HEWLETT PACKARD

HP D2355A
OpenView
DTC
Manager

HP DTC Planning Guide

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

HP D2355A OpenView DTC Manager

DTC Planning Guide

Customer Order Number : D2355-95017
Manufacturing Part Number: D2355-95026

Printed in France - 08/94
on ECF paper
Elementary Chlorine Free

Notice

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

Hewlett-Packard makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Hewlett-Packard shall not be liable for any errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Hewlett-Packard assumes no responsibility for the use or reliability of its software on equipment that is not furnished by Hewlett-Packard.

Hewlett-Packard Company
Grenoble Networks Division
38053 GRENOBLE Cedex 9
France

History

The list which follows shows the dates of each edition of the manual, with the corresponding OpenView DTC Manager software release. Note that new software updates may occur between manual releases, so the software you receive with this manual may have a later version number. The version number given below corresponds to the earliest software release for which this manual is valid.

Edition Number	Date	Software version number
Edition 1	February 1993	*from* A.14.00
Edition 2	August 1993	*from* A.14.10
Edition 3	August 1994	*from* A.14.20

Contents

1

Introduction

The DTC family of communication servers allows devices such as terminals and printers to connect to computer systems across a Local Area Network (LAN).

The DTC family consists of eight models, each of which is suited to a particular usage. By changing the boards fitted in a DTC, it can be easily adapted to specific connectivity requirements.

Two protocols are used for asynchronous LAN communications:

- The industry-standard telnet virtual terminal service running on TCP/IP is used for connections to any system running ARPA services (to be known as Internet services from HP-UX 10.0 onwards).
- AFCP, a protocol optimized for the terminal use typical of the HP 3000's online transaction processing environment, is used for local connections to HP 3000 systems (DTC and host on the same LAN).

To extend connections over X.25 wide-area networks, the DTC also implements X.3/X.28/X.29 PAD support, for devices connected to public or private PADs on X.25 wide-area networks.

A front-end DTC may be used as a gateway to permit connections to and from HP 3000 systems across routed IP networks. This is known as Routable AFCP.

The DTC can also perform protocol conversion to allow users in the ARPA environment, for example UNIX hosts, workstations and PCs with ARPA Services, to access HP 3000 systems via telnet. In addition, the DTC extended switching configuration provides asynchronous access from the DTC to asynchronous ports on systems that are not connected to the LAN.

The DTC includes an SNMP (Simple Network Management Protocol) agent which can be interrogated by, and send error traps to, designated and authorized SNMP managers.

The DTC is configured and managed by software which can run on a PC, an HP 9000 Series 800 or an HP 3000 Series 900. The three management platforms have different capabilities: see chapter 3 (page 15) for information on the DTC's management platforms. The functionality of the DTC depends on the boards that are fitted and the management platform used.

HP provides a number of network planning and support services to help you design and implement a network. Contact your HP representative for more information about these services.

The DTCs

Eight types of DTC are available, three of which have boards that can be changed to suit the types of connections you want to make. The other five DTCs have fixed boards, and are dedicated to specific types of connections.

The DTC 16RX is intended specifically for situations in which routable DTC management is required. Its microcode is stored in Flash EEPROM and is therefore reprogrammable.

Three basic types of boards can be installed in the DTCs:

- **asynchronous boards**, which provide TCP/IP-based connections for the ARPA Telnet environment, and AFCP connections for the HP 3000 environment
- **X.25 boards**, which provide X.25 facilities for wide-area networking (for HP 3000 systems) and PAD support (for HP 3000 and HP 9000 systems).
- **Telnet Access boards**, which provide access to HP 3000 systems from the ARPA Telnet environment by converting TCP/IP to AFCP.

The types and combinations of boards that can be fitted depend on the DTC. See chapter 2 (page 5) for more information on the DTCs.

The DTC Management Platforms

The DTC can be configured and managed from one of three software packages, each of which runs on a different hardware platform. Only one management platform at a time can manage a DTC.

