendors. If an administrator is alerted that a group of PCs is "down" or not responding, the administrator can diagnose the problem across multiple possible sources of fault. He or she can check the XYZ hub to see if it is operating properly. Then the ABC PC server can be verified to be up and running. As each device is selected, the administrator will actually be entering the specific

application designed to manage that device. The menu choices will be tailored to that device and the management information will be specific to that device. True integrated network and system management is possible.

This level of integration will require coordination between vendors, but HP is facilitating that coordination. In fact, integration of this kind is working today.

Multilevel Management

While customers do not want to devote four management stations to manage four different types of devices, they do want the ability to manage all four from as many desks as they choose. Today, multiple location management is expected. More difficult to develop, however, is the ability to have multiple levels of management. Organizations need to manage local workgroup devices from a desk within the site or department. They also need to be able to manage all of these devices from one or more desks in a central location. This means that management information must not only be tracked by the management application, but also be collected and fed to a central manager-of-managers (M.O.M).

HP OpenView Windows/DOS provide tools to help create just such a M.O.M family of products. The platform offers SNMP communication to allow an application to reply to a M.O.M request for management information. In general, this will help applications fit into a wide variety of customer management situations. In particular, HP's DOS or UNIX® products are also well suited to filling the role of the central manager-of-managers.

Additional Features for Application Developers

Because application users are the customers of application developers, all of the previous features are of interest to developers. But there are also a number of features in HP OpenView Windows/DOS that are of specific importance to developers.

Management application developers want to provide their customers with the management products that are both needed and will be bought. Developers want to provide products with the least amount of cost in time-to-market and effort. Developers also want to keep the rewriting of code to a minimum. The HP OpenView Windows/DOS platform will substantially help in all of these areas.

Graphics

There are a number of areas of development necessary to create a management application. Many of these areas are specific to the management of the particular devices. Others are the more general needs of providing an interface for the application user. While it is not always the case, it is frequently the latter need to provide a graphical user interface and mapping ability that management developers are least experienced in providing. These are two areas that HP OpenView Windows/DOS does provide. By working with the HP OpenView Windows/DOS platform, developers are able to concentrate their valuable programming resources on the part of the effort they know best. With substantial programming effort provided by HP OpenView, the application will be selling on the market more quickly.

Other Application Areas

In addition to the graphics areas HP OpenView Windows/DOS gives developers two other parts of a management application, so that the developer does not need to spend development resources. HP OpenView Windows/DOS provides menu handling. The developer decides what a menu item will say and do, and HP OpenView Windows/DOS will create the menu and the interface with Microsoft Windows. The product also supplies alarm handling and logging. These actions are both application specific and include generic alert notification and alarm logging.

Development Support

HP has a long-respected reputation for the finest quality support, and HP OpenView is no exception. HP support for

HP OpenView Windows/DOS developers begins before application development has begun. The developer is not just provided with the development software. Extensive documentation, sample code, and product style guidelines are also provided.

During development, HP provides a responsive confidential support service via CompuServe to answer questions. A monthly newsletter is also available to keep developers up to date. In addition, access is provided to "questions and answers" about the products and information about other important issues such as a matrix of applications that integrate together.

HP support is around for the long term as well. Each time HP develops a new release of the HP OpenView Windows/DOS product, developers are provided with a new copy of the Developer's Kit. In order to help developers get their products out as soon as possible, HP frequently provides an early "developer's" release. This occurs about three months prior to the final product's availability. Every six to twelve months, HP holds developers' conferences. These are events that allow HP to share product plans with developers and give HP a chance to listen to customers. At other times, HP offers special events, such as HP testing sessions, to allow developers to test how their applications integrate with other applications on the same PC and the same HP OpenView product release.

Keeping Up with Technology and Standards

Everything related to PCs changes frequently. Everything related to networking changes frequently. These are facts facing management application developers. Changes tend to come from advances in technology and from changes in standards. HP OpenView Windows/DOS will help developers keep up with the changes. HP releases a new version of the platform on the average of every six to nine months. This will not protect developers from ever having to change their applications, but graphics and the user interface are two of the most difficult areas with which to stay current. These are two of the areas that HP OpenView Windows/DOS is constantly upgrading. The effort saved by developing with HP OpenView Windows/DOS is not over once the first version of an application is shipped; the benefits continue year after year.

HP OpenView Name and Compatibility

HP OpenView Windows/DOS is the leading platform for management applications in the DOS world. It provides the key features that network and system administrators are demanding. The DOS-based platform is an important part of the overall HP OpenView strategy for network and system management. This strategy has become a critical part of the Distributed Management Environment (DME) standard established by the Open Systems Foundation (OSF). One key way in which the DOS platform participates in the DME strategy is through the multilevel management discussed previously.

By developing on HP OpenView Windows/DOS, an application has a headstart in the market in two ways: First, the HP OpenView name is widely accepted as a leader in network and systems management. Second, an HP OpenView application provides compatibility with the leading management platform and potentially provides compatibility with the leading management applications on the market.

HP OpenView Windows/DOS Products

Typically a developer provides his or her customers with a network device or system. In addition, the developer needs to provide an application to manage these devices. In some cases, the developer has already created a management application, and customers are requesting that he or she add Microsoft Windows and mapping capabilities. In a few instances, a developer may already be providing Microsoft Windows and/or mapping ability.

In each of these cases, HP OpenView Windows/DOS is attractive for all of the reasons described previously. Even a developer with an application that provides full Microsoft Windows and mapping ability will be interested in becoming HP OpenView compatible and avoiding some future development time and expense.

Usually the first step is to read this data sheet and/or talk to an HP representative. When the developer thinks that he or she is ready to move to HP OpenView, the Evaluation Kit is purchased in order to fully understand what is involved in interfacing with the platform. In many cases, the developer has made the decision to develop an HP OpenView application and will now purchase the Developer's Kit.

Whether or not a developer uses the Evaluation Kit in the decision process, the Developer's Kit will probably not be purchased until the developer is ready to actually start development. The HP OpenView Windows/DOS Developer's Kit provides everything that is needed to develop an application. Additional non-HP tools, such as a compiler and the Microsoft Windows Software Development Kit, are needed.

With the HP OpenView Windows/DOS Developer's Kit, the developer is ready to start the development or the porting of the management application. As development proceeds, support and product upgrades will be provided by a year of Developer's Assist (included with the Developer's Kit).

When the application is close to being released, the developer contacts HP to arrange for run-time licensing. The developer will also want to coordinate a joint press release with HP and make sure HP includes information about the product(s) when listing HP OpenView applications.

HP OpenView Windows/DOS Developer's Kit

The Developer's Kit is the heart of the HP OpenView Windows/DOS products. The kit provides everything that a developer needs to develop an HP OpenView Windows/DOS application:

- The software for the HP OpenView Windows/DOS GUI/Map.
- The software for the SNMP interface.
- The software for the HP ARPA (TCP/IP) networking stack.
- Full developer documentation.
- User documentation. This documentation is also provided in digital form for inclusion in the developer's application documentation.
- A copy of the run-time software for the product.
- Registration materials for the first year of Developer's Assist support (included with the purchase of this product).

HP OpenView Windows/DOS Developer's Assist

Developer's Assist is a support and upgrade service. One year of Developer's Assist is provided with the purchase of the Developer's Kit. After the first year, Developer's Assist needs to be purchased annually.

Developer's Assist provides a developer, via CompuServe, with timely responses to questions, a monthly newsletter covering product news, and sample application code as it is developed. Developers on Developer's Assist are automatically invited to regular developers' conferences (every six to twelve months) and other special events.

Normally HP produces a new release of HP OpenView Windows/DOS every six to nine months. This is necessary to keep pace with technology, industry standards, and the demands of customers. Developers on Developer's Assist are sent a new copy of the Developer's Kit each time the product is released. In addition, about three months before the new release is available, an early "developer's" release is sent to help developers get a head start on their product development.

HP OpenView Windows/DOS Evaluation Kit

Because developers may not be sure they are ready to create an HP OpenView Windows/DOS application, HP has assembled a product allowing developers to extensively evaluate what such a development process involves. The Evaluation Kit is provided at an attractive price to allow developers to make this evaluation. The Evaluation Kit includes all of the developer's documentation that is found in the Developer's Kit. In addition, a diskette containing a software demonstration of the product and sample application code is provided.

Recommended System Requirements

For the Administrator's PC

- A PC that is 386 or better and fully compatible with the IBM PC
- 4-MB of RAM
- 40-MB of disk storage
- A VGA adapter and monitor or better
- DOS 3.3 or greater
- Microsoft Windows 3.0 or greater

For the Developer's PC

- A PC that is 386 or better and fully compatible with the IBM PC
- 4-MB of RAM
- 80-MB of disk storage
- A VGA adapter and monitor or better
- DOS 5.0 or greater
- Microsoft Windows 3.0a or greater
- Microsoft Windows Software Development Kit
- Microsoft "C," version 6.0 or greater

Ordering Instructions

To order the following products, please contact your local HP sales office, or call (800) 752-0900:

- HP OpenView Windows/DOS Developer's Kit (D1825A) (Note: This product includes one year of Developer's Assist)
- HP OpenView Windows/DOS Developer's Assist (D1826A)

To order the following product, please call (800) 848-9283:

- HP OpenView Windows/DOS Evaluation Kit (D1828A)

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HP Distributed Management Environment (DME) Technologies

Technical Data

The OSF Distributed Management Environment

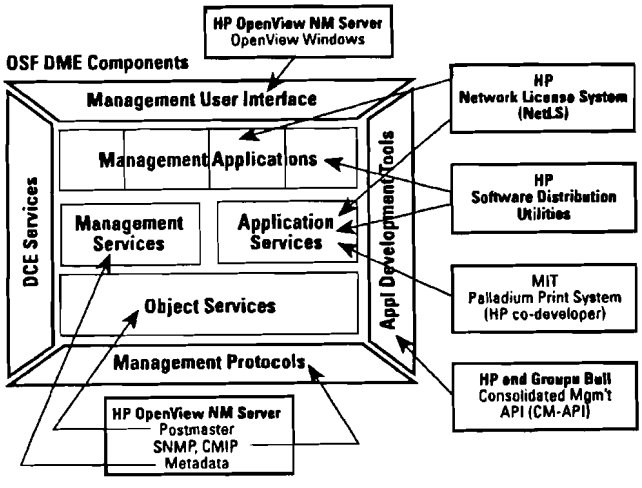
The Open Software Foundation (OSF) is an international organization established to define and provide open (vendor neutral) software solutions for the computing industry. The Distributed Management Environment (DME) is the latest in a series of successful technology programs by the OSF. Earlier technology requests have resulted in an OSF software environment which includes operating system (OSF/1), application user interface (OSF/Motif), and distributed computing environment (OSF/DCE) technologies.

The DME is defined as an extensible framework for unified management of systems, networks, and applications in a distributed multivendor computing environment. It provides a standard platform for management of OSF's open systems technology and for management of other open and proprietary computing environments. The DME architecture, shaped by OSF, combines the standardization and maturity of network management technologies with the benefits of a flexible, object-oriented systems management approach that meet the needs of state-of-the-art distributed computing.

HP Provides The Fastest Path to DME

DME framework components are shown in the figure. OSF selected components of HP products, shown as shaded elements in the figure, as the core of the DME solution. Full descriptions of the DME components are provided in OSF's DME Architecture and Rationale documents. This data sheet describes the

HP Products Selected for OSF DME



HP technologies and relationship of current HP management products to the DME.

DME technologies selected from HP come from three proven HP products: The HP OpenView Network Management Server, Software Distribution Utilities (based on a service currently supplied with the HP UNIX® Operating System), and HP Network License System (NetLS).

HP OpenView

Successful products and OSF technology selections have established HP as the acknowledged authority in open systems and management of distributed computing environments.

The HP OpenView architecture was released in 1988 as the foundation for an open, modular, distributed management solution. Derived from the OSI Management Framework and optimized to include TCP/IP networks, the architecture provides a model for creation of object-oriented solutions. It employs a building block concept for management using three management components: Management User Interface, Management Applications, and Management Services that are interconnected and accessed through standard application programming interfaces (APIs).

Comparison of the OSF DME model and the HP OpenView architecture reveals striking similarities. OSF's architectural choices for the DME Framework validates the established HP OpenView strategy and product set. The OSF selection paves the way for HP OpenView-based products to lead the industry's transition to DME management solutions.

HP OpenView Network Management Server (NM Server)

The HP OpenView Network Management Server is an implementation of the HP OpenView Architecture. It provides an open framework for the development and integration of management applications. The framework's standard APIs and management protocols are used by end users to integrate existing applications and unify management of their multivendor computer environments. Software developers use the open development environment to create comprehensive system and network management solutions. The use of common APIs protects applications from changes in underlying services, protocols, and managed objects. They also provide users freedom of choice to mix-and-match applications and framework components to provide tailored management solutions. The framework's common Management Services adds value by freeing developers from designing these services into each application.

The Network Management Server is made up of several key components: The User Interface (HP OpenView Windows), Communications Infrastructure (communications and management protocols), and Management Services (event and data management). Components selected for the DME are described here. A full description is provided in the Network Management Server product literature (Technical Data Sheet and Technical Evaluation Guide).

DME Management User Interface (HP OpenView Windows)

HP OpenView Windows (OVw) is an advanced graphical user interface, using OSF/Motif and X-Windows, which provides the system administrator a consistent view of the managed environment and seamless integration of management functions regardless of vendor or managed object type. The operator simply selects the managed object on the graphical map and executes commands through pull-down menus that are controlled by OVw.

The OVw desktop environment provides intuitive object and map manipulation tools to facilitate user navigation and control of the most complex network and system environments. These

capabilities promote ease of use, minimize learning time and reduce the need for costly training of operations staff.

HP OpenView Windows provides applications the capability to dynamically create and display a map of network topology and a logical view of the systems management environment. Status changes in the managed environment are displayed through changing colors on the map. The system manager can directly manipulate the environment and its components and display attributes of the component through the consistent user interface.

Enhancements to OVw for the DME will include additions to the User Interface and an expanded Application Interface.

The DME Management User Interface will include a management desktop, for visual presentation of maps and objects, based on HP OpenView Windows and a dialog scripting language and user interface toolkit, for creation and management of dialog boxes.

DME Object Services and Management Protocols (OpenView Communications Infrastructure)

The HP OpenView NM Server offers a powerful Communications Infrastructure (CI) with a well defined API for distributed applications. Applications need only refer to managed objects or services, local or distributed, by name and the CI Postmaster provides the naming, location, and routing services needed to establish a connection. Enhancements for the DME will add a management request broker based on Object Dispatcher technology from Tivoli Systems. Both HP's Postmaster and Tivoli's Object Dispatcher will use DCE global naming/directory (X.500) and security services.

The NM Server currently supports SNMP and CMOT, the two industry-standard management protocols for TCP/IP networks. For the DME, new management protocols, an ISO standard CMIP and a Management RPC protocol will be added to enhance DME communications in distributed computing environments. SNMP and CMIP will provide access to objects and other management systems using standardized management protocols.

The Infrastructure API provides programmatic access between applications, management services, and managed objects. For the DME, a new, Consolidated Management API (CM-API) has been jointly developed by HP and Groupe Bull. The CM-API expands on the OSI CMIS standard to incorporate X/Open Directory Services and Object Management API definitions. The CM-API will include support for SNMP, CMIP, and the DME Management RPC. This API will dramatically improve the ease of developing management applications. This approach simplifies integration of existing management applications that use the SNMP and CMIP protocols into the DME.

DME Management and Application Services

These DME services provide the basis for building a model of the managed environment and fundamental services for support of management applications. Technologies selected from HP include the HP OpenView NM Server Metadata Compiler used by developers to build object class libraries and core services for software management and license management from HP's SDU and NetLS products described below.

DME Management Applications (HP Software Distribution Utilities)

The HP Software Distribution Utilities (SDU) consists of a set of sophisticated tools which performs installation and update of both system and applications software. SDU enables vendors to flexibly distribute software in an open systems environment and gives the administrators and users of those systems the ability to manage software on both standalone and networked systems.

Software Distribution from a Variety of Media

SDU supports creation of a variety of software media, installation of new software, update of installed software to a newer version, and removal of installed software. This software can include any combination of base operating system, application, and end-customer software products. Software can be distributed on CD-ROM, magnetic tape, or from a network server. Information on installed software is maintained on each system to coordinate these operations and to permit user inquiries.

Single-Point Administration

An administrator can simultaneously distribute software to multiple nodes from a single point, eliminating the need for tedious step-and-repeat operations. This capability is built upon the Network Computing System (NCS) based remote procedure call facility of the OSF Distributed Computing Environment (DCE).

OSF/Motif Interface

SDU features an OSF/Motif user interface with online help to make software management tasks easy to learn and use and consistent with other applications. In addition, all tools have a command-line interface for maximum flexibility of sophisticated users.

DME License Management (HP Network License System)

HP Network License System (NetLS) manages, enforces, and monitors software usage and usage policies. It offers new license methods which allow end users to better manage their software resources. This is especially important when those resources are physically located across a distributed, multivendor network. The result is a unified network computing environment that marshals software assets for optimal utilization.

Highlights

- Supports multiple licensing methods and attributes to address needs of entire range of software applications.
- Provides tools to all constituents creating a single, unified system to enforce software licensing policies, to reduce software vendor effort, and to improve end-user software asset management.
- Manages, monitors, and tracks all software products consistently across hardware platforms, providing a uniform software administration mechanism.
- Operates across any computing environment; able to support any software or hardware platform.

Wide Portfolio of Licensing Models

NetLS offers a broad range of licensing models from which software vendors can select. It supports CPU-locking and site-licensing methods, as well as the more flexible concurrent use model. It also features a number of additional licensing types, for example, use-once, dynamic nodelock, personal use, and system or capacity licenses. Vendors can also use a mixed licensing scheme. They can support different licensing methods in the same application, allowing a single version of software to be tailored to customers' needs. A single unified system for

enforcing software licensing policy reduces costs for the software vendor.

Support for All Licensing Constituents

The application developer's kit is designed to be simple and easy to use for vendors. With a minimum of development effort, products can be licensed and managed by NetLS. NetLS also enables independent distributors to participate in the software distribution process. Extensive administration and reporting tools aid end users and end-user administrators in the management of license activity.

License Administration and Reporting

NetLS provides several tools to end users and end-user system administrators that simplify and unify software administration on a network. These tools provide the ability to install and administer licenses, obtain snapshots of current license activity, and generate reports on software usage.

Support for Diverse Computing Environments

NetLS distributes its services across a network, assuring end users of continued access to application licenses, and keeping network traffic to a minimum. It is designed for easy, efficient, and transparent scaling as networks increase in size, distribution, and heterogeneity. Additionally, each service can be run on any machine, regardless of software or hardware platform. This structure comes from its foundation on the Network Computing System (NCS), which handles the distribution of processing tasks across machines in distributed, multi-vendor networks.

Applying HP Solutions Today

Developers and endusers seeking the benefits and economies of open systems management need not wait for DME products. HP has a full range of management products that provide solutions to today's problems and are backed by HP's commitment to migrate over time to full DME capability.

In addition to the products described, from which DME technologies have been drawn, HP offers a wide range of management products including:

Management of multivendor TCP/IP networks, with the ability to "drop in" existing applications into an integrated solution, is possible today with the HP OpenView Network Node Manager product. The Network Node Manager includes capabilities equivalent to the HP OpenView Windows technology selected by OSF.

HP OpenSpool, built on the MIT Palladium Print System co-developed by HP, provides output spooling for distributed technical and commercial computing environments.

HP OmniBack provides powerful unattended, high-speed back-up and restore.

These solutions are available today to greatly improve the efficiency and productivity of your entire system, and they provide a bridge to DME. Of course, HP can also supply integrated test and measurement instrumentation and worldwide consulting and support to satisfy the full range of distributed computing needs.

Put Us to the Test

You can deploy HP today and make the right choice to put you in control of your resources. Let us show you what our unique and complete solution can do to help you achieve your business goals.

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HP OpenView Solution Partners Program

Technical Data

HP OpenView: An Overview

HP OpenView is a family of solutions that improve the level and quality of service provided by network, systems, and application managers while controlling costs.

HP OpenView offers a comprehensive family of systems, network, and application management solutions including platforms, application software products, and systems and network management services. HP OpenView is installed in more than 6,000 networks around the world. System and network management applications are available on a variety of platforms including HP 9000 and HP 3000 business systems and servers, SunOS-based workstations, and MS-DOS systems and will be available from IBM on RS/6000 systems in the future.

HP OpenView provides a standard development and runtime environment that encourages development of a wide variety of network, systems, and application management solutions over a wide variety of hardware platforms. This allows you to leverage your development efforts over multiple hardware platforms, thereby reducing the effort and investment required to support multiple platforms, shortening your time to market. HP OpenView also provides the infrastructure to interoperate with other applications allowing multiple applications to leverage and synchronize their actions in a networked environment.

HP OpenView continues to be a favored management solution among developers, press, consultants, and customers. It is justifiably so. HP OpenView received top ratings in several independent user surveys. HP OpenView is the only network, system, and application management solution that offers the benefits of being widely based on standards, accepted by the Open Software Foundation and the standards community. It is sold and supported by HP's respected sales force and top rated service and support programs on leading computer platforms worldwide. In addition, Value Added Business (VAB) surveys have consistently ranked HP VAB programs as the best in the industry. Hence, not only does the HP OpenView VAB gain access to top notch HP technology and solutions, but also provides incredible leverage through partnership with HP and the pervasive industry presence of HP OpenView.

In return, HP OpenView Value Added Businesses (VABs) provide solution variety, breadth, and depth required by OpenView customers in multivendor environments. HP OpenView VABs provide the expertise, customer understanding, and customer

rapport critical to providing complete solutions to your customers.

From a customer perspective, HP OpenView is an ideal network, systems, and application management choice. HP OpenView embraces all applicable standards and sets new standards recognized by the appropriate industry standards organizations. HP OpenView is directly based on standards such as SNMP, OSF Distributed Computing Environment (DCE), and OSF Distributed Management Environment (DME). HP OpenView is also the only network, systems, and application management software platform that provides a consistent customer interface to applications on multiple leading industry computer platforms including UNIX® and DOS. HP OpenView is, therefore, able to attract leading solution providers and thereby provide the best solutions available today.

From your Value Added Business (VAB) perspective, HP OpenView offers the customer pull, mindshare, sales leverage, multivendor technology, and experience to help make you successful. In fact, HP OpenView products are the most pervasive network, system, and application management solutions available today and continue to gain momentum rapidly. In addition, the tremendous presence of the HP sales force in large international corporations and in businesses everywhere provides sales leverage not available with many other potential business partners.

Getting Started: Integrating Applications with HP OpenView

The simplest and fastest means of integration with HP OpenView is Menu bar integration. Menu bar integration allows the user to call up your application from the HP OpenView pull down menu bar. It also allows your application to receive node lists as input. Hence, menu bar integration provides a simple means of integrating your application into the access and topological input requirements of your customers. Menu bar integration is relatively simple and can be painlessly accomplished within minutes.

Another simple means of integration into HP OpenView is through SNMP support. If you provide SNMP support on your network-based product, your product will be able to communicate with HP OpenView-based SNMP managers. Your product will be able to take advantage of HP OpenView's extensible MIB capabilities in polling, communicating with, and managing your device. In addition, HP OpenView provides an extensible agent that can be extended with additional variables to include the parameters most important to your application requirements and your customer needs.

Tighter integration opportunities are also available. For instance, your application can tap into the information collected and managed by HP OpenView via the HP OpenView data collection, history, and topology mechanisms. This gives your application powerful access to HP OpenView's automatic mapping capabilities and the ability to selectively monitor and manage objects in that topology. Other opportunities exist to tie into HP OpenView's Event Management Services and selectively monitor the network environment for events that are crucial to your customer and your application's success. HP OpenView also provides access to the network and to our HP OpenView Windows standards-based graphical user interface to provide standard mechanisms to interface with the Network and the User environments respectively.

HP OpenView provides you with the most powerful and flexible foundation needed to make you, your products, and your customers successful.

The HP OpenView VAB Program

HP OpenView VABs are eligible for and subject to the standard HP program benefits and requirements. These include benefits such as the HP Developer Discount Program, 2 percent/mo. HP hardware leasing, HP Executive Training Series, HP VAB Events, Sales Tool and Update Mailings, the HP-UX and Domain/OS Solutions Catalog, assorted marketing and informational support programs, and much more. These are detailed further in the HP companion brochure for Value-Added Businesses, "Programs for Success."

In addition to the standard HP VAB programs, HP OpenView VABs are listed in the HP OpenView Catalog that highlights the broad range of HP OpenView network, systems, and application management solutions available. HP OpenView VABs also have opportunities for OpenView focused joint sales, marketing, and support with the HP OpenView sales, marketing, and support teams. Participation in HP OpenView VAB programs only requires that the VAB solution is complementary to OpenView network, system, and application management solutions.

The HP OpenView VAB program considers the success of our VABs a measure of our own success. As such, we endeavor to support and leverage each VAB into its fullest potential. The HP OpenView VAB program encourages your success through focus on key market requirements, through sales lead generation via the widely distributed HP OpenView Catalog and through active HP OpenView lead referrals from the Hewlett-Packard Sales Force.

Becoming an OpenView Solution Partner

For further information or to receive your HP OpenView VAB Information and Registration Kit, please write or call the HP OpenView VAB program at:

Hewlett-Packard Company
HP OpenView VAB Program
3404 East Harmony Road
Mail Stop 45
Fort Collins, CO 80525
Phone: (303) 229-4975
Fax: (303) 229-3526

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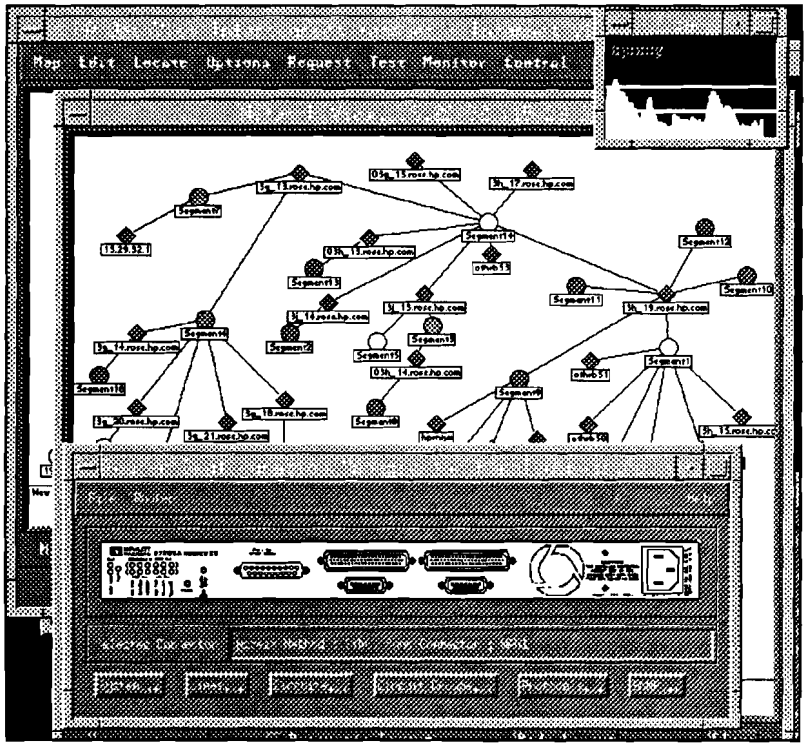
HP OpenView Interconnect Manager/UX

Technical Data

Product Numbers
27360A and 27361A

- **HP 27360A for HP 9000 Apollo Series 300 and Apollo Series 400, and**
- **HP 27361A for HP 9000 Apollo Series 700 and Apollo Series 800**



HP OpenView Interconnect Manager/UX is an enterprise multivendor network and system management solution.. It combines the power of our SNMP market-leading products (Network Node Manager, Hub Manager, Bridge Manager, and Router Manager) to deliver a single-view management system for global networks. The standards-based management technology in Interconnect Manager provides the foundation for OSF/DME and makes it the fastest path to full OSF/DME compliance. Our extensible design provides a One-Minute Application Builder that allows you to monitor and control any IP-addressable device. The X-Window/Motif-based color graphic user interface makes the management of hubs, bridges, routers, systems, and printers as simple as point and click. The Router Configuration Management System (RCMS) takes the mystery out of internet configuration through a color graphic back-of-the-box picture that allows you to fully configure HP and Wellfleet routers. Our leading-edge technology, found in automatic discovery, finds and lays out any IP-addressable device on your network. This easy-to-use manager comes complete with context-sensitive help and HP's unsurpassed leadership in

worldwide support and training makes it the intelligent choice for integrated enterprise management.

Features

- *Adherence to Standards:* HP OpenView Interconnect Manager/UX not only supports current network management standards, but also defines future standards. The technology found in Interconnect Manager today provided the basis for the OSF/DME platform. This will allow you to integrate other vendors' OSF/DME-based management applications (as they become available) with Interconnect Manager, making it the first and most robust single-view manager in the market. Interconnect Manager supports TCP/IP, SNMP/IP and is capable of monitoring various protocols and LAN/WAN links. These include TCP/IP, DECnet IV, Learning Bridge, X.25, XNS, IPX, and AppleTalk II.

- *Extensible Management:* The extensible design of multivendor management allows you to create a simple network management application to monitor and control any vendor's MIB-II and private MIB extensions in less than a minute. Combining the power of the MIB browser, MIB loader, data collector, and the One-Minute Application Builder allows you not only to load, compile, and browse MIBs, but also to build and integrate the application you created with Interconnect Manager screens.

- *Configuration Management:* Combining back-of-the-router color graphic picture with the ability to create, upload, modify, and validate configurations for HP and Wellfleet routers makes internet configuration as simple as activating an interface and accepting or modifying parameters. Router configuration files can be downloaded across the network using TFTP. Configuring ports, adjusting the spanning tree algorithm, or setting thresholds for hubs, bridges, or routers is as simple as pull-down menus. Any changes to the network configuration, such as adding or removing devices, or disabling an interface on a router, are automatically reported through the event notification system.

- *Performance Analysis:* Tuning your network performance is based on instant access to network statistics. Upon request, Interconnect Manager is capable of gathering statistics from any device on the map and displaying the information in a graph, table, or report format. The product is capable of collecting and graphing statistics for MIB-I and MIB-II, as well as private extensions for any vendor supporting the concise MIB format.

- *Fault Management:* Continuous monitoring of any IP-addressable device on your network shows you the real-time status of your mission-critical network operation. Each of these devices is shown on the automatically drawn network map and has a comment field displaying whom to call, so you can start corrective action immediately. Interconnect Manager is capable of monitoring status down to a specific port on a hub or an interface on a bridge or a router. This allows you to monitor specific user connections and to associate user name and station address and IP address. Also, the System Administration Management (SAM) allows you to monitor disk space utilization and CPU utilization, as well as install and configure software across the network for HP-UX based systems.

- *Network Security:* Interconnect Manager gives you various levels of security. These vary from a simple encrypted password for every HP EtherTwist device on the network to a sophisticated unauthorized-alarm notification facility. For example, you may restrict access to a hub using a password or restrict access to a specific port on a hub by disabling that port and setting a threshold to be activated as an alarm in the event of unauthorized access.

- *Ease of Use:* The various task automation facilities, from map drawing to automatic alarm notification, combined with context-sensitive online help and a Motif-based color graphic user interface, ensure that single-view management is achievable without an extended learning curve.

- *World-Class Support:* Selecting HP OpenView Interconnect Manager/UX not only guarantees you the fastest path to full OSF/DME compliance, but also gives you access to HP's world-class support and training. With HP support organizations across the globe, you have access to the services that have been rated number one for the past eight years.

Support Services

- 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 advance planning and other support needs.

Product Requirements

Required Hardware:

- HP 9000
  Series 300 Model 340, 345, 360, 370, or 375, or
  Apollo Series 400, or
  Series 700, or
  Apollo Series 800 Model 825, 834, or 835
- At least 16 Mbytes RAM
- Color monitor with at least 1024 by 768 resolution
- 8-color planes minimum
- Mouse
- Hard disk – the following minimum disk space is required:

Minimum Disk Space	HP 9000 Series 300/ Apollo 400	HP 9000 Apollo Series 700 & Series 800
Network Node Manager	17 Mbytes	20 Mbytes
Interconnect Manager without Router Configuration	19 Mbytes	22 Mbytes
Total minimum	36 Mbytes	42 Mbytes
Interconnect Manager's Router Configuration Option	16 Mbytes	20 Mbytes
Total minimum	52 Mbytes	62 Mbytes

Ordering Information

HP 27360A OpenView Interconnect Manager/UX for Series 300 and Apollo Series 400
Options:
AA0: ¼-inch cartridge tape media and documentation
AAH: DDS media and documentation
OCZ: Credit for previous Network Node Manager users

HP 27361A OpenView Interconnect Manager/UX for Apollo Series 700 and Series 800
Options:
AA0: ¼-inch cartridge tape media and documentation
AAH: DDS media and documentation
OCZ: Credit fore previous Network Node Manager users

Documentation:

HP OpenView Interconnect Manager/UX documentation may be ordered separately through DMK.

5062-9333 Provides Guide to Documentation and Interconnect Manager/UX Administration Reference and Router Configuration Task Reference.
B1009-90002 Provides Network Node Manager and TCP/IP Agent Administration Reference.

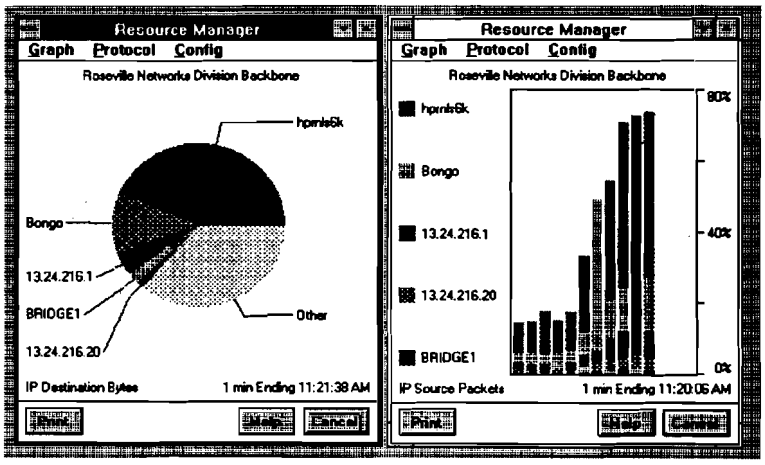
HEWLETT PACKARD

HP OpenView Resource Manager/DOS

Technical Data

Product Number
27257D

The HP 27257D OpenView Resource Manager/DOS is an advanced, real-time trend analysis product. It allows network managers to monitor trends on the network by identifying top talkers, heavy users, communication pairs, and errors and their sources. Monitoring is based on IP, IPX, or MAC addresses and is graphically displayed or printed as pie charts, bar charts, or time-series charts. Resource Manager is fully integrated with HP OpenView Hub Manager and HP OpenView Interconnect Manager/DOS.



Highlights

- ***Single View Management:*** HP OpenView Resource Manager/DOS uses the HP EASE (Embedded Advanced Sampling Environment) instrumentation functions in HP EtherTwist hubs and bridges to sample network trends. Not only does this help you identify trouble spots on your network—and show you where to focus your high-end LAN analysis instruments—it also delivers the trend information you need right to the management station you use. It controls the devices on your network, whether that station is across the office or across the globe.
- ***Integrated Solution:*** HP OpenView Resource Manager is so thoroughly integrated with HP's OpenView Hub Manager and Interconnect Manager/DOS that it even shares the same network map with them. To analyze your network's traffic patterns with Resource Manager, simply point and click on the map to select a cable segment, then pull down the menus to choose the analysis options. When the analysis indicates a particular device that needs attention, clicking on that device's icon on the same map will make all the device monitoring and control

functions of Hub Manager or Interconnect Manager/DOS available to you.

- *Easy Upgrade:* Adding the power of embedded instrumentation to your network is as easy as downloading new firmware code to your existing EtherTwist hubs and bridges. Because the HP hubs and bridges store their firmware in flash EPROM, upgrading is like installing a software patch—there are no chips to replace, and you don't even have to open up the cabinet. And when future network management products are introduced, you will be able to download any firmware upgrades across the network from a central network management station.

Features

- Provides real-time trend analysis for any segment on your network.
- Uses Hewlett-Packard's embedded instrumentation architecture.
- Provides full integration with Hub Manager/DOS and Interconnect Manager/DOS.
- Identifies top five talkers/heavy users.
- Identifies top talkers based on bytes or packets as sources or receivers.
- Identifies top multicast and broadcast sources.
- Tracks network errors and their sources.
- Identifies communication pairs involved in various activities.
- Monitors network trends based on IP, IPX, or MAC addresses.
- Displays network trends in pie charts, bar charts, or time series charts.
- Prints network trends in pie charts, bar charts, or time series charts.

Specifications

System Requirements

- MS-DOS®, Version 3.2, 3.3, 4.01, or 5.0
- Microsoft® Windows Version 3.0A or 3.1
- 2 Mbytes of extended memory
- 10 Mbytes available hard disk space
- VGA or EGA monitor (VGA recommended)
- HP OpenView Hub Manager/DOS or HP OpenView Interconnect Manager/DOS

Warranty

HP 27257D OpenView Resource Manager/DOS is warranted for 90 days against defects.

HEWLETT PACKARD

HP OpenView Network Node Manager

Technical Data

Product Numbers
B1009A for Series 300, 400
B1024A for Series 600, 700, 800
B1034A for SunSPARC

HP OpenView Network Management

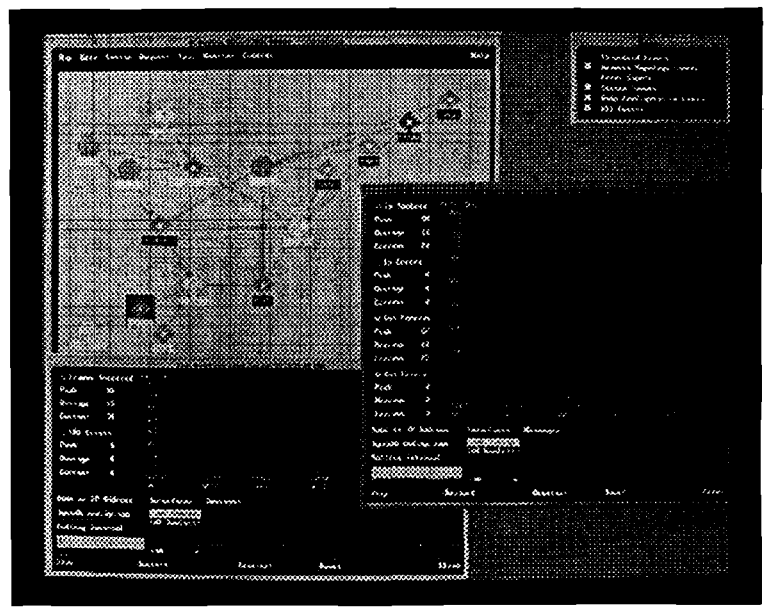
Welcome to HP OpenView

HP OpenView Network Node Manager provides fault, configuration, and performance management for multivendor TCP/IP (Transmission Control Protocol/Internet Protocol) networks on a site or campus. Based on international standards, Network Node Manager manages network devices that are IP-addressable and/or run the Simple Network Management Protocol (SNMP). Network Node Manager 2.0 runs on HP 9000 Series 300, 400, 600, 700, and 800 computers with HP-UX 7.0 or later. Additionally, Network Node Manager runs on SunSPARCstations with SunOS version 4.1 or later.

Part of the HP OpenView family of system and network management products, Network Node Manager includes a graphical user interface based on OSF/Motif, as well as on-line help and documentation to allow network administrators to put the product to work within minutes instead of days.

With the explosion of TCP/IP-based local and wide area networks, corporate Internets, and client-server computing, network administrators need solutions today to minimize network downtime and maximize their productivity. Network Node Manager maximizes productivity by greatly reducing the amount of time administrators spend on network troubleshooting and administration tasks.

Network Node Manager 2.0 offers a number of enhancements over 1.0. To guarantee true multivendor interoperability, HP has



included the ability to build applications that use vendor-specific SNMP MIB objects and vendor-specific traps, as well as the ability to add applications to the menu bars. It also includes historical data reporting and user-defined thresholds. All of these new features can be put to use quickly and without any programming.

HP OpenView Network Node Manager solves the critical problems customers face today in deploying large networks.

Features and Benefits

HP Openview Network Node Manager lets network administrators understand the health of their networks at a glance.

HP Openview Network Node Manager provides a cost-effective, comprehensive solution for managing multivendor computer environments. Through the centralization, automation, and simplification of tasks, users significantly reduce operating costs and improve service levels.

Network Node Manager 2.0 offers three valuable features: Discovery, Single View Management, and an Application Builder.

Feature	Benefit
Based on standards such as TCP/IP, SNMP, and OSF/Motif (see **Required Sun Software** for information about Sun windowing environments).	Ensures effective management of a wide range of network devices and systems from other vendors as well as from HP.
Easy-to-use graphical user interface based on OSF/Motif; online help and documentation.	Network administrators can use Network Node Manager to effectively manage their networks within a few minutes of installation.
Automatically generated and updated network mapping: Network Node Manager automatically generates a TCP/IP network map in minutes.	Saves network administrators hours of entering configuration information once a network is discovered. Network Node Manager tracks on-going changes as they occur.
Extensible and customizable: a true multivendor network management application.	Lets users manage any SNMP device without programming, including standard and vendor-specific Management Information Base (MIB) objects; menu-driven sets provide control.
Continuous network monitoring: once a network map is generated, Network Node Manager continuously displays the status of overall network connectivity on the map, using color to highlight information.	Gives network administrators a single place to look to determine the overall health of the network and a head start toward maximizing network availability.
Event notification: network administrators can decide when to be notified about changing conditions on the network.	Eliminates unnecessary interaction with the network management system.
Network diagnostic tools let users isolate and correct identified problems from a central workstation.	Allows network administrators to work from a central location rather than pursuing problems around the facility.
Integrates existing applications: end-users and developers can easily integrate existing shell scripts and applications into Network Node Manager menu bars.	Protects investment in tools the network administrator is already using and ensures a smooth transition from present network management tools to Network Node Manager.
Dynamic Data Collection and Thresholds: User-specified SNMP MIB object data reporting and event thresholds.	Network administrators can get the current and historical network information they need to understand the dynamic aspects of their network for network planning and troubleshooting.