PC-based management:	HP OpenView DTC Manager
HP 3000-based management:	NMMGR and TermDSM
HP 9000-based management:	HP DTC Manager/UX

The DTC 16RX can be configured and managed only by the HP DTC 16RX Manager, which runs on an HP 9000.

The HP 3000-based and HP 9000-based managment platforms are sometimes referred to as the *host-based* management platforms in the DTC documentation.

There are differences in the functionality available on the platforms. See chapter 3 (page 15) for more information on the DTC's management platforms.

2

The DTC Hardware

This chapter gives an overview of each of the DTCs currently available, and explains the basic hardware configurations possible.

The following DTC models are currently available:

DTC Model	Part number
DTC 16	2340A
DTC 16TN	J2060A
DTC 16iX	J2062A
DTC 16MX	J2063A
DTC 16RX	J2064A
DTC 48	2345A
DTC 72MX	J2070A
HP ARPA Telnet Express	2344A

Five types of connection can be made (though not all DTCs can provide all types of connection):

- direct asynchronous connections
- asynchronous connections via modems
- connections to X.25 networks
- connections from ARPA systems to HP 3000 systems via HP 3000 Telnet Access protocol conversion
- connections between DTC ports and HP 3000 systems across routed IP networks, using Routable AFCP.

The DTC 16 (HP 2340A)

The DTC 16 provides AFCP connections for the HP 3000 environment, telnet connections for the ARPA environment, and X.25 connections for wide-area networking. It can be managed from all three DTC management platforms. The DTC 16 is an SNMP agent and can be monitored by authorized SNMP managers.

The DTC 16 is no longer sold by HP.

Three types of board are available for the DTC 16:

- eight-port boards with RS-232-C connectors for direct connections
- six-port boards with RS-232-C connectors for modem connections
- an X.25 board

The DTC 16 has three slots, into which boards can be fitted in these combinations.

- **Slots 0 and 1** can be fitted with either six-port RS-232-C modem boards, or eight-port RS-232-C direct-connect boards. Modem and direct-connect boards may be mixed on the same DTC.
- **Slot 2** can only be fitted with an X.25 board.

The DTC 16 can be configured for the following connections:

- up to sixteen direct-connect ports
- up to twelve modem ports
- eight direct-connect and six modem ports
- one of the above combinations, plus an X.25 connection

ThickLAN, ThinLAN or EtherTwist connections are available to connect the DTC to the LAN.

The DTC 16TN (J2060A)

The DTC 16TN is dedicated to the telnet environment, and provides up to sixteen asynchronous connections. It can be managed from the HP 9000-based and the PC-based management platforms. It does not provide AFCP or X.25 connections, and cannot be managed from the HP 3000-based management platform. The DTC 16TN is an SNMP agent and can be monitored by authorized SNMP managers.

The DTC 16TN has two connectors, each of which can be connected to a distribution panel which allows either all direct-connections or all modem-connections. Each distribution panel has eight ports. Both RJ-45 and DB-25 connectors are available.

A Fan-Out cable can be used instead of a direct-connection distribution panel. Fan-Out cables terminate in 3-pin connectors.

The rear of the box has a BNC connector for ThinLAN and a 15-pin AUI connector for ThickLAN, EtherTwist and StarLAN fibre optic LANs. The DTC 16TN automatically detects the type of LAN it is attached to.

The DTC 16iX (J2062A)

The DTC 16iX is dedicated to the HP 3000 environment, and provides up to sixteen asynchronous connections. It can be managed from the HP 3000-based and the PC-based management platforms. It does not provide ARPA Telnet or X.25 connections, and cannot be managed from the HP 9000-based management platform. The DTC 16iX is an SNMP agent and can be monitored by authorized SNMP managers.

The DTC 16iX has two connectors, each of which can be connected to a distribution panel which allows either all direct-connections or all modem-connections. Each distribution panel has eight ports. Both RJ-45 and DB-25 connectors are available.

A Fan-Out cable can be used instead of a direct-connection distribution panel. Fan-Out cables terminate in 3-pin connectors.

The rear of the box has a BNC connector for ThinLAN and a 15-pin AUI connector for ThickLAN, EtherTwist and StarLAN fibre optic LANs. The DTC 16iX automatically detects the type of LAN it is attached to.