Discovery
Network Node Manager automatically discovers, maps, and continuously monitors all network and system resources across a TCP/IP network. As the network changes, the Discovery capability automatically shows the changes and updates the network map.

Single View Management
New and existing user or third-party applications can be easily integrated in a matter of minutes, protecting the user's investment.

Application Builder
Users and developers can quickly build applications to manage network devices and resources that use the industry-pervasive, multivendor Simple Network Management Protocol (SNMP).

Dynamic Data Collection and Thresholds
Users can get the current and historical network information they need to understand the dynamic aspects of their network for network planning and troubleshooting.

The chart outlines the general features and benefits of Network Node Manager.

Network Node Manager's management tools currently fall into three major categories: fault management, configuration/system management, and performance management. The following sections explain the innovative capabilities of HP OpenView Network Node Manager in more detail.

Fault Management

Network Status
Continual connectivity verification for IP-addressable devices is performed automatically using the TCP/IP utility ping. Results are color-coded on the network map (green for up status, red for down status, and yellow for marginal status).

Continuous Network Discovery
After a map is generated, Network Node Manager continues to find new nodes as they are added and automatically determines if nodes are deleted from the network. Other topology changes, such as the addition and deletion of network interfaces, are also reflected in the map.

User-defined thresholds
Users can determine what is critical for their networks and set thresholds, which, if exceeded, will generate an alarm. Network Node Manager does threshold checking by polling nodes specified by the user.

Specific parameters on which thresholds can be set:

- CPU load on HP-UX and SunSPARC systems
- Percentage of disk space used on HP-UX and SunSPARC systems
- Number of packets received with errors
- Number of packets sent with errors
- Number of collisions on the network
- Number of frames received with CRC errors

Event Notification
A variety of sources generate alarms within the network management system. These alarms are presented to the network administrator via the network map, an event browser window, and an event log.

Specific alarms may indicate a network failure:

- Threshold exceeded for one of the conditions described
- Failure to communicate with a host performing routing
- An SNMP node started or stopped forwarding packets
- An SNMP node has the wrong link address for another node
- An SNMP node did not respond to an SNMP request
- SNMP nodes do not agree on a link address for a node
- Agent network interface is down
- Network is critical due to the number of nodes down
- A particular network segment is critical

Menu Encapsulation
Users can easily add their own applications to the Network Node Manager menu bar by simply specifying a title and action for the menu item in a registration file. Users utilize a node selected on the map as the input to a command launched from a menu item.

Applications launched from menus can include any executable command or shell script. For simple TTY applications, Network Node Manager automatically creates a terminal window to contain the output. For X-Window applications, the display is automatically output to the screen.

Trap Formatting and Actions
Many SNMP devices send traps (events) that are specific to that device. With trap formatting and actions, the network administrator can:

- Specify the text message that will be logged when a particular vendor-specific trap arrives at the management station
- Specify a program to be executed when a particular trap arrives, such as calling the network administrator's beeper
- Execute shell scripts or any executable command upon the arrival of a trap

Remote Diagnostics
Tools that facilitate troubleshooting have been integrated with the network map. Tests may be initiated quickly on nodes selected from the map with the mouse. Remote tests include:

- IP test uses ping to check physical connectivity from the manager system to a remote node or between two remote nodes
- TCP test performs a TCP connection to determine if a connection can be established to a remote node
- SNMP test tests if a remote node has an SNMP agent running

Easy information access
To expedite problem resolution, users have quick access to essential information by selecting nodes from the map and choosing menu items. This information includes:

- Addressing information for remote systems including IP, link level (Ethernet), and subnet mask values
- Contents of a remote system ARP cache
- Disk space utilization on HP-UX systems
- A record of the most recent events received by the manager application from a particular node
- Interface information and statistics for remote systems
- Contents of a remote system routing table
- A list of network services operational on a remote system
- Contents of the TCP connection table for a remote system

Manage/Unmanage
Network administrators have the capability to define the scope of what is managed and to determine which parts of the network must be discovered and monitored at any given time. Managed nodes are polled for status and configuration on a regular basis. Unmanaged nodes are not polled except when specified by the network administrator.

Remote Terminal
Users have convenient access to remote systems via virtual terminal applications through the network map. Terminal types are hpterm for terminal emulation to HP systems, xterm to most other UNIX® systems, and vt3k for use with HP 3000 systems.

Map Snapshots
The current network map can be saved and used later to help determine what has changed in the network.

Find Network Routes
Users can view graphical and textual displays of the route a packet takes through the network between any two systems.

Command Line Commands
Network Node Manager includes a number of commands that can be executed directly from the command line. These commands allow the user to access most of the information on the network via a dumb terminal. These commands include:

- Get an SNMP value (snmpget)
- Set an SNMP value (snmpset)
- Send an SNMP trap (snmptrap)
- Query a node with SNMP Get Next Request (snmpnext)
- Query a node repeatedly with SNMP Get Next Requests (snmpwalk)
- Print out the map database
- Find the route between two nodes (findroute)
- Take a snapshot of the map database (mapsnap)
- Check connectivity between two nodes (netcheck)
- Check a node's complete configuration (nmdemandpoll)
- Check an HP-UX or Sun node's disk space (rbdf)
- List network information of a remote mode (rnetstat)
- Remote packet echo from one node to another (rping)

Configuration and System Management

Dynamic Map

Automatic generation and continual updating of the network map and associated database eliminates significant manual recordkeeping by providing a central electronic record of network configuration information.

HP Bridge/Hub Layout

The network administrator has a clear view of a network's physical configuration to aid in both troubleshooting and inventory.

Network Node Manager automatically discovers HP's IP-addressable 10-10 Bridges, remote bridges, EtherTwist hubs, and fiber hubs. When these devices are discovered, Network Node Manager automatically lays them out properly on the map. In the case of bridges, it automatically detects which nodes are on which side of the bridge. In the case of the EtherTwist and fiber hubs, it detects which ports have nodes connected and which have other hubs connected and lays out the map accordingly.

Easy Map Editing

Users can represent information on the map that cannot be dynamically discovered, such as the addition of non-IP devices and details of the physical topology. This mouse-driven editing includes the ability to:

- Move objects
- Add objects to the map
- Delete objects
- Add connections between objects
- Delete connections between objects
- Change object types

MIB Browser

Users can easily point-and-click their way down and up any SNMP device MIB tree. Any object's value can be retrieved as a single value; multiple objects can also be retrieved in table form. Numerical objects can also be graphed in real-time. Setable MIB objects can be set through this same dialog box. Set security is provided via community names.

Application Builder

Users have the ability to put the query of an MIB object or objects into Network Node Manager menus. The query can get a single MIB object value, a table of values, or a real-time graph. Used in combination with the MIB Browser, MIB encapsulation gives both full SNMP interoperability and flexible display of data.

Event Notification

Alarms generated due to configuration changes are:

- Network interface added to a system
- Network interface removed from a system
- New node discovered on the network
- Node removed from the network
- SNMP node started or stopped forwarding packets
- Node link level address changed
- Object identifier changed for a node
- System description changed for a node
- Node name changed
- Subnet mask changed

Map Snapshots

Snapshots record the current inventory of devices on the network, eliminate manual recordkeeping, and provide a central electronic record of network configuration information.

List of Remote Network Services
Users can access information about services available on a remote node.

Online Node Description
With a single mouse button click, information can be retrieved about a node's location, contact name, type of node, and network configuration. In addition, the network administrator can add free-form comments to the node description, such as serial numbers and other relevant information.

Integration of SAM
Remote system administration for HP-UX systems can be driven from the network map. By using HP System Administration Manager (SAM), you can configure software on systems on the network.

Locating Map Objects
Users can locate objects by various attributes. This is useful for inventory control and for finding systems in large networks. Attributes that can be searched include:

- Host name
- IP address
- Link (Ethernet) address
- Object type (gateway, workstation, PC, mainframe, etc.)
- Nodes running SNMP
- String search in comments

Performance Management

Real-time monitoring of statistical information is provided in easy-to-read graphical form. Data on peaks and averages associated with the polling statistics is provided for easy trend identification and problem tracking.

Dynamic Data Collection and Thresholds

Users can gather historical information for any numerical MIB element on any SNMP device or group of devices. This information is saved to a binary file and can be printed in a number of user-defined ASCII formats or accessed directly. The saved files can be imported into popular spreadsheets or SQL databases.

Users also can define thresholds on any numerical MIB element. Both features can access MIB I, II and enterprise-specific objects.

Additional Features:

- Selections can be made using wildcard designations
- Event messages are triggered when thresholds are reached
- Users can define threshold reset values
- Time synchronization between manager and agent for data collection
- Menu driven

CPU Load of HP-UX and SunOS Systems
Users can monitor the relative CPU load of HP 9000 systems and SunSPARC systems running the HP iOpenView TCP/IP Agent for SunSPARC.

Interface Traffic
Interface traffic includes the following:

- Incoming packets
- Incoming packets with errors
- Outgoing packets
- Outgoing packets with errors

Link Traffic
Users can monitor and graph the following LAN (Ethernet or IEEE 802.3) card statistics for HP-UX SNMP node receptions and transmissions:

- Frames transmitted
- Frames received
- Frames deferred
- Collisions
- CRC errors

Polling Intervals
The user can decide how often to poll remote nodes for statistical information. This is important because it lets the administrator control the amount of network traffic generated to perform network management. For busy networks, the interval between status polls can be increased to hold down network traffic.

Managed Devices

IP-Addressable Devices
Network Node Manager will discover, map, and maintain status on all IP-addressable devices on the network whether or not the devices run SNMP agents. This includes HP 3000s, PCs, and numerous devices from other vendors.

SNMP Devices
Using its extensible MIB capabilities, Network Node Manager 2.0 can manage virtually any SNMP device whose agent conforms to standards. Manageable devices include HP 9000 Series 300, 400, 600, 700, and 800 systems; HP/Apollo DN Series systems running TCP/IP; other UNIX systems such as IBM RS/6000, DEC Ultrix, and Sun; virtually all TCP/IP routers, HP bridges and EtherTwist hubs; many other vendors' network bridges and multiport repeaters; and numerous other devices.

Connectivity

Connectivity between Network Node Manager and other vendors' SNMP agents is supported for any agent that conforms to the SNMP specification RFC 1098 and to the first version of the Internet-standard Management Information Base, which is covered in RFC 1066.

In addition, Network Node Manager can handle vendor-specific SNMP objects through its extensibility features. As long as an SNMP device MIB object description file is in proper ASN.1 format, Network Node Manager can read it and access the special MIB objects. Using this feature, Network Node Manager can manage virtually any SNMP device.

Product Requirements

Required HP Hardware

- **HP 9000 workstation**
- Series 300: All models upgraded to the 68040 processor
  - Series 400: All models
  - Series 600: All models with X-terminal display
  - Series 700: All models
  - Series 800: Models 825, 834, or 835 with bitmapped display; all models with X-terminal
- RAM: 8 Mbytes minimum, 16 Mbytes recommended (16 Mbytes required for use with Visual User Environment)
- Color Graphics: 1024 x 768 minimum resolution, 1280 x 1024 recommended
- Six- color planes minimum; eight-color planes recommended
- Hard disk (supported only on root server in diskless clusters)
- Three-button mouse

Required Sun Hardware

- SunSPARC station 1.1+, IPC or 2
- 16 MB RAM minimum
- CG3 color graphics required
- 207 MB hard disk minimum (second 207 MB disk is recommended)
- Three-button mouse

Required HP Software

- HP-UX 7.0 or later (including X-Window OSF/Motif)
- LAN/Link for HP 9000
- ARPA Services/9000

Required Sun Software

- SunOS 4.1 or greater
- OpenWindows Version 2 with Patch Release 4 for X11/NEWS Server or Third Party 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 Managed SunOS SPARC station Nodes

Related Software
Network Node Manager is more effective at managing a TCP/IP network if many SNMP agents are available on the network. Especially important are SNMP agents for routers/gateways (whether computers or specialized devices). SNMP agents for non-HP devices may be available from the device vendor or in the public domain.

SNMP agents are bundled into HP-UX systems with Version 8.0 or later. For HP-UX 6.5 and 7.0, SNMP agents are available under product numbers:

- HP B1010A for Series 300/400
- HP B1025A for Series 600/800

SNMP agents for SunSPARC stations are available from HP under product number:

- HP B1035A

  Network Node Manager 2.0 is included with the HP OpenView Interconnect Manager, an application that provides a number of different management functions for HP routers, bridges, and EtherTwist hubs. Product numbers for the HP OpenView Interconnect Manager are:
- HP 27360A for Series 300/400
- HP 27361A for Series 700/800

Installation

HP OpenView Network Node Manager is a customer-installable product. The customer may purchase installation from HP if desired.

Support Services

HP Software Materials Update
Customers receive updated software and documentation for any revision to the product up to but not including the next upgrade.

HP BasicLine Software Support
Customers receive self-support through right-to-use updates and access to an electronic database.

HP ResponseLine Software Support
Customers receive all the services of HP BasicLine Software Support plus unlimited access to the Response Center for problem resolution assistance.

HP Software Materials Update (Sun Systems)
Customers receive updated software and documentation for any revision to the product up to but not including the next upgrade.

Update materials are only available to customers who purchase HP application software support.

HP Application Software Support Service (Sun Systems)
Customers receive telephone access to the HP Response Center, access to HP SupportLine, critical on-site assistance, and the right to use software updates. Support is provided for HP software products only. SunOS or other third party application support is not available as part of this service.

Network Support Services

Network Planning and Design
Customers receive a comprehensive network strategy that supports their business objectives. HP Network Consultants analyze the customer's communications requirements and create a detailed network design based on those requirements.

Network Startup
Customers receive quick implementations of their networks, a simplified service interface, verified network operation, and assured on-going supportability.

NetAssure gives customers fault isolation and assistance with problem resolution anywhere on their networks.

Ordering Information

B1009A HP OpenView Network Node Manager for Series 300 and 400

Options:
AA0 1/4-inch tape and manual
0B1 Manual only
0AK License-to-use for 1 HP-UX manager

B1024A HP OpenView Network Node Manager for Series 600, 700, and 800

Options:
AA0 1/4-inch tape and manual
AA1 1/2-inch tape and manual
AAH DDS media and manual
0B1 Manual only
0AK License-to-use for 1 HP-UX manager

B1034A HP OpenView Network Node Manager for Sun SPARC

Options:
AA0 1/4-inch Sun format tape and manual
0B1 Manual only
0AK License-to-use for 1 Sun manager

HEWLETT PACKARD

HP OpenView Interconnect Manager/DOS

Technical Data

Product Number 27256D

The HP 27256D OpenView Interconnect Manager/DOS is an integrated multivendor SNMP manager for personal computers, workstations, printers, network adapter cards, hubs, bridges, and routers. HP OpenView Interconnect Manager is a Microsoft® Windows enhanced-mode application that is capable of providing the power of multitasking to manage a multivendor extended LAN and a dynamic environment.

Highlights

- *Management by Remote Control:* You no longer need to sit and watch HP OpenView Interconnect Manager running. Based on a carefully designed and fully integrated remote alarm notification system (RANS), Interconnect Manager can notify you when an alarm is triggered on your network. Regardless of where you are at the time of the alarm—across your desk or across the globe—Interconnect Manager will activate a pager or a voice-activated system to inform you of alarms. You are immediately notified of network utilization, security violation, or other thresholds you set as alarms.
- *Integrated Multivendor Management:* Our leading-edge discovery and layout function automatically discover and lay out all your NetWare/IPX clients/servers and ARPA/IP devices in a single network map. Using the map, you can monitor and control devices on your network down to the PC on your desk or your printer. To understand which side of your LAN is generating the most traffic across the LAN Bridge, or which PC is generating the most errors on a specific hub, activate the Interconnect Manager graphing facility. To browse another vendor's MIB (management information base), including proprietary extensions, activate the MIB browser facility. Because the Interconnect Manager application is designed for Microsoft Windows enhanced mode, performance is not compromised by these comprehensive, easy-to-use features.
- *Controlled Levels of Management:* To arm your network managers with different levels of monitoring and to control across the network, Interconnect Manager lets you decide at map-drawing time to exclude certain subnets from being drawn. This will eliminate their visibility to certain network management functions. Also, after the map has been drawn, you can assign passwords to devices on your network and provide the password only to network managers who are responsible for control functions like configuration changes. This will make monitoring available to all network managers, with control permitted only for those with the password.

Features

- Notifies you of network alarms remotely across your desk or across the globe.
- Draws your network map automatically, including multivendor devices with NetWare/IPX, or ARPA/IP support.
- Knows what is on your network, down to the level of identifying personal computers on your desk and printers connected to your network.
- Manages personal computers and/or the personal computer network adapter cards via the ports on the EtherTwist Hub/Plus, avoiding the cost and performance degradation caused by running an SNMP/IP agent on your personal computer.
- Monitors network utilization—including multivendor devices with IP or IPX support—through the graphing facility.
- Provides easy point-and-click browsing of MIB-II or proprietary MIB extensions with Interconnect Manager MIB browser facility.
- Secures network devices through a password encryption for each device on your network.
- Protects your investment through standards support and a seamless upgrade path. HP OpenView Interconnect Manager fully supports SNMP/IP, SNMP/IPX, and MIB-II.
- Reduces your learning curve through an easy-to-use graphical user interface, context-sensitive help, and task-oriented documentation.
- Makes control of your network as simple as setting thresholds and configuring Interconnect Manager to monitor the network and trigger when needed.
- Allows control of bridges through setting spanning tree parameters and setting wildcards for filtering and/or forwarding.
- Performs router configuration through Telnet, which is fully integrated with the discovered routers on your network map.
- Allows uploading and downloading of device configuration files, for modifying an existing configuration or copying of configurations between similar devices.

Specifications

System Requirements

- MS-DOS®, Version 3.2, 3.3, 4.01, or 5.0
- Microsoft Windows Version 3.0A or 3.1
- 2 Mbytes of extended memory
- 10 Mbytes available hard disk space
- VGA or EGA monitor (VGA recommended)
- Microsoft Windows-compatible mouse

Warranty

HP 27256D OpenView Interconnect Manager/DOS is warranted for 90 days against defects.

HEWLETT PACKARD

HP OpenView Switch/PAD Manager

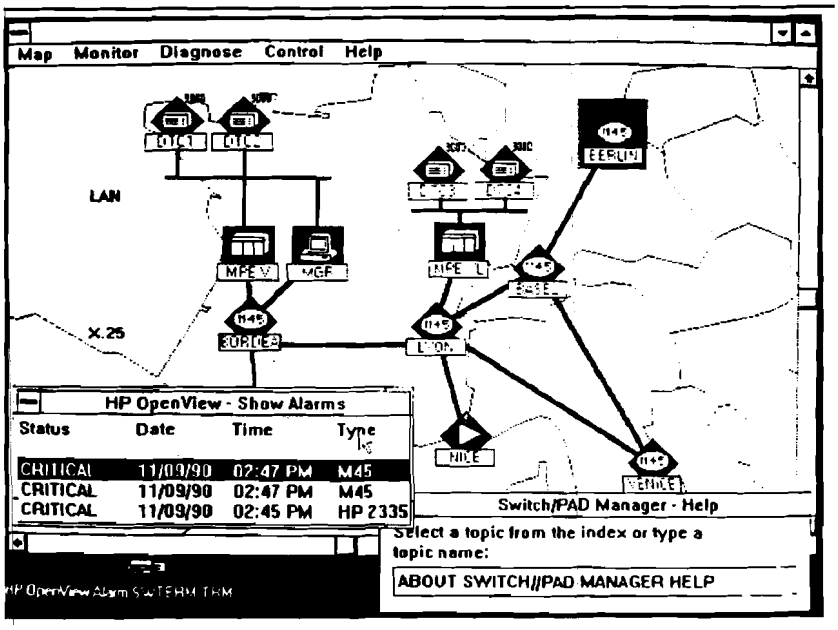
Technical Data

Product Numbers
32054B #104/204/205/206,
J2017A #204/205/206

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.

With the HP OpenView Switch/PAD Manager, based on the HP OpenView workstation, system managers or network administrators can centrally monitor the status of the entire network. In addition, the

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	

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

- D2512A – HP 386S/20 running at 20 MHz (with 52 Mbyte hard disk drive) – 3½-inch flexible disk.
- D2406A – 2 Mbytes additional memory
- D1196A – VGA color monitor (board and monitor).
- 2225Cx + 24542D – ThinkJet printer + cable
- C1413A – HP Mouse
- 24541B – Dual serial card
- 24542M – 2 serial cables
- 24542G – 1 serial cable
- MS-DOS® version 5.0
- MS-Windows version 3.1 or later
- 32048A – HP OpenView version A.05.01 or later
- J2017A – HP OpenView Switch/PAD Manager software A.01.03 or later

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.

32054C HP OpenView Windows Workstation. The HP OpenView Windows Workstation is a specially configured HP Vectra, with PC software already installed. Includes 2 Mbytes additional memory, ThinkJet printer cable, HP mouse, Security Lock, MS-DOS version 5.0, MS-Windows version 3.1, HP OpenView version A.05.01.

ABA-> ABZ (*must order*) – D2512A – HP 3865/200 running at 20 MHz (with 52 Mbyte hard disk drive) – 3½-inch flexible disk.

104 (*must order*) – Switch/PAD Manager connection (Dual serial card, 3 serial cables)

204* Switch/PAD Manager software (media product). User License for 1 – 4 M45 Nodes or HP 2334A/2335A PADs network only.
or

205 Switch/PAD Manager software (media product). User License for 5 – 10 M45 Nodes.
or

206 Switch/PAD Manager software (media product). User License for over 10 M45 Nodes.

* Must order only one of these software options, depending on the size of Model 45 switches network.

Note: If the Model 45 collecting node connected to the HP OpenView Switch/PAD Manager PC doesn't have a monitor J2007A (ie, 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 is supported on the ES/12, QS/16S, QS/20, RS/20, and RS/25s, and 386/20 HP PCs. The PC must be configured with same configuration (Disk/Memory/Software version) as mentioned above:

J2017A Switch/PAD Manager

204 Switch/PAD Manager software + Switch/PAD connection (dual serial card, 3 serial cables). User License for 1 – 4 M45 Nodes or HP 2334A/2335A PADs network only.

205 Switch/PAD Manager software + Switch/PAD connection (dual serial card, 3 serial cables). User License for 5 – 10 M45 Nodes.

206 Switch/PAD Manager software + Switch/PAD connection (dual serial card, 3 serial cables). User License for over 10 M45 Nodes.

Note: If HP OpenView Switch/PAD Manager and HP OpenView DTC Manager are installed on the same ES/12 Vectra, a total of 4 Mbyte additional memory is required (D1354A: 2 Mbyte additional memory). On other PC platforms (QS16/S, RS/20,...), only a total of 2 Mbyte additional memory is required.

Ordering the software upgrades

245 Switch/PAD Manager software upgrade from 32054B Opt 204 to Opt 205. User License from 1 – 4 M45 Nodes to 5 – 10 M45 Nodes. or

256 Switch/PAD Manager software upgrade from 32054B Opt 205 to Opt 206. User License from 5 – 10 M45 Nodes to over 10 M45 Nodes.

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 #0JT #0L7
TeamLine support for HP OpenView workstation
H2025A + H00 #0JT #0L7
ResponseLine support for HP OpenView workstation
H2026A + S00 #AA6
HP Software updates (5¼-inch floppy) #AA8 HP Software updates (3½-inch floppy).

MS-DOS® is a U.S. registered trademark of Microsoft Corporation.

HEWLETT PACKARD

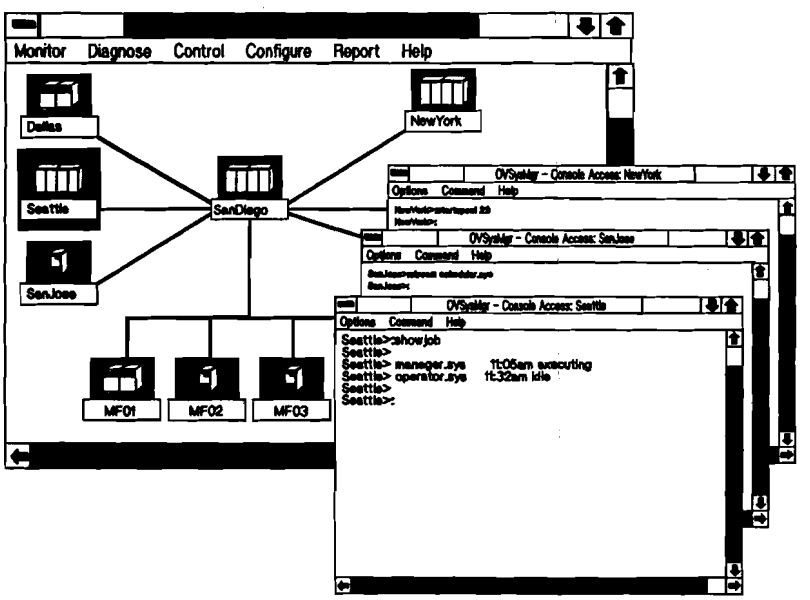
HP OpenView System Manager

Technical Data

Product Numbers
36936A, 36937A, 36938A

Product Description

HP OpenView System Manager allows operators to monitor and control multiple networked HP 3000 computers 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 provides the key to efficient operations: Management by Exception. Management by Exception frees operators from the burden of monitoring every system console message. Instead, operators are notified only when a problem occurs that they are truly interested in. By allowing operations departments to define which problems to track, HP OpenView System Manager eliminates unnecessary notification, allowing fewer operators to manage more systems. HP OpenView System Manager is part of the HP OpenView family of network and systems management products.

Features and Benefits

- **HP OpenView Windows Graphical User Interface:** Allows operators to monitor all of their networked HP 3000 computers at a glance through an intuitive graphical network map. 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 3000 computers via a central HP OpenView Windows graphical network map.
- **Management by exception:** Increases operator 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.
- **Centralized system console control:** Provides system control including shutdown and restart of all managed HP 3000 computers 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.
- **Partnership with existing systems management 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 consolidates the status and centralizes control of these applications on the HP OpenView Workstation.
- **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.

Functional Description

HP OpenView System Manager gives operators the choice of monitoring their networked HP 3000 computers 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 Workstation. HP OpenView System Manager consolidates operations of networked HP 3000 computers 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 3000 computers 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.

- **Shift Change Notes**
  To ensure smooth operations service during shift changes, HP OpenView System Manager provides a message annotation feature. After reviewing a console message, this feature allows operators to append the message with a note telling the next shift what actions need to be taken.

- **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 3000 computers 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. Using the console control capability, operators can control system shutdown (Control-A), system restart (Control-B), MPE command execution (example, restarting network), and applications.

- **Systems Management Applications Consolidation**
  Operations departments may consolidate status monitoring and centralize control of their existing systems management applications. Applications such as job scheduling and disk space utilization can be managed on an exception basis.

- **Application Monitoring and Control**
  In addition to managing networked HP 3000 computers, HP OpenView System Manager 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 System Manager. The application's current status is then reflected on the HP OpenView graphical network map.

- **Console Message Logging and Reporting**
  For long-term problem detection, HP OpenView System Manager logs all console messages in a database residing on the management node. Operations staff may generate customized reports from this log for selective trend analysis. For example, if an operator was interested in tracking security problems, a report could be generated showing all "invalid password" messages occurring over the last six months. If the report showed an unusual number of these messages on a particular system, and that system had a modem connected, then the operator may have a security problem that warrants further investigation.

Configuration Description and Operator Interface

HP OpenView System Manager is a distributed application that runs on up to five HP OpenView Workstations, a management node (HP 3000, MPE/XL system), and one or more managed nodes (HP 3000, MPE/V and /XL systems). A single management node supports up to 64 managed nodes, and the product manages systems over any NS network. The main application resides on the HP 3000 management node. The HP OpenView Windows Workstation provides a user interface to the management node functionality, and uses HP OpenView Windows and Microsoft® Windows.

HP OpenView System Manager employs two connections between the management node and each managed node. The primary connection consists of an NS-X.25, NS-LAN, or NS-Point-to-Point network. The primary connection is used for all status monitoring and control capabilities. The secondary connection consists of either one of the following:

1. An X.25 connection to the managed node's ldev 20 hardware console port via an X.25 PAD,
   or
2. 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.

The secondary connection is used as a backup on the rare occasions when the network or systems go down. When the network or systems do go down, the secondary connection allows HP OpenView System Manager to continue providing full console access.

Product Requirements

The following hardware and software are required for HP OpenView System Manager:

HP OpenView Windows Workstation

- HP Vectra PC running Microsoft Windows 3.0 (must be purchased outside HP), HP OpenView Windows 5.1, HP AdvanceLink for Windows A.03.02 and NS 2.11
  or
- HP OpenView Windows Workstation (P/N 32054B with option 202; option 101, 1102, or 103; and a localization option) that includes all required PC software pre-installed on an HP Vectra PC

HP 3000 Management Node

- HP 3000 Series 9xx
- HP OpenView DTC Manager (P/N D2355A)
- HP OpenView Windows Workstation (P/N 32054B, option 201) dedicated for DTC Manager
- MPE/XL operating system release 2.2 or later
- HP ThinLAN 3000/XL Link (P/N 36923A)
- NS3000/XL Network Services (P/N 36920A)

If using an X.25 secondary connection, the following is required:

- DTC (P/N 2345A or 2340A), with DTC/X.25 Network Access card
- X.25 XL System Access (P/N 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 w/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 that 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:

- (1) Hayes or Hayes compatible modem (assumes presence of an existing support modem on ldev 21)
  or
- (1-2) DTCs, depending on configuration

HP 3000 Managed Node MPE/V

- HP 3000 Micro family or Series 37-70
- MPE/V Operating System (U-MIT or later)
- NS X.25 3000/V Network Link (P/N 24405A) or HP ThinLAN 3000/V Link (P/N 30240A) or NS Point-to-Point Network Link (P/N 30284A, 30285A)
- NS3000/V Network Services (P/N 32344A)

MPE/XL

- HP 3000 Series 9xx
- MPE/XL Operating System (Release 1.0 or later)
- DTC X.25 XL Network Link (P/N 2345A, 2346D/E/F/G, 2355A, 36939A) or HP ThinLAN 3000/XL Link (P/N 36923A) or NS Point-to-Point Network Link (P/N 36922A)
- NS3000/XL Network Services (P/N 36920A)

Note: The NMEvent API feature is supported on MPE/V Operating System platform 1P or later, and on MPE/XL Operating System release 2.2 or later.

Installation and Configuration Policy

HP OpenView System Manager is customer installable and configurable. 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. For a complete description of the installation and configuration process, refer to the HP OpenView System Manager Manager's Guide (P/N 36936-61002).

Customer Responsibility
The customer is responsible for performing the following tasks in order to successfully install and configure HP OpenView System Manager:

- Ensuring that all nodes to be managed with HP OpenView System Manager are properly connected via one of the following NS links:
  - HP ThinLAN 3000/V Link
  - NS Point-to-Point Network Link (for HP 3000/V or XL)
  - HP ThinLAN 3000/XL Link
  - NS X.25 3000/V Network Link
  - DTC X.25 XL Network Link
- Updating the HP 3000 Management Node to the proper release level and installing the HP OpenView System Manager product using AUTOINST. Refer to the HP 3000 MPE XL Installation and Update Manual (P/N 36123-90001).
- Updating any HP 3000 managed nodes to the proper release level.
- Installing and configuring the HP OpenView workstation, including the HP OpenView System Manager software.
- Configuring the management node, managed nodes, and HP OpenView Windows Workstation users.
- Verifying the proper installation, configuration, and operation of HP OpenView System Manager on the management node, the managed nodes, and the HP OpenView workstation.

Optional
If using an X.25 secondary connection:

- Ensuring that all nodes to be managed with HP OpenView System Manager have an X.25 PAD connected to their console port and that the PAD is connected to the management node via X.25.

If using a LAN or Point-to-Point secondary connection:

- Ensuring that back-to-back modems are properly set up between the management node and each managed node's console port. Because the secondary connection is rarely employed, the existing support modem on ldev 21 can be used.

Ordering Information

HP 36936A

HP OpenView System Manager PC and Management Node software. Must order one copy for each management node.

Select one processor option for each management node:

Processor Options:

310	For 920, 922LX
315	For 922RX
320	For 922, 925, 925LX, 932
330	For 935
335	For 949
340	For 950, 955, 960
350	For 980

PC Software

One copy of the HP OpenView System Manager PC software (HP 36936A) 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 PC software. One way is to order 36936A, which includes HP OpenView System Manager PC software only. All other required PC software must be purchased separately. Another way is to 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.

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 on the same order as the new processor option.

HP 36937A

HP OpenView System Manager Managed Node/XL software. Must order one copy for each MPE/XL managed node. Managed node software is not required for the management node.

Select **one** processor option:

Processor Options

310 For 920, 922LX
315 For 922RX
320 For 922, 925, 925LX, 932
330 For 935
335 For 949
340 For 950,955,960
350 For 980

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

HP 36938A

HP OpenView System Manager Managed Node/V software. Must order one copy for each MPE/V managed node.

Select **one** processor option:

Processor Options

310 For Series 37 and Micro family
320 For Series 39-58
330 For Series 64-70

Upgrade Credit Options

OCD For processor option 310
OCE For processor option 320
OCF For processor option 330

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 Sales Representative or refer to the HP data sheets for the specific services you are interested in.

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HP OpenView Management Stations

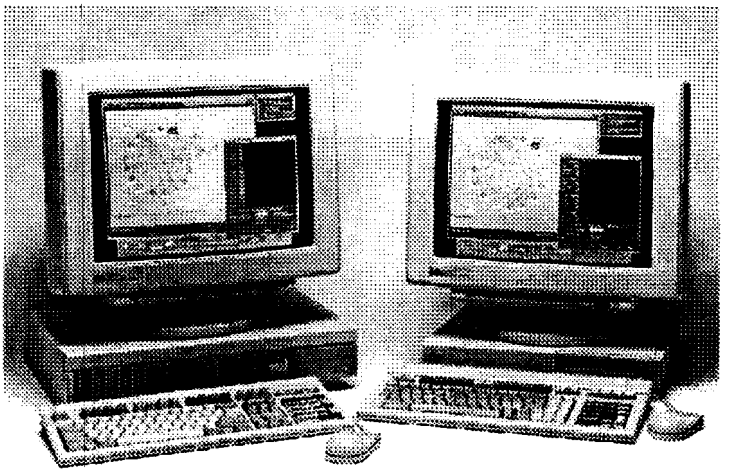
Technical Data

Product Numbers
B1039A for Campus Management Station and
B1040A for Enterprise Management Station

Welcome to HP OpenView

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. HP OpenView is a complete family of cohesive products and services for the integrated management of multivendor networks and systems.

The HP OpenView Management Stations are everything you need to immediately deploy SNMP multivendor network and system management with HP OpenView Network Node Manager. These ready-to-use systems take the headaches out of implementing a management station and save valuable set-up time.



Features and Benefits

Turnkey System for Immediate Use
HP-UX, the Visual User Environment (VUE), and HP OpenView Network Node Manager are all fully pre-loaded onto HP hardware. This saves you the effort of installing the operating system and applications software and makes it very simple to get and manage your network in just a few minutes' time.

The Right System for Different Size Networks
The HP OpenView Network Management stations are available in two different configurations for both medium size and larger networks, so that you can pick a network management station that best fits your needs.

Easy to Get Started
Clear, simple instructions are included with the HP OpenView Management Stations to plug in and use right away.

Everything You Need
The HP OpenView Management Stations are extremely simple to order and use. One product number gets you all the components you need to begin managing your network and systems right away. For example, there is no need to worry about getting the correct configuration of color graphics or disk size.

The HP OpenView Management Stations meet your needs for managing distributed LANs and interconnected workgroups with a minimum of effort.

Based on Leading-Edge Technology
The HP OpenView Management Stations are based on dual pillars of HP technology: HP's superior price-performance hardware platforms, and industry-leading HP OpenView network management software. You know you are working with the best network and systems management technologies available.

HP OpenView Management Station Configurations

The HP OpenView Management Stations consist of two different preconfigured systems to meet the needs of different size TCP/IP networks: the Campus Management Station for networks of up to 500 nodes, and the Enterprise Management Station for networks of to 2,000 nodes.

Both stations are optimally configured for running the HP OpenView Network Node Manager software product. Each includes a 19-inch monitor and high-resolution color graphics for clear, crisp presentation of Network Node Manager's graphical user interface; plenty of RAM and disk space for the application and network database; a CD-ROM drive to facilitate software delivery and future updates; and the full set of HP-UX CD-ROMs with pre-computed code words for backup. In the case of the Enterprise Management Station, the necessary SCSI cable and terminator are supplied for the external CD-ROM drive.

The Campus Management Station consists of the following components:

- HP 9000 Model 710 with:
  - 19-inch color monitor
  - 1280x1024 high resolution color graphics
  - 24 Mbytes of RAM
  - One internal 420 Mbyte disk drive
  - One internal CD-ROM Drive
  - HP VUE and Instant Ignition pre-loaded and pre-configured
  - OpenView TCP/IP Agent
- HP OpenView Network Node Manager pre-loaded and ready to run
- HP-UX/700 CD-ROM Set
- Quick start instructions for getting started on managing your network

The Enterprise Management Station consists of the following components:

- HP 9000 Model 720 with:
  - 19-inch color monitor
  - 1280x1024 high resolution color graphics
  - 32 Mbytes RAM
  - One internal 420 Mbyte disk drive
  - One external CD-ROM drive with SCSI cable and terminator
  - HP VUE and Instant Ignition pre-loaded and pre-configured
  - OpenView TCP/IP Agent
- HP OpenView Network Node Manager pre-loaded and ready to run
- HP-UX/700 CD-ROM Set
- Quick start instructions for getting started on managing your network

Related Information

Additional information on the individual components of the HP OpenView Management Stations can be obtained from the following literature:

- HP 9000 Model 710 Data Sheet, P/N 5091-3183E
- HP 9000 Model 720 Data Sheet P/N 5091-0977E
- HP OpenView Network Node Manager Data Sheet, P/N 5952-3363
- HP OpenView TCP/IP Agent Data Sheet, P/N 5091-2427E

Ordering Information

B1039A Campus Management Station

Options:

1FH AT-style American language keyboard
1FJ HP-style American language keyboard

B1040A Enterprise Management Station

Options:

1FH AT-style American language keyboard
1FJ HP-style American language keyboard

Information subject to change without notice.

HEWLETT PACKARD

HP OpenView TCP/IP Agent

Technical Data

Product Numbers
Bundled with HP-UX 8.0
LAN/Link Product on
Series 300, 400, 600, 700, an
800 Systems,
B1035A for SunSPARC

Welcome to HP OpenView

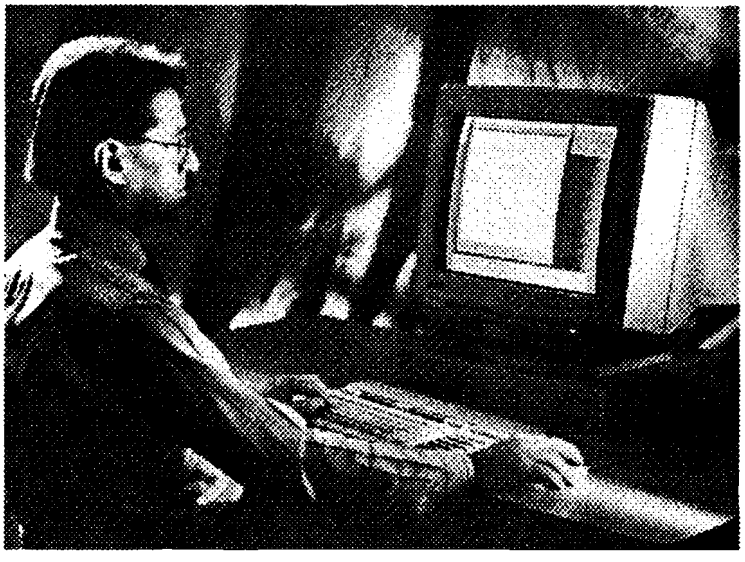
HP OpenView TCP/IP Agent provides the capabilities necessary to manage an HP 9000 Series 300, 400, 600, 700, 800 and SunSPARC computer via SNMP, (Simple Network Management Protocol). SNMP is the defacto standard protocol for managing TCP/IP (Transmission Control Protocol/Internet Protocol) networks.

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
  - 36967A for the Series 800
  - J2146A for the Series 8X7
- ARPA Services/9000
  - B1014A for the Series 300/400
  - B1030A for the Series 800/700/600
- SunOS 4.1 or later for the SunSPARC

Related Software

- HP OpenView Network Node Manager
  - B1009A for the Series 300/400
  - B1024A for the Series 600/700/800
  - 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.

B1035A HP OpenView TCP/IP Agent for SunSPARC

Options:

AA0	1/4-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

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HP OpenView Network and Systems Management Support Products (HP-UX and Sun)

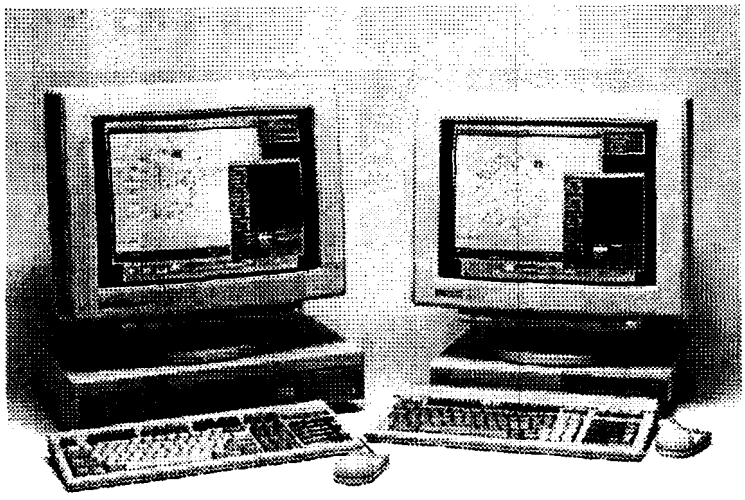
Technical Data

HP OpenView Network and Systems Management Products:
End-User Support Products
Developer Support Products

Welcome to HP OpenView

HP Open View 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.