The DTC 16MX (J2063A)

The DTC 16MX provides AFCP connections for the HP 3000 environment and telnet connections for the ARPA environment. The DTC 16MX is an SNMP agent and can be monitored by authorized SNMP managers.

The DTC 16MX can be managed from all three DTC management platforms. However, the full functionality of the DTC 16MX is only available when the DTC is managed by the PC-based manager. A DTC 16MX managed from the HP 9000 management platform has the same functionality as a DTC 16TN. A DTC 16MX managed from the HP 3000-based management platform has the same functionality as a DTC 16iX.

The DTC 16MX has two connectors, each of which can be connected to a distribution panel which allows either all direct-connections or all modem-connections. Each distribution panel has eight ports. Both RJ-45 and DB-25 connectors are available.

A Fan-Out cable can be used instead of a direct-connection distribution panel. Fan-Out cables terminate in 3-pin connectors.

The rear of the box has a BNC connector for ThinLAN and a 15-pin AUI connector for ThickLAN, EtherTwist and StarLAN fibre optic LANs. The DTC 16MX automatically detects the type of LAN it is attached to.

The DTC 16RX (J2064A)

The DTC 16RX must be managed by the DTC 16RX Manager, running on an HP 9000 Series 700 or 800 system. It has the same functionality as a DTC 16MX. The DTC 16RX is an SNMP agent and can be monitored by authorized SNMP managers.

The DTC 16RX offers routable management: the DTC and its manager do not have to be on the same LAN. Its microcode is stored in Flash EEPROM, and can therefore be reprogrammed.

The **tftp** (trivial file transfer program), which is a standard component of HP-UX, is used for communication between the DTC 16RX and the DTC 16RX Manager.

The DTC 16RX has two connectors, each of which can be connected to a distribution panel which allows either all direct-connections or all modem-connections. Each distribution panel has eight ports. Both RJ-45 and DB-25 connectors are available.

A Fan-Out cable can be used instead of a direct-connection distribution panel. Fan-Out cables terminate in 3-pin connectors.

The rear of the box has a BNC connector for ThinLAN and a 15-pin AUI connector for ThickLAN, EtherTwist and StarLAN fibre optic LANs. The DTC 16RX automatically detects the type of LAN it is attached to.

The DTC 48 (HP 2345A)

The DTC 48 provides AFCP connections for the HP 3000 environment, telnet connections for the ARPA environment, and X.25 connections for wide-area networking. It can be managed from all three DTC management platforms. The DTC 48 is an SNMP agent and can be monitored by authorized SNMP managers.

The DTC 48 is no longer sold by HP.

The DTC 48 can be fitted with up to six boards, in any combination of:

- eight-port asynchronous direct-connect boards
- six-port asynchronous modem-connect boards
- either of the following:
  - one Telnet Access board
  - up to three X.25 boards

For example, you could install one Telnet Access board and five, 6-port modem-connect boards, or two X.25 boards and four, 8-port direct-connect boards.

The DTC 48 supports three types of asynchronous connections:

- RS-232 modem connections, on 6-port modem-connection boards, using 25-pin sub-D connectors supporting asynchronous modems based on the V.22 *bis* standard
- HP Type 232 3-pin direct connections, which provide the Rx, Tx, and GND (ground or earth) connections of a standard RS-232 connection
- HP Type 422 5-pin direct connections, which provide differential Rx and Tx in two twisted-pair connections, and GND (ground or earth)

For more details, including cabling information for terminal and printer connections, refer to the *DTC 48 Installation and Service Manual.*

The DTC 72MX (J2070A)

The DTC 72MX provides AFCP connections for the HP 3000 environment, telnet connections for the ARPA environment, and X.25 connections for wide-area networking. It can be managed from all three DTC management platforms. The DTC 72MX is an SNMP agent and can be monitored by authorized SNMP managers.

The following boards are available for the DTC 72MX.