Now you can enhance your business success with HP's software support services for your HP OpenView Network and Systems Management products. HP has many years of experience in delivering open, standards-based products that integrate easily with HP and non-HP computer systems. HP has consistently delivered high quality support services. Now, you can get that same level of quality and service from HP for your OpenView Network and Systems Management products in an open, multivendor environment.



HP OpenView Network and Systems Management. Support products and services are available for both end-users and for application developers.

HP OpenView End-User Support

HP Software Materials Update
As updates to the software products become available, this service provides customers with both software and manual updates directly. To receive Software Materials Update services for non-HP systems, customers must purchase HP Application Software Support Service for non-HP systems as well as HP Software Materials Update for non-HP systems, (see next page).

HP BasicLine Software Support
Customers receive self-support capability through a right-to-use software update license and access to HP SupportLine, HP's electronic database of current, comprehensive support information used by HP Response Centers.

HP ResponseLine Software Support
Customers receive all the services of HP BasicLine Software Support in addition to HP Response Center access for problem solving assistance, guaranteed call return within 2 hours, electronic call submittal capabilities, and on-site escalation if the problem can't be solved remotely.

HP TeamLine Software Support
Customers receive all the services for HP ResponseLine Software Support in addition to personalized software support and on-site applications assistance delivered through an HP account support consultant who is familiar with the customer's specific system environment and all software support issues.

HP Multivendor Support Services (Sun Systems)
HP SuccessLine hardware support is available on selected SUN products in some countries. This service is available through your local sales office. Contact your local support representative for more information.

HP Application Software Support Service (Sun Systems)
This support service, is for the support of HP software on Sun Systems. It is similar to responseLine Software Support for HP Systems. Customers receive telephone access to the HP Response Center, access to HP Support Line, critical on-site assistance and the right to use software updates. Support is provided for HP software products only. Sun operating system or other third party application support is not available as part of this service. The Software Materials Update service for non-HP systems must be purchased with this service.

Network Support Services

Support services tailored to meet specific customer needs are available, such as:

HP Network Planning and Design
Customers receive a comprehensive network strategy that supports their business objectives. HP Network Consultants analyze the customer's communications requirements and create a detailed network design based on those requirements.

HP Network Startup
Customers receive quick implementations of their networks, a simplified service interface, verified network operation and assured on-going support.

HP NetAssure Service
This service provides customers with network fault isolation and assistance with problem resolution anywhere on their networks.

HP OpenView Developer Support Products

HP OpenView offers development environments on both DOS and UNIX® operating systems. The service and support products described in this data sheet are for UNIX operating systems. For information on the DOS products please see the HP OpenView Windows/DOS Development Products Data Sheet,(5091-2747E).

There are two kinds of support products available for HP OpenView Developers on UNIX platforms: HP OpenView Developer Assist Plus, and tailored contractual support.

HP OpenView Developer Assist Plus

This service is designed to offer high quality electronic technical assistance to HP OpenView NSM application developers. Through this service, you can confidentially submit questions and service requests to one of HP's technical support engineers, through CompuServe. CompuServe's information network and electronic mail system support HP OpenView NSM developers worldwide. CompuServe's advanced communication network guarantees that all communication between you and HP support engineers is completely confidential. Our current CompuServe solution provides E-Mail and Technical Library access. Developers must subscribe to CompuServe in order to receive both Technical Library access and E-mail support. Developer Assist Product does not include consulting for design and layout of network management applications, however it does include API support and aid in implementation. Design and Consulting services are available on a contractual basis.

Along with electronic support, customers have the capability to describe problems and ask question via phone access. Developer Assist Plus service is directly from the HP laboratories where OpenView platforms, application building blocks and network and system management software solutions are designed and developed. Customers will receive an acknowledgment for E-Mail or phone requests within 24 hours.

The HP OpenView Developer Assist Plus Product is an annual support product and needs to be renewed each year. With the initial purchase of the HP OpenView Developer Assist Plus Product, three additional months are included. The first year of HP OpenView Support will be for twelve months plus three bonus months, for a total of fifteen months. Subsequent years will be based on a normal twelve month year.

HP OpenView Design and Consulting

Customers receive expertassistance when developingHP OpenView applications. This service is designed to allow customers to quickly and efficiently develop and implement specialized solutions based on HP OpenView.

HP OpenView Design and Consulting is available for both OEM developers and end-users. Specific deliverables are negotiable. The following services are examples that could be available depending on the specific customer need:

- Requirements analysis/potential solutions/implementation design

- Application review
  - Review functional specifications, design specifications, test plans and user documentation
- Specialized code development support
- Object modeling assistance
- 3rd Party Solutions/integration of applications

Design and Consulting services details will be specified in a contract tailored to meet individual customer requirements.

HP OpenView Contractual Support

For those customers developing network management applications that desire a tailored support package, a customized program is available. For those customers requiring services beyond the standard Developer Assist Product, individualized support contracts are available. These contracts could include a combination of standard developer support, on-site training, and design and consulting services. The level of services will be based on the developer's specific requirements.

Ordering Information

End-User Support

- HP OpenView Software Materials Update
  - Network Management Server HP-UX
    *H2014A+S00, opt # **
  - Network Node Manager HP-UX
    H2014A+S00, opt # *
- HP OpenView BasicLine Software Support
  - Network Management Server HP-UX
    H2012A+L00, opt # *
  - Network Node Manager HP-UX
    H2012A+S00, opt # *
- HP OpenView ResponseLine Software Support
  - Network Management Server HP-UX
    H2011B+H00, opt # *, #0L7
  - Network Node Manager HP-UX
    H2011B+S00, opt # *, #0L7
- HP OpenView TeamLine Software Support
  - Network Management Server HP-UX
    H2010A+S00, opt # *, #0L7
  - Network Node Manger HP-UX
    H2010A+S00, opt # *, #0L7
- HP OpenView Software Materials Update (Sun Systems, Requires H2084A + H00)
  - Network Node Manager (Server)
    H2085A+S00, opt # 700
  - Network Node Manager (Client)
    H2085A+S00, opt # 100
- HP OpenView Applications Software Support Service(Sun Systems, Requires H2085A + S00)
  - Network Node Manager (Server)
    H2084A+H00, opt # 700
  - Network Node Manager (Client)
    H2084A+H00, opt # 100
- HP Multivendor Support Services
  - Work with Local Sales Center or Customer Information Center
- HP Network Support Services
  - Work with Local Sales Center or Customer Information Center

* applicable processor option

Developer Support

- HP OpenView Developer Assist Plus(For HP and SUN Systems)
  - Network Management Server
    32013A, opt # 010
  - Network Node Manager Applications Developers
    32013A, opt # 010
- HP OpenView Developer Contractual
  - Work with Local Sales Support Center or Customer Information Center
- HP OpenView Design and Consulting
  - Work with Local Sales Center or Customer Information Center

HEWLETT PACKARD

HP OpenView Extensible SNMP Agent

Technical Data

HP OpenView Network Management Product Numbers
B1036A for Series 300/400
B1037A for Series 600/700/800
B1038A for SunSPARC

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 HP 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 HP OpenView Extensible SNMP Agent. Commands can include any executable or shell script.

Get Started Immediately
Templates and examples are included with the HP OpenView Extensible SNMP Agent so that you can get started immediately. The templates clearly show how to define new SNMP objects on your managed systems. 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 any network management environment, whether it is managed by the HP 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 SunSPARC systems, providing true multivendor network and system management.

Functionality

Basic SNMP Conformance

The HP OpenView Extensible SNMP Agent conforms to SNMP specifications to facilitate interoperability with both HP's and other vendors' management solutions. It follows RFCs 1212 and 1213, which covers 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, P/N 5091-2427E.

Extensibility

The HP 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.

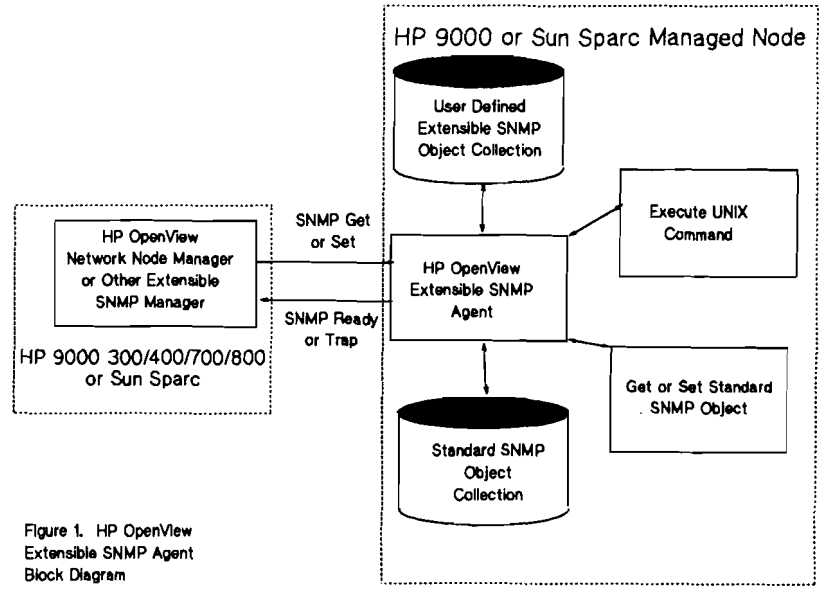


Figure 1. HP OpenView Extensible SNMP Agent Block Diagram

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 HP 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.

Extensible SNMP Agent Example

In the example shown in figure 1, a network manager has determined that he or she 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.

specified in concise MIB format. The network manager 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 the network manager 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 HP 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 on to 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 HP OpenView TCP/IP agent. These are:

- Agent process has been started (coldstart)
- Request has an improper community name

In addition, the HP 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, sets up a script to monitor for the condition, and executes 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 HP 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
- SunSPARC station or SPARC server 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 8.0 or later for all HP 9000 platforms
- SunOS 4.1 or 4.1.1

Related Software

- HP OpenView Network Node Manager
  - B1009A for Series 300/400
  - B1024A for Series 600/700/800
  - B1034A for SunSPARC
- HP OpenView TCP/IP Agent
  - Bundled with HP 9000 LAN/Link product
  - B1034A for SunSPARC systems
- HP OpenView Interconnect Manager
  - 27360A for Series 300/400
  - 27361A for Series 600/700/800

Ordering Information

B1036A HP OpenView Extensible SNMP Agent for HP 9000 Series 300/400

Options:

AA0 1/4-inch tape and manuals
AAH DDS (DAT) tape and manual
0B1 Additional copy of manual
UA0 License for use on a single system
0A9 License for use on 10 systems
UAE License for use on 100 systems
UAG License for use on 1000 systems
UE4 Upgrade from single system license
UE5 Upgrade from 10 systems license
UE6 Upgrade from 100 systems license

B1037A HP OpenView Extensible SNMP Agent for HP 9000 Series 600/700/800

Options:

AA0 1/4-inch tape and manuals
AAH DDS (DAT) tape and manual
0B1 Additional copy of manual
UA0 License for use on a single system
0A9 License for use on 10 systems
UAE License for use on 100 systems
UAG License for use on 1000 systems
UE4 Upgrade from single system license
UE5 Upgrade from 10 systems license
UE6 Upgrade from 100 systems license

B1038A HP OpenView Extensible SNMP Agent for SunSPARC

Options:

AA0 1/4-inch tape and manuals
0B1 Additional copy of manual
UA0 License for use on a single system
0A9 License for use on 10 systems
UAE License for use on 100 systems
UAG License for use on 1000 systems
UE4 Upgrade from single system license
UE5 Upgrade from 10 systems license
UE6 Upgrade from 100 systems license

Options UA0, 0A9, 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 SunSPARC systems.

If HP B1038A, Extensible SNMP Agent for SunSPARC, is purchased, then the HP OpenView TCP/IP Agent for SunSPARC, HP B1035A, is not required.

HEWLETT PACKARD

HP 4990S LanProbe Distributed LAN Analysis System

Technical Data

Product Numbers
HP 4990A, HP 4990S
HP 4991A, HP 4992A
HP 4993A, HP 18490A

Overview

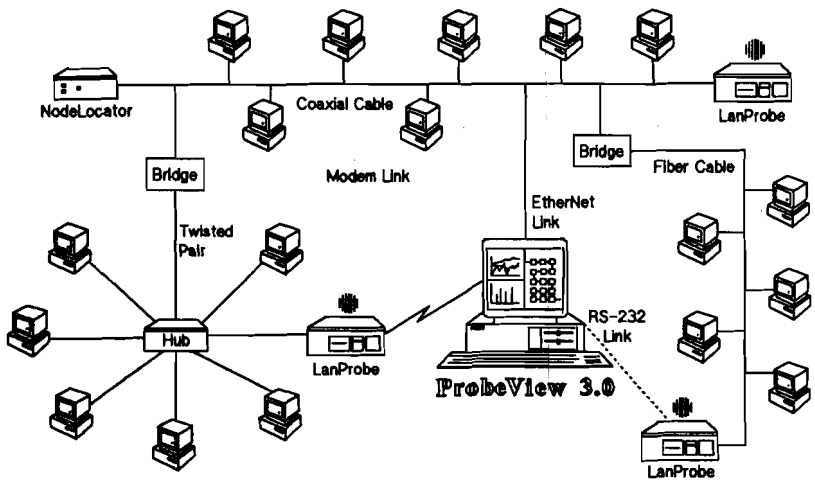
The HP LanProbe distributed LAN analysis system from Hewlett-Packard gives local area network managers the power to systematically maintain, intelligently manage, and plan the growth of Ethernet networks.

With unprecedented ease-of-use, the HP LanProbe system monitors, tests, and diagnoses virtually all aspects of your network and presents its findings in clear, color graphics.

The HP LanProbe system enables a network manager to monitor all critical aspects of a remote or local network from one central vantage point. It tracks the range of problems that can plague an Ethernet LAN, including those related to the cable, communications software, traffic load, equipment malfunction, and even user error. Furthermore, the system's rich array of statistics and extensive export capabilities finally enables network planning to be based on facts—not guesses.

The system consists of one or more HP 4991A LanProbe segment monitors and HP 4990A ProbeView™ 3.0 software running under Microsoft® Windows 3.0.

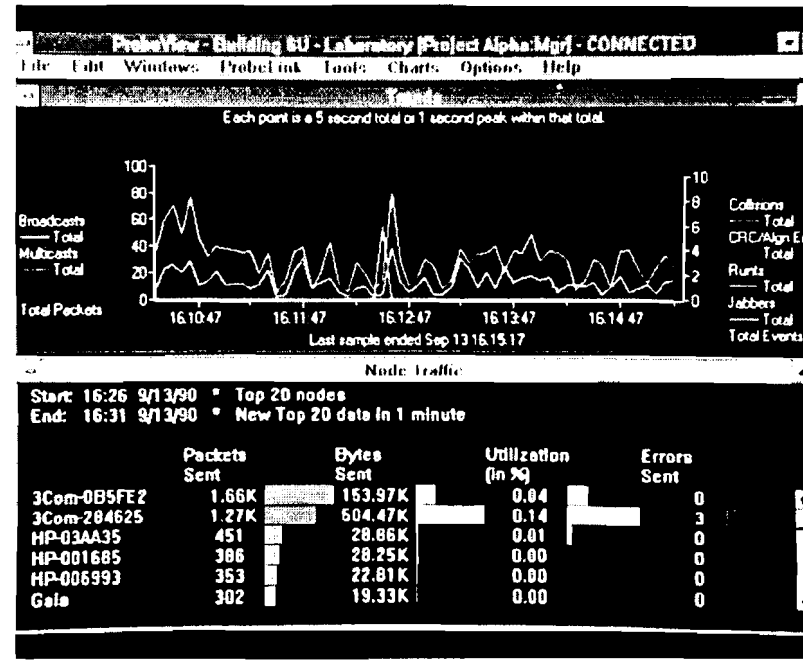
LanProbe & ProbeView Configuration



HP 4991A LanProbe Segment Monitor

The HP LanProbe segment monitor attaches to the end of an Ethernet segment and monitors all traffic. Attachment can be made directly to a thin or thickcoaxial cable, or via an external transceiver to fiber optic or twisted pair cabling.

Network data relating to the segment is transferred to a workstation running HP ProbeView via RS-232-C, an Ethernet adapter, or a modem connection. Network data relating to the segment is transferred to a workstation running HP ProbeView via RS-232-C, an Ethernet adapter, or a modem connection.



HP 4990A ProbeView C.00.00 Software

HP ProbeView C.00.00 software, which runs on a PC/AT or PS/2 workstation, presents network information in graphical displays. Running under Windows, its point-and-click logic and simplicity help ensure that the system pays dividends from day one.

HP 4992A NodeLocator

The NodeLocator option attaches to the opposite end of the cable from the HP LanProbe segment monitor. It automatically locates the position of nodes on Ethernet networks using coaxial cabling schemes.

HP 4993A ProbeView Console

A fully-configured HP Vectra PC with all the necessary software, including HP ProbeView, is provided as an option. Because all of the required workstation hardware and software are properly installed and configured by HP, the user has the convenience of virtually instant system use.

Put Your LAN on the Map

Installed in minutes, the HP LanProbe system quickly and automatically identifies all active nodes on a segment and displays them on a map with their adapter vendor names and addresses. You can enter additional information about the nodes—such as equipment types, their location, and other notes – into the database by simply clicking on an icon and typing in the desired data.

When the NodeLocator option is used, the relative distances of the nodes are automatically discovered and scaled on the map to accurately depict the physical layout of the segment. Thereafter, when a new node is installed and becomes active, or one is moved or becomes inactive, the change will be detected and dynamically shown on your map. The HP LanProbe system provides an unmatched tool for documenting your network.

Addressing Your LAN's Weakest Link

The most vulnerable part of an Ethernet LAN is the cable itself. This cabling is subject to considerable abuse, which can bring the whole network down. Tracking the source of a problem through the labyrinth of building ducts, walls, and conduits is often a nightmare. With the HP LanProbe system, you can conduct sensitive tests to assure the continual good condition of the coaxial cable.

When a fault is detected, you are alerted and given its precise location on the map; all you need to do is go to that place and fix it.

Vital Statistics

The HP LanProbe system continuously monitors vital parameters of a LAN segment to learn the network's operating norms. Traffic statistics, such as valid packets, collisions, errors, and broadcasts, are gathered and displayed on a "QuickView" chart. This gives a clear snapshot of the LAN's operation in an easy-to-understand format that also makes anomalies immediately apparent. Current activity, peaks, and averages are displayed, and you can set threshhold levels for any of the parameters. In the event that your specified thresholds are exceeded, the HP LanProbe will alert you—even if you are not currently connected to it—and make a log entry. It can also forward these alerts as SNMP traps to other network management consoles.

"Trends" showing the ebb and flow of segment activity are also charted. You can choose to view these on a daily basis or at any other preferred time interval.

"Node Traffic" presents the key LAN variables specific to each node, with the option of only reviewing the top 20 nodes or plotting all node traffic on the segment. This chart, like any other, can be copied and pasted into other Windows 3.0 applications, enabling the generation of authoritative performance reports and memos.

Echo Tests

An extensive set of echo tests using IP, DECnet and Novell® protocols, provides immediate node response status, which is depicted on both network and segment maps. Automatic background testing allows you to check your most critical nodes continually. Echo statistics from these tests reflect the quality of internet performance in terms of response times and rates. Statistics that can be exported are: maximum, minimum, average, and current echo response times and number of successful tries.

Solving Protocol Mysteries

A LAN's performance is radically affected by the inner workings of complicated and invisible protocols. When the rules governing these protocols are violated or contradict themselves, a network can be rendered inoperative or unreliable. The HP LanProbe system looks at every packet to give you insight to your network's activity.

The Trace capability enables you to capture packets and examine their architecture. It flags bad packets, facilitating the quick identity of their origin. In addition to the trace tool's library of the 28 most commonly used filters, you have the complete flexibility to create your own filters to look for packets of particular interest.

Decodes Option

An optional protocol analysis option translates the content of each packet into English. This facilitates solving numerous problems such as: client-server connectivity, protocol mismatches, and excessive broadcasts. The protocol analysis option now lets you decode AppleTalk, Banyan Vines, DECnet, OSI, Novell NetWare®, TCP/IP, XNS—all from the console.

SNMP Traps

HP ProbeView alerts can now be received by SNMP management consoles, such as HP's OpenView, through SNMP traps. These include information on status of both IP and non-IP nodes, threshold exceeded, and cable faults. In this way the HP LanProbe system becomes a powerful subsystem for SNMP enterprise network management. It gives you a much deeper view of individual LAN operations than from just an SNMP management "umbrella."

Other Key Features

A Log of critical events that occur on the segment is provided. This information, including thresholds exceeded, duplicate IP address detected, power outage, new node discovered, node aged, cable fault, and many other items, is automatically entered in the log. This data is uploaded whenever connected to HP ProbeView software. With any of the predefined filters installed, protocol specific events are now flagged. Log data can be sent to an online printer for continuous printing and, as with statistics, can also be exported.

AutoPolling enables a schedule to be set for HP ProbeView to connect with any HP LanProbe segment monitor, collect specified information, and optionally back up the system. Trends, Node Traffic, Map, and Log data can thus be gathered on a continual basis and saved in standard MS-DOS® CSV files. These files, which may also be automatically appended over an extensive period of time, can then be used by spreadsheets, databases, and other applications for further analysis and reporting.

Alert Manager enables multiple HP LanProbe segment monitors to connect to HP ProbeView simultaneously to deliver an alert message. When an alert has been received, the Alert Manager icon pulsates red with an accompanying beep. The alert message can be read by clicking the icon. All alerts are automatically entered into the log.

Filters and Tests
The HP LanProbe system comes with a library of predefined filters and built-in network tests that can be used in conjunction with trace tool or the log. Some of these are listed below:

- runts, jabbers, broadcasts, multicasts
- alignment and CRC errors
- 3Com diagnostics run for 3C501, 3C503, 3C505
- bad Ethernet source addresses
- ICMP parameter problems
- ICMP time exceeded
- bad IP addresses
- SNMP Traps

Concurrent operation of all HP ProbeView functions – map, log, trace, statistics alert management, and echo – is an essential part of the HP LanProbe design. It allows documentation of critical events and the observation of significant correlations, giving you in-depth analysis of the LAN's operation. All tools can be displayed simultaneously as windows, providing a method to quickly and easily navigate from one to another. Furthermore, HP ProbeView can be run simultaneously with other Windows 3.0 applications.

Remote out-of-band access is provided for HP LanProbe through an integral 2,400 baud modem or an external Hayes-compatible modem. This works in exactly the same manner as if the workstation running HP ProbeView were directly connected to the HP LanProbe segment monitor through an RS-232-C or an Ethernet port. In-band remote access is possible through any IP router or gateway.

The export of Map, Trends, NodeTraffic, Log, and echo tests can be done automatically through AutoPolling into MS-DOS CSV files. Manual export into MS-DOS files of this data, and that of trace, is also possible.

Specifications

HP 4991A LanProbe Segment Monitor

Data capture rate: 10 Mbps
Network compatibility: Ethernet version 2.0, IEEE 802.3 compatible
Transceiver connector: 15-pin D subminiature connector with slide latch
Ethernet connector: Standard BNC* (BNC-to-N type connector included)

Modem: Internal, 2400 baud modem standard; support for external Hayes-compatible modem
Termination: Internal 50 Ohm, switchable
Cable test: Standard; opens: range 50-1700 feet, accuracy 2% or ±10 feet shorts: range 50-600 feet, accuracy 2% or ±10 feet
Standard compliance: FCC part 68; CSA 556B, CSA 22.2 #0.7 complies with IEC 348; meets FTZ 1064/84; UL 1244
Dimensions (hxwxd): 4.15 × 16.3 × 17.5 inches (10.5 × 41.4 × 44.5 cm)
Weight: 16 pounds (7.26 kilograms)
Power requirements: 120 VAC/240 VAC
Power consumption: 35 watts
Operating environments: Temperature = 0° to 55°C, Humidity = 0% to 90% noncondensing
Storage temperature: -40°C to +70°C

* HP LanProbe provides electrical grounding for the coaxial cable when connected via the optional internal transceiver

HP 4992A NodeLocator

Network compatibility: Ethernet version 2.0, IEEE 802.3 compatible
Ethernet connector: BNC (BNC-to-N type connector included)
Termination: Internal 50 Ohm, switchable
Standard compliance: CSA 556B, IEC 348, UL 1244
Dimensions (hxwxd): 1.64 × 5.57 × 7.20 in (4.17 × 14.15 × 18.29 cm)
Weight: 1.2 pounds (.55 kilograms)
Power requirements: 120 VAC or 240 VAC, separate module
Power consumption: 5 watts
Operating environments: Temperature = 0° to 55°C, Humidity = 0% to 90% noncondensing
Storage temperature: -40°C to +70° C

HP 4990A ProbeView Software Host Requirements

(For preconfigured solution see HP 4993A HP ProbeView Console.)
Host computer: HP Vectra PC, IBM PC/AT, PS2, or compatible 386 class computer
Memory: 2 Mbytes or more recommended
Floppy disk: 1.2 Mbyte 5¼-inch, or 1.44 Mbyte 3½-inch
Hard disk: 4 Mbytes free space after installing Windows
Graphic interface: Windows-compatible EGA or VGA
Mouse: Windows-compatible mouse
DOS: 3.3 or higher
Windows: 3.0 or higher (for optimal performance,use Windows extended memory and disk cache drivers)
Serial port: COM1 or COM2
Printer (not required): HP PaintJet; HP LaserJet, DeskJet, and ThinkJet families; HP 7550 plotter; Epson 9-pin dot matrix; PostScript® laser printer
Phone line: Required for remote access only, RJ11 analog connection for direct dial
Network access: HP 27250A ThinLAN, 27245A EtherTwist, 27210A or B ThinLan, 27236A StarLAN 10, 3Com 3C501, 3C503, 3C523, and other cards supported by HP ARPA Services 2.1
Network access software: ARPA 2.1 HP D1812B

HP 4993A ProbeView Console

ProbeView: HP 4990A HP ProbeView Manager
Host computer: HP Vectra 386/25 Personal Computer, video controller card, keyboard
Memory: 4 Mbytes
Floppy disk: 1.44 Mbyte 3½-inch
Hard disk: 84 Mbytes
Graphic interface: Super VGA color display
Mouse: Windows compatible HP mouse
Network access: HP 27250A ThinLAN card
DOS: HP Vectra MS-DOS version 3.3, USA
Windows: MS Windows version 3.0, USA
Network Access software: ARPA 2.1 HP D1812B

Ordering Information

HP 4990A ProbeView Software

Requires Microsoft Windows version 3.0 or higher and HP ARPA Services (D1812B option 0012) for Ethernet card support.

Options:

100	Adds HP ProbeView Observer Software with HP ProbeView Manager software
200	Adds Protocol analysis capability
300	Adds HP ARPA Services
400	Adds Microsoft Windows
500	Replaces English manual with Japanese manual

HP 4991A LanProbe Segement Monitor
Options:

001	Deletes cable test, BNC connector, and NodeLocator capability*
002	Deletes internal modem*
003	Deletes cable test, BNC connector, internal modem, and NodeLocator capability

HP 4992A NodeLocator (optional)

Automatically locates nodes on coaxial cable. Requires cable test, BNC connector, and NodeLocator capability with HP LanProbe. Will not work with HP 4991A options 001 or 003.

* Once deleted, cannot be retrofitted

HP 4993A ProbeView Console

HP Vectra Intel 386/25 with 4 Mbytes memory and 3½-inch floppy disk drive. Has VGA monitor, HP 27250A ThinLAN card and HP mouse. Comes with HP ProbeView, HP ARPA Services, and MS Windows installed.

Options:

003	Adds an additional 2 Mbytes memory
004	Adds an additional 4 Mbytes memory
005	Deletes HP ProbeView Manager software, adds HP ProbeView Observer software
006	Adds 5¼-inch floppy disk drive
007	Deletes ThinLAN card, adds EtherTwist card
008 A	Adds protocol analysis capability

HP 18490A ProbeView Observer Software

HP 18491A Protocol Analysis Option (for existing HP ProbeView installations) Requires version B.00.00 or higher.

Support Services

The following HP support options are available for HP LanProbe system products.

HP 4990A ProbeView Manager Software update service (contract for 1 year)

Contains appropriate upgrades for HP ARPA Services and Microsoft Windows.

+UA6	Media is 5¼-inch disk
UA8	Media is 3½-inch disk

HP 4991A LanProbe Firmware update service (contract is for 1 year)

U0J	Firmware updates only HP 4991A LanProbe Hardware support contracts
W30	3 year return to HP
02A	Priority support 8 a.m.–9 a.m.
02B	Next Day support 8 a.m.–9 a.m.
22B	Return to HP support

HP 4992A NodeLocator Hardware support contracts

W30	3 year return to HP
02A	Priority support 8 a.m.–9 a.m.
02B	Next Day support 8 a.m.–9 a.m.
22B	Return to HP support

HP 18490A ProbeView Observer Software update service (contract is for 1 year)

Contains appropriate upgradesw for HP ARPA Services and Microsoft Windows.

UA6	Media is 5¼-inch disk
UA8	Media is 3½-inch disk

HP 18491A Protocol Analysis Option Software update service (contract is for 1 year)

UA6	Media is 5¼-inch disk
UA8	Media is 3½-inch disk

HEWLETT PACKARD

HP Wire Test Instrument

Technical Data

Product Number
28687A

The HP 28687A Wire Test Instrument verifies and troubleshoots twisted-pair cabling for Type 10BASE-T networks. It quickly performs the necessary tests to evaluate the key parameters specified by IEEE 802.3 to 10BASE-T standard: crosstalk attenuation, signal attenuation over frequency, burst noise, and continuity.

The HP 28687A Wire Test Instrument is a result of HP's commitment and leadership role in the Type 10BASE-T arena, as well as HP's experience in the development of high-quality test instruments. "This full-function portable instrument gives you a better way to verify and troubleshoot twisted-pair LAN cabling."

Features

- Tests key parameters for Type 10BASE-T networks: crosstalk attenuation, signal attenuation over frequency, burst noise, and continuity. (Crosstalk attenuation and signal attenuation are measured using 5-MHz sine wave, 10-MHz sine wave and 10-Mbit/s pseudo random Manchester-encoded data.)
- Evaluates both bundled 25-pair and individual 4-pair twisted-pair cabling.
- To ensure reliability, the HP 28687A performs self-test and calibration during power on and recalibrates periodically during use.
- Weighing less than 10 pounds, this portable unit can be easily carried to where you need it.
- The Monitor function lets you take up to a 24-hour look at the cabling for identification of intermittent cabling problems. Data can be printed out as it is collected, or printed and reviewed at the end of the test period.
- The 16-character alphanumeric display steps you through the test procedures and provides you with diagnostic information on each test performed for each twisted pair.
- Prints out a hard copy of your test results by connecting to any printer which supports the standard RS-232 interface.
- Easy-to-read LEDs indicate which pairs you have selected for testing, which tests you have selected, and which pairs passed or failed.
- For quick wiring connections, the HP 28687A has a built-in 50-pin Telco connector and comes bundled with a 12-port modular adapter for 8-pin jack connections.

Functional Description

Complete Testing of Type 10BASE-T Cable

Twisted-pair cable, unlike coaxial cable, allows for variations in physical characteristics and has dynamic performance requirements such as crosstalk, signal attenuation, and installation-dependent specifications. Tools developed for the telephone industry are not specialized to test for these specification requirements. The HP 28687A Wire Test Instrument can quickly identify problems in these areas. Designed specifically to verify compliance to the IEEE 802.3 10BASE-T standard, the HP 28687A Wire Test Instrument lets you easily verify and troubleshoot twisted-pair LAN cabling.

Easy to Use

This lightweight portable unit saves time by simplifying the complex task of testing twisted-pair cabling. Individual tests or combinations of tests can be run – 5 LEDs indicate which tests you have selected. Up to 24 pairs (12 ports) can be tested simultaneously – LEDs indicate which pairs you have selected. The alphanumeric display steps you through the test procedures and gives you complete diagnostic information when you want it. An RS-232 printer port also allows you to print a hard copy of the results. Twelve green LEDs indicate whether the pairs have passed or failed the tests. Intermittent cabling problems can be identified by pushing the MONITOR button, which performs the selected tests for up to 24 hours.

Troubleshooting and Verification

Network downtime is expensive. While the costs of a downed network cannot always be quantified, daily business depends on a functional network. With the HP 28687A Wire Test Instrument, cable problems can be easily and quickly identified.

To avoid intermittent problems and performance degradation problems, both new and in-place twisted-pair cabling should be evaluated prior to use as a LAN media. The HP 28687A Wire Test Instrument verifies the suitability of in-place twisted-pair cable for your Type 10BASE-T application before you install your network.

Functional Specifications

Physical Specifications

Dimensions:
Width: 27.9 cm (11.0 in)
Depth: 34.3 cm (13.5 in)
Height: 15.9 cm (6.3 in)
Weight: 4.1 kg (9.0 lb)

Environmental Specifications

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

Relative Humidity:
Operating: 5% to 95% at 40°C (104°F) noncondensing
Nonoperating: 5% to 90% at 65°C (149°F) noncondensing

Electrical Specifications

At Nominal Voltage (ac) RMS	Maximum Current RMS	Maximum Power	Frequency Range
100-120 volts	0.5 amp	30 watts	50-60 Hz
200-240 volts	0.3 amp	30 watts	50-60 Hz

Maximum Input Voltage:
Common Mode: 500 volts
Differential Mode: 24 Volts at f < 60 Hz,
1.5 Volts at f > 60 Hz

Measurement Specifications

	Measurement Range	Accuracy	Resolution
Signal Attenuation	0-15 dB	±0.5 dB	0.1 dB
Crosstalk Attenuation	0-36 dB	±1.0 dB	0.1 dB
Burst Noise	232 mV minimum	±32 mV	

Measurement made through a 3-pole Butterworth low-pass filter with a 3-dB cut off at 15 MHz.

Source Characteristics:

Frequency Range	5-MHz sine wave, 10-MHz sine wave, 10-Mbit/s pseudo random Manchester-encoded data
Output Level Range	1.25 volts peak ± 250 mV
Impedance	100 ohms ± 10 ohms
Output connector	50-pin Telco connector

Receiver Characteristics:

Frequency Range	5 MHz to 15 MHz
Input Level Range	20 mV peak to 1.5 volts peak
Impedance	100 ohms ± 10 ohms
Input Connector	50-pin Telco connector

Altitude Operating: 0-4.6 km (15,000 ft)
Nonoperating: 0-15.3 km (50,000 ft)

Approvals

RFI (Radio Frequency Interference): FCC Class A, FTZ-1046/1984, CISPR-22 Class A, VCCI Class 1

Safety: CSA C22.2-220 for ITE. Compliance with UL 478, UL 1244, and IEC 348.

Ordering Information

The HP 28687A Wire Test Instrument includes an operating manual, 12 loopback hoods, one 12-port modular adapter, one test results pad and a power cord.

Related Documents and Literature

5959-2208 HP SiteWire Twisted-pair Cabling Installation Guide
5090-2607 HP LAN Configuration Guide for IEEE 802.3 and Ethernet Networks
5090-2642 HP EtherTwist Network Startup Guide

Warranty

The HP 28687A Wire Test Instrument is warranted for 1 year against defects. Check with your local Hewlett-Packard Sales and Support Office for more information.

Accuracy specified at 100-ohm line impedance.

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

HEWLETT PACKARD

Approaches to Network Design Seminar

Technical Data

Course Number
HP 50750S

HP Educational Services: Your Key to Higher Productivity

Course Overview

Learn tips and techniques to help make your network design project a success. This course uses real-world examples to illustrate the key steps involved in planning and designing a network.

Course Features

- Gain a fundamental understanding of planning and designing local and wide area networks
- Learn how to evaluate your company's network requirements
- Practice doing physical and logical network designs through case studies
- Learn how to work with networking vendors to get what you need, when you need it
- Learn about HP AdvanceNet networking solutions

Specifications

Course Length: 2 days

Audience: Management information systems and data communications professionals who are responsible for managing or working with an outside consultant on a network design project

Prerequisites: Recommended but not required:

- Introduction to Data Communications (HP 35051S) and
- Local Area Networks Seminar (HP 50747S) and
- Wide Area Networks Seminar (HP 50748S)

Delivery Method: Classroom, onsite

Format: This course combines lectures with structured group discussions. The instructor supervises small work groups during sessions devoted to completing a network design case study.

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

- The network life cycle
- The network planning and design process
- Getting started on your project

Day 2

- Analyzing network requirements
- Network logical and physical design considerations
- Evaluating network design proposals
- HP network products and support

Ordering Information

To order Approaches to Network Design Seminar (HP 50750S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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.

Region Sales Headquarters

United States:
Hewlett-Packard Company
4 Choke Cherry Road
Rockville, MD 20850
(301) 670-4300

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 255-9800

Hewlett-Packard Company
5161 Lankershim Blvd.
No. Hollywood, CA 91601
(818) 505-5600

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 955-1500

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Hewlett-Packard Ltd.
6877 Goreway Drive
Mississauga, Ontario L4V 1M8
(416) 678-9430

European Headquarters:
Hewlett-Packard S.A. Marcom Operations Europe
P.O. Box 5291180 AM Amstelveen
The Netherlands
(31) 20 547 9999

Japan:
Yokogawa-Hewlett-Packard Ltd.
15-7, Nishi Shinjuku 4 Chome
Shinjuku-ku, Tokyo 160
(03) 5371 1323

Latin America:
Hewlett-Packard
Latin American Region Headquarters
Monte Pelvoux No. 111
Lomas de Chapultepec
11000 Mexico, D.F. Mexico
(525) 202 0155

Australia/New Zealand:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street, Blackburn,
Victoria 3130, Australia
(03) 895 2895

Far East:
Hewlett-Packard Asia Ltd.
22/F Bond Centre, West Tower
89 Queensway, Central, Hong Kong
(852) 8487777

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

HEWLETT PACKARD

HP CableSite Service

Technical Data

A Service of the HP Netwo Support Program

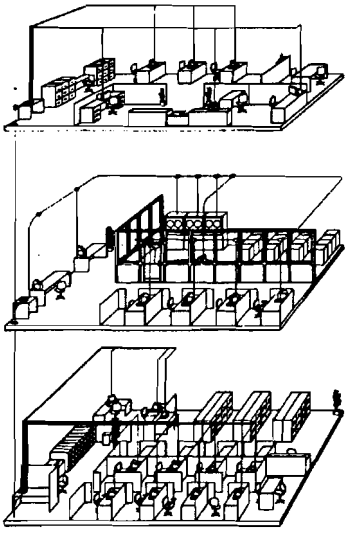
HP CableSite service helps you design and build a local area network (LAN) cable system that enhances success with your LAN. With HP CableSite service, HP provides single-vendor responsibility for the design and implementation of your cable infrastructure. We can provide an entirely new cable system or add new cable to an existing network. HP CableSite service, as with all the services in the HP Network Support program, can be scaled to fit your network technology and size.

Features

- Cable requirements analysis
- Cable design
- Cable installation
- Cable testing
- Cable documentation
- Multiple-site coordination

Benefits to You

- Flexibility for future needs
- Quality design
- Quality installation
- Verified cable functionality
- Foundation for ongoing supportability
- Simplified implementation



Flexibility for Future Needs

An HP CableSite requirements analysis ensures you of a flexible, cost-effective cable foundation that meets your needs today and in the future. Based on information that you provide to HP, we deliver detailed documentation describing cable system specifications, installation requirements, and testing criteria.

Quality Design

With HP CableSite service, you receive a detailed LAN cable system design custom tailored to fit your network design. In this way, we ensure that the cable infrastructure matches your specific environment to help prepare for successful cable installation.

Quality Installation

HP provides quality installation of your LAN cable by a team of experienced installers. We begin by reviewing a detailed cable implementation schedule with you as well as identifying site preparation requirements for installation. Then, we carefully install cable and regularly review progress with you to ensure a smooth, timely installation.

Verified Cable Functionality

After completing all of the HP CableSite service installation activities, HP performs standard tests on all major cable plant sections to verify proper functionality. We also diagnose and isolate any detected problems and continue to work with you until all the installed cable is operational.

Foundation for Ongoing Supportability

Accurate documentation is critical for successful management and supportability of your cable infrastructure. HP CableSite service provides you with complete documentation of the installed cable plant including a cable system map and a list of key support contacts.

Simplified Implementation

Successful, multiple-site cable plant implementation may require coordination with other vendors. HP works with other vendors, directly or through your staff, for installation scheduling and resource coordination.

Specifications

Coverage Hours

HP CableSite service is available during normal business hours Monday through Friday, excluding HP holidays. Off-hours service is available at an additional fee.

Eligibility

Your HP sales representative and account team can evaluate your cable design and implementation needs with HP CableSite service. In general, your LAN is eligible for HP CableSite service if it meets the following criteria.

Network Design

A complete, documented network design must be available to Hewlett-Packard before HP CableSite service begins. The design document must include these items:

- A physical network map with communication links identified
- A description of all network hardware
- A description of applications that use the network

HP Network Consulting service can assist you in developing your network design if one does not exist.

Site Requirements

Your LAN must be:

- Located in sites that meet the site specifications listed in HP documentation applicable to your products (specifications may apply to both HP and non-HP products)
- Located in HP-defined service travel areas
- Located in stationary facilities (mobile vans, ships, airplanes, automobiles, and railroad cars are specifically excluded)
- Attended by customer personnel at all times when HP support or installation personnel are on-site

Ordering Information

HP CableSite service is custom quoted to meet your specific requirements.

Please contact your HP sales representative or local HP sales office for HP CableSite service ordering information.

HP CableSite service is subject to local availability.

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
- Introduction to 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
- 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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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.

Region Sales Headquarters

United States:
Hewlett-Packard Company
4 Choke Cherry Road
Rockville, MD 20850
(301) 670-4300

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 255-9800

Hewlett-Packard Company
5161 Lankershim Blvd.
No. Hollywood, CA 91601
(818) 505-5600

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 955-1500

Canada:
Hewlett-Packard Ltd.
6877 Goreway Drive
Mississauga, Ontario L4V 1M8
(416) 678-9430

European Headquarters:
Hewlett-Packard S.A. Marcom Operations Europe
P.O. Box 5291180 AM Amstelveen
The Netherlands
(31) 20 547 9999

Japan:
Yokogawa-Hewlett-Packard Ltd.
15-7, Nishi Shinjuku 4 Chome
Shinjuku-ku, Tokyo 160
(03) 5371 1323

Latin America:
Hewlett-Packard
Latin American Region Headquarters
Monte Pelvoux No. 111
Lomas de Chapultepec
11000 Mexico, D.F. Mexico
(525) 202 0155

Australia/New Zealand:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street, Blackburn,
Victoria 3130, Australia
(03) 895 2895

Far East:
Hewlett-Packard Asia Ltd.
22/F Bond Centre, West Tower
89 Queensway, Central, Hong Kong
(852) 8487777

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

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: 2 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

- HP LAN Manager/X overview
- Network planning and PC client software installation
- Using the NETSETUP installation program to install a PC network
- Tuning PC client memory

Day 2

- Using HP LAN Manager/X clients
- HP LAN Manager/X server installation
- HP LAN Manager/X server setup

Day 3

- HP LAN Manager/X server management
- 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).