- The **LAN board**, which provides the LAN connection and basic LAN access. The board has connectors for ThinLAN, ThickLAN, EtherTwist and StarLAN fibre optic, and automatically detects the type of LAN it is attached to. A LAN board must be installed in each DTC 72MX.
- **Asynchronous Processor boards**, which can have up to 24 connections each.

  An Asynchronous Processor board has three connectors, each of which can be connected to a distribution panel which allows either all direct-connections or all modem-connections. Each distribution panel has eight ports. Both RJ-45 and DB-25 connectors are available.

  A Fan-Out cable can be used instead of a direct-connection distribution panel. Fan-Out cables terminate in 3-pin connectors.
- **X.25 boards**, which can be either for RS-232 or V.35.
- **Telnet Access board.**

The DTC 72MX has four slots, which are filled as follows:

- one slot must contain a LAN board
- one Telnet Access board can be added
- up to three X.25 boards can be added
- up to three asynchronous processor boards can be added
- any combination of cards is possible

The HP ARPA Telnet Express (HP 2344A)

The HP Telnet Express provides telnet virtual terminal access to HP 3000/900 systems for LAN-based systems that use the telnet protocol. Access is provided by performing protocol conversion from telnet/TCP/IP to the AFCP protocol used by the MPE/iX operating system. As a dedicated processor, the HP ARPA Telnet Express provides better performance than a DTC 48 with an ARPA Telnet Access board and can have more telnet connections.

3

The DTC Management Platforms

This chapter gives an overview of the DTC management platforms, their limitations and requirements. It is not a complete guide, and you should consult the documentation for each product or contact your HP representative for more information.

There are four platforms for managing DTCs:

- **HP OpenView DTC Manager** (DTC Manager), which runs on PCs
- **HP DTC 16RX Manager**, which runs on HP 9000 Series 700 and Series 800 HP-UX systems
- **HP DTC Manager/UX**, which runs on HP 9000 Series 800 HP-UX systems and (starting with HP-UX release 10.0) on HP S700 HP-UX systems
- **NMMGR** and **TermDSM** (jointly referred to as "NMMGR" in this manual), which run on HP 3000 Series 900 systems

DTCs can also reply to requests from, and send error traps to, authorized SNMP managers. SNMP is described on page 22 of this chapter.

The full functionality of the DTC is only available when it is managed by the PC-based DTC Manager or the DTC 16RX Manager: DTC Manager/UX and NMMGR have certain restrictions and limitations. See the section "Restrictions and Limitations" on page 23 of this chapter for more details.

DTC Management Overview

A DTC contains enough code in its hardware to enable it to run self-tests and to communicate with the LAN. The code that enables it to establish and maintain connections is downloaded from the management platform, together with the configuration information for each port and board.

When a DTC is switched on or reset, it runs a series of self tests, then multicasts a message on the LAN requesting a code and configuration download (the DTC 16RX requests only a configuration download). The management platform that has the files for the DTC responds by downloading the files, and the DTC is then under the management of the platform from which it has received the download.

The management functions can be split into four main categories:

- configuring ports, boards and the DTC's overall characteristics
- controlling the DTC
  - resetting ports, boards, and the entire DTC
  - starting and stopping boards
- monitoring the status of the DTC hardware, for example ports and boards
- monitoring the status of connections running through the DTC

HP OpenView DTC Manager

The HP OpenView DTC Manager (DTC Manager) is used for configuring, monitoring, diagnosing and controlling the entire DTC family (except the DTC 16RX). DTC Manager has a graphical, mouse-driven user interface. You configure DTCs on a network map, where each DTC is represented by a unique, labeled symbol.

DTC Manager is one of several network management applications that can run under HP OpenView Windows, HP's network management environment. The DTC Manager relies on other software for its operation, for example Microsoft Windows and MS-DOS, and it is essential that the correct versions of the different software elements are used. See the *HP OpenView DTC Manager 14.2 Installation and Upgrade Guide* for more information.

DTC Management Features

Using the DTC Manager you can perform the following management functions on DTCs that have received their download from the OpenView workstation you are using:

- create and modify configuration files offline, and modify configuration parameters online
- monitor the status of the DTC's CPU, asynchronous ports, Telnet Access boards, or X.25 boards and connections
- monitor connections on asynchronous connections and PAD support LCIs, and also X.25 system-to-system connections
- run self-tests on asynchronous ports, DTCs, Telnet Access and X.25 boards
- upload data from ports, boards, and DTCs
- reset ports, boards and DTCs
- start and stop Telnet Access and X.25 boards
- run traces on X.25 connections
- set SNMP authorization filters and designate SNMP managers for receiving error traps

All these functions are oriented towards managing individual DTCs. To use them you first select the DTC on the network map, then choose the management function from the appropriate menu.

Network Management Features

The DTC Manager also provides the following management functions to help you manage a network of DTCs:

- management of security lists and passwords, restricting access to remote systems for local terminals using DTC PAD support
- logging of events signalled by managed DTCs
- continuous monitoring of events
- remote connection, allowing you to manage a remote site by running DTC Manager at a distance

HP DTC 16RX Manager

The HP DTC 16RX Manager runs on HP 9000 Series 700 and 800 systems. It is used for configuring, monitoring, diagnosing and controlling the DTC 16RX only: it cannot be used to manage other members of the DTC family. It can be integrated under HP OpenView UX.

DTC Management Features

Using the DTC 16RX Manager you can perform the following management functions on local or remote DTC 16RXs:

- create configuration files and modify configuration parameters
- monitor the status of the DTC's LAN board and asynchronous ports
- monitor connections on asynchronous connections
- upload data from ports and DTCs
- reset ports and DTCs
- set SNMP authorization filters and designate SNMP managers for receiving error traps

Network Management Features

The DTC 16RX Manager also provides the following management functions to help you manage a network of DTCs:

- logging of events signalled by managed DTCs
- continuous monitoring of events

NMMGR and TermDSM

Node Management Services Configuration Manager (NMMGR) is used to configure asynchronous connections to HP 3000 systems, including connections via the DTC. The interface is ASCII, and uses function keys and command lines.

DTC Management Features

Using NMMGR and TermDSM you can perform the following management functions on DTCs that have received their download from the HP 3000 you are using:

- create and modify configuration files offline
- monitor the status of the DTC's CPU, asynchronous ports, X.25 boards and connections
- monitor connections on asynchronous connections and PAD support LCIs
- run self-tests on asynchronous ports, DTCs and X.25 boards
- upload data from ports, boards, and DTCs
- reset ports, boards and DTCs
- start and stop X.25 boards
- run traces on X.25 connections
- set SNMP authorization filters and designate SNMP managers for receiving error traps

Network Management

NMMGR can manage security lists and passwords, and restrict access to remote systems for local terminals using DTC PAD support.

HP DTC Manager/UX

HP DTC Manager/UX runs on HP 9000 Series 800 systems and (starting with HP-UX release 10.0) on HP S700 HP-UX systems. It can manage telnet connections only. AFCP connections, Telnet Access protocol conversion and X.25/PAD connections are not available from DTCs managed by DTC Manager/UX.

DTC Manager/UX consists of five commands which are run from the shell command line:

dtcconfig	which opens the DTC configuration window
dtclist	which lists DTC configurations or events in the event log
dtcdiag	which gives diagnostic information on a DTC
dtcmodifyconfs	which modifies DTC configurations
dtcping	which pings DTCs

The **dtcconfig** command opens the DTC configuration window, from where the DTC is configured. **dtcconfig** can only be run by the superuser. The interface to the configuration tool is via function keys and menus.

DTC Management Features

Using the DTC Manager/UX you can perform the following management functions on DTCs that have received their download from the system you are using:

- create and modify configuration files
- monitor the status of the DTC's CPU, asynchronous ports and connections
- run self-tests on asynchronous ports and DTCs
- upload data from ports, boards, and DTCs
- reset ports, boards and DTCs
- set SNMP authorization filters and designate SNMP managers for receiving error traps

SNMP (Simple Network Management Protocol)

SNMP is a network protocol, used for communicating between network nodes (called agents) and network managers. For example, the DTC can be configured as an SNMP agent and can then receive requests from an SNMP manager such as HP OpenView Node Manager.