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.

Region Sales Headquarters

United States:
Hewlett-Packard Company
4 Choke Cherry Road
Rockville, MD 20850
(301) 670-4300

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 255-9800

Hewlett-Packard Company
5161 Lankershim Blvd.
No. Hollywood, CA 91601
(818) 505-5600

Hewlett-Packard Company
2015 South Park Place
Atlanta, GA 30339
(404) 955-1500

Canada:
Hewlett-Packard Ltd.
6877 Goreway Drive
Mississauga, Ontario L4V 1M8
(416) 678-9430

European Headquarters:
Hewlett-Packard S.A. Marcom Operations Europe
P.O. Box 5291180 AM Amstelveen
The Netherlands
(31) 20 547 9999

Japan:
Yokogawa-Hewlett-Packard Ltd.
15-7, Nishi Shinjuku 4 Chome
Shinjuku-ku, Tokyo 160
(03) 5371 1323

Latin America:
Hewlett-Packard
Latin American Region Headquarters
Monte Pelvoux No. 111
Lomas de Chapultepec
11000 Mexico, D.F. Mexico
(525) 202 0155

Australia/New Zealand:
Hewlett-Packard Australia Ltd.
31-41 Joseph Street, Blackburn,
Victoria 3130, Australia
(03) 895 2895

Far East:
Hewlett-Packard Asia Ltd.
22/F Bond Centre, West Tower
89 Queensway, Central, Hong Kong
(852) 8487777

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HEWLETT PACKARD

HP NetAssure Service

Technical Data

HP Multivendor Network Support Program

HP NetAssure service maximizes the uptime of your network and increases the effectiveness of your network operations staff. HP NetAssure service provides you with fault isolation and assistance with problem resolution, anywhere on the network. This service is flexible enough to support your single-site office or manufacturing network as well as your multisite network. Hewlett-Packard invests in network and data communications training and support tools so that you do not need to make that investment. HP's worldwide support organization is available to ensure that your network is operating properly and is available to meet your business needs.

Features

- One telephone call
- Multivendor problem management
- Fast response time
- HP Network Predictive support

One Telephone Call

When you have a network problem, you need it fixed quickly. Since your network is composed of a variety of products, vendors, and technologies, identifying the cause of the problem is difficult. With HP NetAssure service, one telephone call to the HP Response Center initiates the problem isolation process. This timely identification of a problem with either HP or another vendor's equipment reduces network downtime.

HP's fault isolation activities begin with the powerful remote diagnostics of the HP Response Center. If necessary, HP dispatches a support engineer to one or multiple locations as an on-site resource. Under HP NetAssure service, each appropriate HP office is staffed with highly trained engineers, stocked with test equipment, and armed with technical information about your network.

Multivendor Problem Management

HP simplifies problem resolution and reduces your network downtime by working directly with select vendors to return your network to normal operation quickly. Coordinating multiple vendors' services is time consuming. Under HP NetAssure service, HP assists in managing the resolution of the problem for you.

To expedite the resolution of network problems, HP has working relationships with select network vendors. If our diagnosis of the network problem indicates that equipment from one of these vendors is involved, HP contacts the vendor directly for remote or on-site assistance. HP continues to work with the vendor while the problem is being resolved, keeping your network operator informed of resolution status.

HP also works with your network operator to cooperatively manage problem isolation with vendors or non-HP products. Either way, you win with HP managing the resources to get your network back up and running.

Fast Response Time

HP simplifies problem resolution and reduces your network downtime by working directly with select vendors to return your network to normal operation quickly. When network operators call the HP Response Center with a network problem, they talk to a network support specialist within two hours to begin problem isolation. Working with the latest technology, the network support specialist performs remote problem diagnosis. If HP cannot resolve the problem remotely, we promptly dispatch a local support engineer.

HP Network Predictive Support

For select HP 3000 products on networks supported with HP NetAssure service plus HP SuccessLine Next Day support or HP SuccessLine Priority support, HP Network Predictive support is available to monitor line-error trends. This helps HP predict and diagnose network problems. In addition, HP Predictive Support software has been enhanced to include coverage of the HP INP network interface card. These combine to further enhance your network availability.

90 Days Free

When you purchase 12 months of HP NetAssure service at the same time that you purchase HP Network Startup service, you receive 90 days of HP NetAssure service free of charge prior to commencement of paid coverage.

Eligibility

Your network is eligible for HP NetAssure service if it meets the following criteria.

Supported Connections.
HP must agree upon all network connections supported under HP NetAssure service. While repair of non-HP products remains the responsibility of the customer or vendor, HP has working relationships with select vendors to expedite problem isolation and resolution. Your HP sales representative and account team can provide you with current information on supported connections and evaluate your network for supportability under HP NetAssure service.

Minimum Network Configuration.
HP NetAssure service requires at least one HP CPU (HP 1000, HP 3000, or HP 9000) on the network or at least one HP personal computer (HP Vectra PC or HP 150 PC) for PC networks.

Product Support.
The minimum level of support required for each HP CPU on the network is HP BasicLine, when HP ResponseLine is purchased for another CPU at the site, for all system software, and HP SuccessLine Next Day support for all system hardware. The minimum level of support required for each HP PC on the network is HP ResponseLine and HP SuccessLine Scheduled support on all software and hardware respectively. Documented maintenance arrangements must be in place for all other hardware and software products to be supported under HP NetAssure service.

Operating Condition.
At the time HP NetAssure service coverage begins, your network must be fully operational. HP NetAssure coverage may begin upon completion of HP Network Startup service. Other networks may require verification by HP at an additional charge. If the network requires service prior to HP NetAssure service coverage, you can purchase HP assistance at standard service rates.

Remote Support.
The ability to access a network remotely increases the effectiveness of HP's troubleshooting capability and reduces your network downtime. HP NetAssure service customers must allow the HP Response Center remote

access to their network. Although nodes may need to be configured for remote access, you may only need to connect the modems when remote diagnosis is necessary.

Remote access requirements depend on your network topology. Your HP support engineer works with you to determine specific support requirements, and HP may provide modems for certain connections.

Modified Products.
HP products modified without prior approval from HP are not eligible for HP NetAssure service.

Site Requirements. Your network is eligible for HP NetAssure if your network connections are:

- Installed in sites that meet the specifications listed in the HP documentation that applies to your products. (Specifications may apply to both HP and non-HP nodes on the network.)
- Located in HP-defined service travel areas
- Located in stationary facilities (Automobiles, mobile vans, ships, airplanes, and railroad cars are specifically excluded.)
- Attended by customer personnel at all times when HP support personnel are on site

Customer responsibilities

You must identify a network operator and an alternate within your organization as persons responsible for network operation. These are the primary contacts for HP and are authorized callers to the HP Response Center for assistance under HP NetAssure service. You may identify additional callers by ordering the additional HP Response Center caller option.

The network operator is responsible for contacting the HP Response Center for problem assistance and for coordinating internal customer resources as necessary. The customer network operator and alternate may be required to attend select HP training courses. Your HP support engineer can help you determine detailed training requirements for your network operator.

The network operator is also responsible for working with the HP support engineer to maintain accurate network documentation and must notify HP when major topology changes occur on the network. Information about the network configuration is critical for successful management and support. Standard HP documentation makes it easier to maintain this information.

Coverage Hours

Your network operator can contact the HP Response Center for assistance under HP NetAssure service between 7:00 am and 9:00 pm, Eastern time, Monday through Friday, excluding HP holidays. Subject to local availability and price uplifts, additional coverage hours and days may be available.

Upon receipt of a call during the coverage hours above, HP may need to dispatch a support engineer. For network sites with HP systems connected in the network, HP's on-site response under HP NetAssure service is governed by the response time purchased for the HP hardware maintenance agreement for the networked systems. If dispatch is required to a site that has no HP products connected to the network, the response time is the next working day.

Charges

Charges for HP NetAssure service are based on HP's published prices in effect in the country where the network connections are maintained.

Travel Zones.
If your system is within 100 miles of a primary or secondary HP Support Responsible Office, you receive the specified on-site response time. Response times to locations beyond 100 miles may be longer.

Travel to sites located within 200 miles of your HP Support Responsible Office is provided at no additional charge. If you are located beyond 200 miles, HP assesses a travel charge based on the distance to your location.

Ordering Information

The cost of HP NetAssure service is determined by your network configuration. HP measures the size and complexity of your network by the number and type of physical network connections. The cost is then based on HP's standard prices for each type of network connection.

For additional information on HP NetAssure service and the HP Multivendor Network Support program, contact your local HP sales representative.

HP NetAssure service and certain features such as HP Network Predictive support are 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.

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 work-group 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.

HEWLETT PACKARD

HP Network Operations Support Service for Multivendor Networks

Technical Data

A Service of the HP Network Support Program

HP Network Operations support provides a flexible, secure network operation service for your multivendor local-area network (LAN) or wide-area network (WAN). To supplement your staff, HP Customer Network Centers (HP CNCs) can perform network operations tasks round the clock or provide partial shift coverage, depending on your needs. In addition, HP team members work closely with other HP resources to ensure maximum availability of your network. Hewlett-Packard can also custom tailor solutions to meet your specific requirements.

Features

- Delivery through dedicated HP CNCs
- Network monitoring and status reports
- Telephone assistance
- Remote and on-site fault isolation and problem management
- Flexible coverage hours
- Network performance reporting and analysis
- Support representative for account reviews
- Efficient management of network changes
- Secure operations environment

Benefits to You

- Superior technical support
- Real-time availability management
- Timely and responsive help
- Maximum network uptime
- Support when you need it
- Maximum network performance
- Efficient network growth
- Accurate, up-to-date documentation
- Protection of your proprietary network

Superior Technical Support

HP is committed to delivering superior networking products and support. To ensure successful network planning, implementation, and operation, HP has established three centralized HP CNCs around the world. These strategic centers are in Atlanta, Georgia (North America); Bristol, United Kingdom (Europe); and Singapore (Far East).

HP Network Operations service is delivered by a team of HP CNC network consultants and network operators who have superior technical expertise in multivendor LAN and WAN network environments. In addition, HP CNC network operators work with HP NetAssure engineers who provide specialized expertise in isolating network faults in multivendor environments. HP CNC service and support is available 24 hours per day, seven days a week.

Real-time Availability Management

HP Network Operations service ensures that your network maintains high levels of performance and reliability. You get real-time availability management of your multivendor network. By regularly performing status checks of network components, events, and overall network performance, HP network operators provide timely problem diagnosis and resolution that reduces network downtime.

Timely and Responsive Help

When a network problem arises, you need help quickly. The HP CNC provides networking expertise and problem-resolution support with a single phone call. Your network manager will be talking to an HP network operator within 15 minutes after a telephone request has been received. In addition to providing technical assistance and problem resolution, the CNC can also provide an up-to-date status of your network any time that your network manager calls.

Maximum Network Uptime

HP Network Operations service includes HP NetAssure coverage, which provides you with the problem resolution that you need to ensure maximum network uptime. In response to either a telephone assistance call or a network alert, the HP network operator begins to restore the network or correct the problem.

Sophisticated data communications technology, up-to-date network documentation, and other diagnostic tools help the operator perform first-level diagnosis and fault isolation on network links or components. When the problem is isolated, the network operator initiates steps necessary to restore network service.

If network operators cannot resolve the problem remotely in a timely fashion, it will be escalated to the HP NetAssure team. The HP NetAssure team will remotely isolate the network problem or dispatch a local support engineer if necessary.

Support When You Need It

HP Network Operations service provides coverage of your network when you need it most. HP can provide 24-hour, seven-day-per-week coverage or partial shift coverage to satisfy your business needs.

Maximum Network Performance

Look to HP Network Operations service to help you maximize the performance of your multivendor network. HP provides regular consolidated reports covering network status and performance, which you can use in planning for cost-effective and high-performance growth. As an option, the HP CNC can also tailor specific reports to meet your requirements.

An assigned HP support representative regularly organizes support management reviews to discuss performance, review progress on current support issues, and disseminate HP product information.

Efficient Network Growth

HP simplifies your network changes by providing timely and reliable network change management services under HP Network Operations service. When your network manager initiates a network change request, the network operator at the HP CNC schedules and implements the requested changes to the network configuration. Careful implementation and verification of these changes ensures efficient network growth and successful transitions that minimize potential disruption to normal network operations.

Accurate, Up-to-Date Documentation

Keeping up-to-date network documentation is essential to the successful operation and ongoing supportability of your network. HP maintains and distributes network documentation updates to make sure your organization always has the most accurate and up-to-date information.

This documentation contains the most current hardware and software configurations of network components, physical locations of equipment, and your key contacts for each network location. Documentation goes to your sites and to the HP entities supporting your network, in accordance with specifications set by your network manager.

When HP network operators have modified the network configuration as part of change management, appropriate network documentation is automatically updated and distributed.

Protection of Your Proprietary Network

HP recognizes that network security is of utmost importance. We locate all of the equipment used to operate your network in a secure operations center at the HP CNC. The operations center facility is controlled by an electronic lock system and admits only authorized HP CNC personnel. HP also uses dedicated equipment to operate, and manage your network, which ensures that your network is completely isolated from other networks. Such security features, along with the commitment of HP personnel to maintain your network's reliability and integrity, allow you to focus on your business issues with the assurance and confidence that your network is in good hands.

Additional Features

If the network management hardware and software being used to operate the network resides at one of the HP CNCs, HP will also provide:

- Installation of network management software updates
- Regular backups of network management files
- Preventative maintenance scheduling

Installation of Network Management Software Updates

The HP CNC installs new revisions of software for your network management equipment, in coordination with your network manager.

Regular Backups of Network Management Files

HP network operators perform regular backups of files residing on network management equipment to protect against data corruption or loss.

Preventative Maintenance Scheduling

HP network operators also ensure that regular preventative maintenance is performed on network operation hardware to maintain system and network reliability.

Specifications

Coverage Hours

Your network will be operated and managed up to 24 hours per day, seven days per week, as agreed upon. Your approved list of callers may contact the HP CNC for assistance up to 24 hours per day, seven days per week, depending on your contract.

Customer Responsibilities

Remote Support

Remote access to your network increases HP's troubleshooting effectiveness and minimizes your network downtime. When you purchase HP Network Operations service, you must allow remote access to the network from HP CNCs and the HP Response Center. Although nodes may need to be configured for remote access, the modems only need to be connected when remote diagnosis is necessary.

Remote access requirements differ depending on your network topology. Your HP support engineer works with you to determine specific support requirements, and HP may provide modems when necessary.

Network Manager

A network manager responsible for the network and an alternate must be identified within your organization as primary contacts for HP. These individuals must be experienced in networking. Your network manager provides HP with distribution guidelines for documentation updates. The use of any operator's console not located at the HP CNC should be limited only to network monitoring. Node or configuration modification will be the sole responsibility of the HP network operator, as directed by your network manager.

Eligibility

Product Support

HP Network Operations service is available for multivendor LANs and WANs, subject to HP's review and approval. The minimum level of support required for HP network equipment is HP Software Update Materials service, Priority level of HP SuccessLine (for network nodes and systems hardware coverage), and Next Day level of HP SuccessLine (for peripheral hardware coverage). Documented maintenance arrangements must be in place for all other hardware and software products to be covered by the HP Network Operations contract.

Operating Conditions

When your HP Network Operations coverage begins, your network must be fully operational. If HP Network Operations coverage begins upon completion of HP Network Startup service, this requirement is met. Other networks may require verification by HP at an additional charge. If the network requires service prior to HP Network Operations, you may purchase HP assistance at standard service rates.

Modified Products

HP products or network configurations that have been modified without prior approval from HP are not eligible for the service.

Site Requirements

To be eligible for HP Network Operations your network connections must be:

- Located at sites that meet the specifications listed in the HP documentation that applies to your products (specifications may apply to both HP and non-HP nodes on the network)
- Located in HP-designated service travel areas
- Located in stationary facilities (mobile vans, ships, airplanes, and railroad cars are specifically excluded)
- Attended by customer personnel at all times when HP support personnel are on-site

Limitations

Availability

HP Network Operations service is subject to local availability.

Charges for the service are determined on a special-quote basis only. Charges depend on the complexity of your network, hours of coverage, and optional features included. The size and complexity of your network is measured by the number and type of physical network connections.

Travel

Travel to sites located within HP travel zones 1, 2, 3, 4, and 5 is included. Service provided to sites in travel zone 6 will include additional travel charges.

Ordering Information

For more information on HP Network Operations service, contact your local HP sales representative.

HEWLETT PACKARD

HP Network Startup

Technical Data

A Service of the HP Network Support Program

HP Network Startup service helps you get your network up and running quickly. With this service, Hewlett-Packard works with you to coordinate the installation, configuration, and testing of your network. We can help you bring a new network on-line or add new connections to an existing network. The HP Network Startup service, as with all the services in the HP Network Support program, can be scaled to fit your network technology and size.

Features

- Scheduling and coordination assistance
- Network configuration
- Network testing
- Network documentation

Benefits to You

- Timely implementation of your network
- A simplified service interface
- Verified network operation
- Assured ongoing supportability

Timely Implementation of Your Network

HP Network Startup service simplifies installation scheduling and resource coordination. We work with you to develop a complete service schedule. This increases your effectiveness, because all necessary tasks and resources are identified from the start. The overall time frame for HP Network Startup activities is based on your system and network availability requirements. Together you and the HP support team identify all installation activities to be performed, a time frame for each activity, and the responsible party (HP, your network operations staff, or another vendor). The schedule also identifies critical-path activities and contingency plans when appropriate.

A Simplified Service Interface

Successful startup of your network requires proper configuration of all network components. With HP Network Startup service, we configure each HP component in your network to your network design specifications. We can also work with other vendors on the network directly or through your operations staff to define configuration parameters that must be determined jointly.

Expanding your network and adding new nodes affects the configuration of your existing network components. When HP Network Startup service is purchased to add nodes to a network, we configure new nodes and work with your network operator to determine how the existing network components will be affected.

Verified Network Operation

Hewlett-Packard tests all major connections implemented under HP Network Startup service to ensure that they communicate properly. After all installation and configuration activities have been completed, HP performs standard tests to verify network operation. If the tests reveal an operational difficulty, HP diagnoses and isolates the problem. We continue to work with you and your operations staff, as long as reasonable progress is being made, until all connections implemented with HP Network Startup service are functional.

Assured Ongoing Supportability

Accurate information is critical for the successful management and operation of your network. Hewlett-Packard provides complete documentation of the network, including a network map, detailed configuration information, and a list of your support contacts (HP and non-HP). This documentation is a valuable tool for the smooth, ongoing operation of your network.

Specifications

Eligibility

Your HP sales representative and account team can evaluate your network's specific connection types for implementation with HP Network Startup service. In general, your network is eligible for HP Network Startup service if it meets the following criteria:

Minimum Network Configuration

HP Network Startup service requires at least one HP central processing unit (CPU) – HP 1000, HP 3000, or HP 9000 – on the network or at least one HP personal computer (HP Vectra PC or HP 150 PC) on a PC-only network.

Additional Nodes

HP Network Startup service can be purchased to add new nodes to a network if HP NetAssure service covers the network or if HP verifies that the network is operating properly prior to the addition.

Network Design

A complete, documented, ready-to-implement network design must be available to Hewlett-Packard before the HP Network Startup service begins. The network design document must include these items:

- Physical network map with communication links identified
- Description of all network hardware and software
- Description of applications utilizing the network

Assistance in developing a network design is available through the HP Network Consulting service.

Site Requirements

Your network connections are required to be:

- Located in sites that meet the specifications listed in HP documentation applicable to your products (specifications may apply to both HP and non-HP nodes on the network).
- Located in HP-defined service travel areas.
- Located in stationary facilities (specifically excluding mobile vans, ships, airplanes, automobiles, and railroad cars).
- Attended by customer personnel when HP support personnel are on-site.

Modified Products

Hewlett-Packard products that have been modified without prior approval from HP are not eligible for HP Network Startup service.

Coverage Hours and Travel

HP Network Startup services are available between 8:00 am and 5:00 pm, Monday through Friday, excluding HP holidays. For HP Network Startup service requested beyond normal working hours, off-hours service is available for an additional fee. Hewlett-Packard bills travel fees for each trip separately at HP's published rates.

Ordering Information

Please contact your Hewlett-Packard sales representative or local HP sales office for HP Network Startup service ordering information.

HP Network Startup service is subject to local availability.

HEWLETT PACKARD

HP OpenView DTC Manager and HP OpenView DTC/X.25 XL 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 and the HP OpenView DTC/X.25 XL products.

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 product assembler and disassembler (PAD) support.
- Practice configuring an asynchronous interface card and configuring DTC/TIO using HP OpenView DTC Manager.
- Practice configuring system-to-system switching information and X.25 logging.
- Practice performing HP 3000 Series 900 host configuration tasks.
- Learn to start up and shut down network services on the host and X.25 in the HP OpenView product and the MPE XL operating system.
- Gain expertise at managing online terminal input and output (TIO).

Specifications

Course Length: 3 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, local area networks (LANs), wide area networks (WANs), and HP NS3000/XL network services

Prerequisites: MPE/XL System Management Skills (HP 31119S) or Moving from MPE V to MPE/XL: 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, 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
- Planning the network
- HP DTC Manager installation
- Drawing the map and associated tasks

Day 2
- Configuring the DTC/TIO
- Configuring the MPE/XL and HP-UX host
- DTC online management of TIO

Day 3
- System-to-system configuration
- PAD access configuration
- Maintenance and troubleshooting

Ordering Information

To order HP OpenView DTC Manager and OpenView DTC/X.25 Fundamentals (HP B2800S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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.

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4 Choke Cherry Road
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(301) 670-4300

Hewlett-Packard Company
5201 Tollview Drive
Rolling Meadows, IL 60008
(708) 255-9800

Hewlett-Packard Company
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No. Hollywood, CA 91601
(818) 505-5600

Hewlett-Packard Company
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Atlanta, GA 30339
(404) 955-1500

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(525) 202 0155

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31-41 Joseph Street, Blackburn,
Victoria 3130, Australia
(03) 895 2895

Far East:
Hewlett-Packard Asia Ltd.
22/F Bond Centre, West Tower
89 Queensway, Central, Hong Kon
(852) 8487777

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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/XL 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/XL 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/XL 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
- Planning the network
- Installing and configuring hardware and software

Day 3
- Configuring the network
- Starting and testing the network
- Maintaining the network

Day 4
- Solving network problems
- 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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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.

Region Sales Headquarters

United States:
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(852) 8487777

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HEWLETT PACKARD

HP PC-LAN Support Service

Technical Data

HP PC-LAN Support service provides you with a single source of support for your PC-based local area network (LAN) and associated products. Now you don't have to manage multiple service agreements or decide who to call for service. A single call to Hewlett-Packard institutes the support you need and provides maximum uptime and user productivity, at minimum cost.

HP's commitment to multivendor software and hardware support, combined with state-of-the-art remote diagnostic capabilities, keeps your LAN operating properly and minimizes interruptions to your business. Skilled, factory-authorized HP personnel, backed by the HP Response Center, ensure that you receive high-quality support from an industry leader.

HP PC-LAN Support service provides flexible and cost-effective coverage. You can select the type of service and support that suits your specific business needs and budgets.

Features

- One phone call, single point of contact
- Fast response time
- Support for most popular LAN products
- Remote diagnostic software and modem
- Multivendor problem resolution

Benefits to You

- Prompt resolution of your LAN problems
- Minimal network downtime
- HP service on all your LAN products
- Freedom from managing multiple service contracts

Prompt Resolution of Your LAN Problems

With HP PC-LAN Support service, a diagnostic modem becomes an integral part of your LAN. An HP support representative installs the modem and diagnostic software once your LAN's operation has been verified. The HP Response Center, working with the latest diagnostic technology, performs remote problem diagnosis when you need it. HP's network support specialists, in coordination with your network operator, have direct access to your LAN, ensuring that necessary resources are available to return your network to normal operation.

Minimal Network Downtime

When you have a network problem, you need help quickly because the availability of your network is critical to your business. Within two hours after calling, your network operator will be talking to an HP Response Center network support specialist. If network diagnosis indicates a problem with your LAN server hardware, HP dispatches a support specialist on the same day to initiate an on-site repair.

HP Service on All Your LAN Products

As a qualified service provider for many leading LAN vendors, HP delivers the same comprehensive support for your multivendor LAN that you have come to expect for your HP products. HP's access to training, parts, and technical expertise ensures that you receive the high-quality support that is crucial to your business success.

Freedom from Managing Multiple Service Contracts

With HP PC-LAN Support service, one call to the HP Response Center initiates the problem-resolution process. Many problems, such as configuration errors, can be resolved immediately over the telephone. If the problem requires on-site resources, HP dispatches a highly trained support specialist who is equipped with sophisticated test equipment and technical information about your LAN. Within 48 business hours, HP will repair all LAN peripherals and workstations also covered under an HP maintenance agreement.

HP's support specialists repair many popular multivendor workstation products from such vendors as Novell®, 3Com, IBM, Apple, Compaq, DEC, Epson, Hayes, Okidata, Televideo, and many others. Whether the problem occurs with multivendor hardware or software, you can rely on HP for support of all eligible products.

Specifications

Coverage Hours

Your network operator may contact the HP Response Center for assistance between 8:00 am and 5:00 pm local time, Monday through Friday, excluding HP holidays (and subject to local availability).

Response Time

If you need on-site assistance, Hewlett-Packard's on-site response for LAN server hardware maintenance will be within 4 coverage hours between 8:00 am and 5:00 pm from the time the HP Response Center initiates a dispatch.

Response time for LAN work-stations or peripherals is governed by the response time specified in the hardware maintenance agreement for the networked products. It is calculated from the time the HP Response Center dispatches a support representative to your site.

Customer 's Responsibilities

Prerequisites.
At the time service coverage begins, your network must be fully operational. Prior to such coverage, an HP support representative will perform an on-site verification procedure. If the network requires service prior to coverage, you can purchase HP assistance at standard service rates.

Remote Support.
When remote diagnostics are necessary, you must allow the HP Response Center remote access to your LAN via a direct-dial, voice-grade telephone line hookup to the diagnostic modem.

Network Operator.
You must identify a network operator and alternate as persons responsible for network operation. These will be the primary contacts for Hewlett-Packard and will be the callers authorized to contact the HP Response Center for assistance under HP PC-LAN Support service.

The network operator is responsible for contacting the HP Response Center and coordinating necessary internal customer resources. The network operator also works with HP to maintain accurate network documentation, and notifies HP when major configuration changes occur on the network.

The network operator and alternate need a basic understanding of LANs, LAN operating software, and application software. Both may be required to attend selected HP training courses. Your HP support representative can help you determine detailed training requirements.

Eligibility

Product Requirements.
Each HP-serviceable personal computer or peripheral on your network can be supported by HP SuccessLine service. (A peripheral is defined as a printer, plotter, modem, gateway, bridge, hub, or external disk drive.)

Other Products.
HP supports many popular LAN software and hardware products from a number of manufacturers. Please contact your HP support representative for a complete list of eligible products.

Site Requirements.
Your network must be:

- Installed in sites that meet the site specifications set out in applicable product documentation
- Located in specific service travel zones
- Located in stationary facilities (e.g., excluding mobile vans, ships, airlines, and railroad cars)

Limitations

HP PC-LAN Support service is subject to local availability.

Ordering Information

The number of servers on your LAN determines the price of HP PC-LAN Support service, and is based on HP's standard price for LAN servers. To obtain additional information or to order HP PC-LAN Support service, please contact your HP support representative.

For more information, call your local HP sales office listed in your telephone directory or an HP regional office for the location of your nearest sales office.

HEWLETT PACKARD

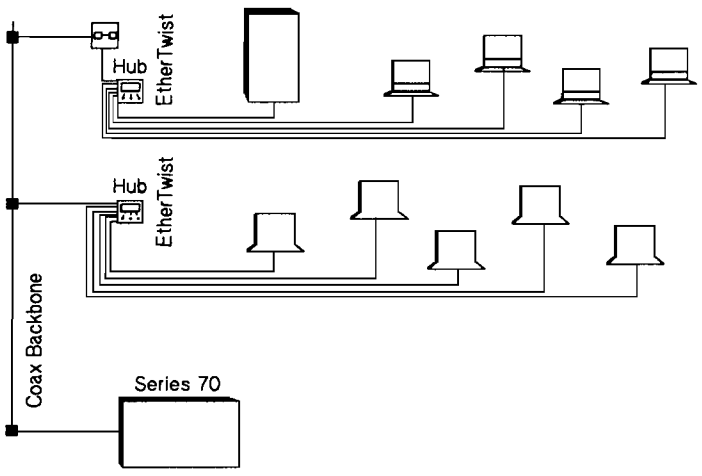
HP WireTest

Technical Data

HP WireTest is a unique service provided by Hewlett-Packard to test the suitability of your existing twisted-pair cable for use with HP EtherTwist. This service furnishes you with the information needed to make the important decision to use your existing wiring for 10BASE-T network. HP WireTest maximizes the value of your existing wiring system!

From expertise gained in the development of technical measurement and instrumentation devices, Hewlett-Packard has designed a sophisticated new tool for the HP WireTest service. This electronic instrument quickly verifies if your wire complies with IEEE 802.3 type 10BASE-T wiring specifications by performing continuity, signal attenuation, crosstalk attenuation, and burst noise tests.

The availability of the HP WireTest service, in conjunction with the HP EtherTwist family of products, provides full support of twisted-pair local area networks. Twisted-pair wiring offers many benefits to meet your communication needs today: economical, low-cost media; low-cost adds, moves, and changes; and uniform voice and data media. Networking with HP's twisted-pair products provides a scalable and flexible growth path to meet your needs today and in the future.



Features

- Site Qualification checklist
- Evaluation of existing twisted-pair wire for EtherTwist networks
- Quick and simple test procedure
- Accurate and reliable test performed by a trained HP Customer Support Engineer
- Continuity, attenuation, crosstalk, and burst noise tested

- Recommendation based on HP's expertise

Benefits

- Identifies candidates for the HP WireTest service; eliminates any unnecessary testing of wire
- Preserves your investment in the existing building wiring
- Low-cost, economical evaluation
- Operating problems are reduced, leading to greater network reliability and increased user satisfaction
- Assurance that the wiring media complies with specifications for 10-Mbit/s EtherTwist data transmission
- Confidence that your existing wiring will support HP EtherTwist Networks

The HP WireTest service supports the HP AdvanceNet strategy of providing complete networking solutions by full support of the HP EtherTwist family of components: hardware, software, and twisted-pair wiring.

Ordering Information

The HP WireTest service will be delivered by highly trained HP Customer Support Engineers and performed on a time-and-materials basis. Order Network Verification part number 50059P.

For more information regarding HP WireTest and HP EtherTwist contact your HP Sales Representative or local Hewlett-Packard sales office.

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 and 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
- Configuring network connectivity
- Configuring network connectivity lab

Day 2
- ARPA/Berkeley service review
- Configuring ARPA services
- Additional ARPA services--BIND, send mail
- Configuring and using ARPA services lab

Day 3
- NFS concepts
- Configuring NFS
- Additional NFS services--file locking, REX, VHE
- Configuring NFS labs

Day 4
- Configuring NIS
- Troubleshooting
- 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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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.

Region Sales Headquarters

United States:
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4 Choke Cherry Road
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(301) 670-4300

Hewlett-Packard Company
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(03) 895 2895

Far East:
Hewlett-Packard Asia Ltd.
22/F Bond Centre, West Tower
89 Queensway, Central, Hong Kong
(852) 8487777

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HEWLETT PACKARD

HP OpenView DTC/X.25 XL 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 XL 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/XL 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/XL 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/XL product
- X.25 XL 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
- Starting and stopping the network

PAD access configuration

- DTC/X.25 XL PAD support
- 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
- Resolving port problems
- 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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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 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/XL System Management Skills (HP 31119S) or Moving from MPE V to MPE/XL: 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/XL migration tools

HP DTC Manager installation
- HP OpenView DTC Manager software installation
- Software compatibility
- Configuring HP OfficeShare

Drawing the map and associated tasks
- HP OpenView OVDraw features
- HP OpenView OVDraw templates
- HP OpenView DTC Manager modem configuration
- Changing password

Day 2

Configuring the DTC/TIO
- HP OpenView OVRun features
- CPU and port configuration
- Configuring an asynchronous interface card
- Copy and paste facility
- Saving the configuration

Configuring the MPE/XL and HP-UX host
- Host configuration tasks
- MPE/XL 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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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 H2550S

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), network information server (NIS), and diskless clusters on HP 9000 Series 300, Series 400, and Series 800 HP-UX systems.

Course Features

- Learn to discuss networking HP 9000 concepts and components and identify 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 and 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 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
- Configuring network connectivity
- ARPA/Berkeley service review
- Configuring network connectivity lab
- Using ARPA services lab

Day 2

- Configuring ARPA services
- Additional ARPA services--BIND, send mail
- NFS concepts
- Configuring ARPA services lab

Day 3

- Configuring NFS and NIS
- Additional NFS services--file locking, REX, VHE
- Configuring NFS and NIS labs

Day 4

- Troubleshooting
- Network tools and commands
- Introduction to HP-UX clusters
- Troubleshooting and tools labs

Day 5

- Configuring an HP-UX cluster
- Cluster concepts and operation
- Managing a cluster
- Creating CDFs
- Configuring a cluster and managing a cluster lab

Ordering Information

To order HP-UX Network Administration: LAN Link, ARPA/Berkeley, NFS, NIS, and Diskless (HP H2550S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide information about onsite delivery.

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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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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

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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide information about onsite delivery.

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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 videocassettes in either PAL or NTSC formats, one student guide, and one student workbook. Equipment needed to use the course are ½-inch VHS videocassette 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.

Who Should Attend

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.

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.

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

HEWLETT PACKARD

Network Fundamentals

Technical Data

Course Number
HP 22853A

This self-paced course teaches industry and de facto networking standards and generic connection alternatives for local area networks (LANs) and wide area networks (WANs). Compare the cost, advantages, and limitations of the following LAN technologies: data PBX, voice/data PBX, baseband, and broadband. Also compare the cost, advantages, and limitations of the following WAN technologies: switched services, leased services, and packet switching. The course takes approximately 16 hours to complete.

Benefits

This course will teach you more about:

- Networking fundamentals
- Data communication fundamentals
- Network standards
- LAN fundamentals
- WAN fundamentals
- SNA fundamentals

Special Features

This self-paced course consists of one VHS videocassette in PAL or NTSC format and one student workbook. Equipment needed to use the course are 1/2-inch VHS videocassette 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 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.

Who Should Attend

This course is for technical support staff, system managers, programmers, and telecommunications professionals.

Prerequisites

Basic understanding of computers

Ordering Information

To order Network Fundamentals, specify course number HP 22853A. Customers in the U.S. call HP DIRECT, 1-(800) 637-7740, 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.

Course Outline

- Introduction to networking
- Data communicaions fundamentals
- Network standards
- LAN fundamentals
- WAN fundamentals
- SNA fundamentals

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 handsHP on practice
- Learn how to use the full capabilities of your system through handsHP 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
1HP 800HP HPCLASS
(1HP 800HP 472HP 5277).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide information about onsite delivery.

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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 videocassettes in PAL or NTSC formats, one course book, one student guide, and one OSI Primer. Equipment needed for the course are one VHS videocassette 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.

Who Should Attend

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.

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 videocassette format option is available).

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 & 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

HEWLETT PACKARD

Programming with HP OpenView NM Server

Technical Data

Course Number
HP 22885S

Course Overview

This programming-intensive course teaches you how to develop an HP OpenView network management application using HP OpenView application programmatic interfaces and diagnostic tools.

Course Features

- Understand the functionalities and development capabilities of the HP OpenView NM Server product
- Gain an overview of HP OpenView NM Server and its architecture
- Learn to use HP OpenView NM Server programming concepts in the development of an application
- Practice developing a simple application utilizing all the major services of HP OpenView NM Server
- Gain expertise at debugging an HP OpenView NM Server application

Specifications

Course Length: 5 days

Audience: Application developers and level 300 applications engineers involved in supporting external developers

Prerequisites: A strong background in UNIX®, C programming, APIs, and OSF/Motif, plus working knowledge of networking, network management functions and protocols, HP-UX product installation, and network troubleshooting

Delivery Method: Classroom, onsite

Format: This course is 40 percent lecture and 60 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

- Network management architecture and protocols
- HP OpenView NM Server product overview
- Programming concepts
- Defining an object

Day 2

- Designing an application
- HP OpenView windows programming
- Using the communications infrastructure in an application

Day 3

- Using data management services (DMS) for data storage
- Using event management services (EMS)
- Designing an object manager

Day 4

- Implementing an object manager
- The registration process

Day 5

- Advanced topics
- Using diagnostics

Ordering Information

To order Programming with HP OpenView NM Server (HP 22885S) in the U.S., call (800) HPCLASS [(800) 472-5277].

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide information about on-site 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
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Chicago, IL
Dallas, TX
Detroit, MI
Los Angeles, CA
New York/Metro, NJ
San Francisco/Bay Area, CA
Washington, D.C.

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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).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide 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

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 error is 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, on-site

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 on-site 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)
- Connecting with X.25 networks

Ordering Information

To order X.25 Packet Switching Network (HP 50752S) in the U.S., call 1-800-HPCLASS (1-800-472-5277).

HP's Customer Registration Center can provide you with price, scheduling, and enrollment information, as well as provide information about on-site delivery.

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HEWLETT PACKARD

Network License System (NetLS)

Technical Data

Product Numbers
B2144A, B2677A, B2678A, LA350BAD

What is the Network License System?

The Network License System (NetLS) is a software toolkit that enables application vendors and end users to match software costs to actual usage. NetLS manages, enforces, and monitors software usage and usage policies.

Key to this system is the breadth of usage policies and license models supported by NetLS. Traditional license methods, CPU-locking, and site licensing, with their restrictive usage policies and rigid pricing structures, are no longer sufficient for distributed computing environments in heterogeneous networks. NetLS provides application vendors greater flexibility and control in licensing their software, and provides end users the ability to purchase and use software more effectively.

With these new license methods and usage policies, software vendors are assured of an equitable revenue stream and end users are better able to manage their software resources. This is especially important when those resources are physically located across a distributed, multi-vendor network. The result is a unified network computing environment that marshals software assets for optimal utilization.

Highlights

- Supports multiple licensing methods and attributes to address needs of entire range of software applications
- Provides tools to all constituents creating a single, unified system to enforce software licensing policies, to reduce software vendor effort, and to improve end-user software asset management
- Manages, monitors, and tracks all software products consistently across hardware platforms, providing a uniform software administration mechanism
- Operates across any computing environment, able to support any software or hardware platform

Wide Portfolio of Licensing Models

NetLS offers a broad range of licensing models from which software vendors can select. It supports CPU-locking and site licensing methods as well as the more flexible concurrent use model. It also features a number of additional licensing types, e.g., use-once, dynamic nodelock, personal use, and system/capacity licenses. Vendors can also use a mixed licensing scheme. They can support different licensing methods in the same application, allowing a single version of software to be tailored to customers' needs for each sale.

NetLS does not dictate business policy. It has the flexibility to handle any licensing policy adopted by a software vendor. A single unified system for

enforcing software licensing policy reduces costs for the software vendor which can be passed on to end users.

Support for All Licensing Constituents

Incorporation of a licensing system into a vendor's software product directly affects application vendors, license distributors, end users, and end-user administrators. As a result, NetLS provides tools that meet the needs and roles of each group.

The application developer's kit is designed to be simple and easy to use for vendors. With a minimum of development effort, products can be licensed and managed by NetLS. NetLS also enables independent distributors to participate in the software and license distribution process. They can generate and distribute licenses; the original vendor retains authority over the licenses the distributor can create, but does not need to be directly involved in the license creation process. Extensive administration and reporting tools aid end users and end-user administrators in the management of license activity.

License Administration and Reporting

NetLS provides several tools to end users and end-user system administrators that simplify and unify software administration on a network.

These tools provide the ability to:

- Install and administer licenses
- Obtain snapshots of current license activity
- Generate reports on software usage

Support for Diverse Computing Environments

NetLS distributes its services across a network, assuring end users of continued access to application licenses and keeping network traffic to a minimum. It is designed for easy, efficient, and transparent scaling as networks increase in size, distribution, and heterogeneity. Additionally, each service can be run on any machine, regardless of software or hardware platform. This structure comes from its foundation on the Network Computing System (NCS), which handles the distribution of processing tasks across machines in distributed, multivendor networks.

NetLS complements the concept of network computing by providing a unified network-wide mechanism to manage software licenses. It encourages the free flow of applications and users across the various systems in heterogeneous networks.

Configurations

NetLS is composed of two components, LSLOCK, the application developer's kit and LSSERVER, the runtime software. LSLOCK is available as a layered product on HP-UX and Domain/OS. LSSERVER is bundled into both operating systems. On Domain/OS, documentation is included; at HP-UX 8.0, it is ordered separately.

NetLS licenses, distributed to application end users to allow vendors' licensed application to execute, must also be ordered.

NCS/NCK dependency.

Source code available.

Ordering Information

B2144A NetLS for HP-UX 8.0 for Series 700
B2677A NetLS for HP-UX 8.0 for Series 300/400
B2678A NetLS for HP-UX 8.0 for Series 800/600
LA350BAD NetLS for Domain/OS SR10 for Motorola and Prism architectures
LB42K000 Annual NetLS license creation rights

Ports

Ports to non-HP platforms are available from Gradient Technologies, 577 Main Street Suite 4, Hudson, MA 01749 (508) 562-2882.

Documentation

D-11273-B Licensing Software Products with the Network License System (D-11272-B Managing Software Products with the Network License System is bundled with OS.)