For each DTC, a list of up to five authorization filters can be set. The filters ensure that SNMP requests are only accepted from authorized managers. If required, any error traps generated by the DTC can be automatically routed to an SNMP manager.

The configuration information for each SNMP agent is stored in a MIB (Management Information Base). This information can be requested by authorized SNMP managers. As part of configuring an authorization filter, one of two MIB views must be chosen to define which configuration information is available to each manager. The two MIB views are:

MIB-II	standard SNMP information
DTC MIB	standard SNMP information, plus additional information taken from the HP-UX private MIB

An SNMP manager that has been assigned the DTC MIB can request information not available to a manager that has been assigned MIB-II.

SNMP is supported on all DTCs, including DTC 48s that have been fitted with a memory upgrade.

Restrictions and Limitations

The following table lists the DTCs and types of connections that can be managed from each management platform. Refer to the data sheet or your HP representative for more information.

	OV Manager	16RX Manager	Manager/UX	NMMGR
DTC 16	yes		yes	yes
DTC 16iX	yes			yes
DTC 16TN	yes		yes	
DTC 16MX	yes		yes	yes
DTC 16RX		yes		
DTC 48	yes		yes	yes
DTC 48/3000	yes			yes
DTC 72MX	yes		yes	yes
HP ARPA Telnet Express	yes			
Asynchronous connections to HP 3000	yes	yes		yes
Asynchronous connections to HP 9000	yes	yes	yes	
Asynchronous connections to ARPA systems	yes	yes	yes	
X.25 connections	yes			yes
PAD connections	yes			
SNMP	yes	yes	yes	yes
Telnet Access	yes			
Routable AFCP	yes			

Note that HP 3000-based management restricts the DTC to connections to the system from which it is managed.

4

Connections to HP 3000 Series 900 Systems

The DTC provides a comprehensive set of features for connecting devices to HP 3000 computer systems. This chapter describes the three main ways in which asynchronous connections can be made:

- Devices, such as terminals and printers, connected to the DTC can connect to an HP 3000 system across the LAN using protocols optimized for the on-line transaction processing environment of MPE/iX.
- Devices may be connected to an HP 3000 system across a routed IP network, by means of a front-end DTC acting as a gateway.
- Terminals in the ARPA environment can access HP 3000 systems via HP 3000 Telnet Access, which converts the ARPA TCP/IP-telnet protocols to the protocols used by MPE/iX. Programmatic access from HP 3000 systems to ARPA systems via telnet is not possible.

The DTC can also be used for connections to HP 3000 MPE/V systems using the DTC extended switching configuration. See page 49 for more information.

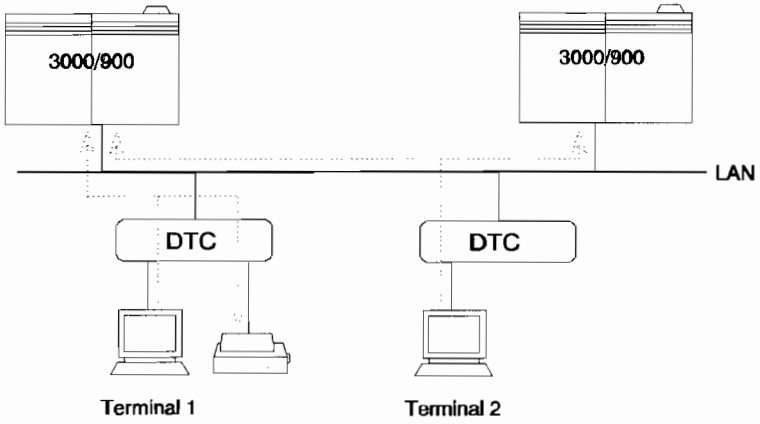
Connections via a DTC to an HP 3000 can be managed by either DTC Manager or by NMMGR. Managing a DTC from NMMGR restricts connections through the DTC to the system that is managing it – it is not possible to connect to other systems.

Note that the DTC only provides a mechanism for connection to the system: different systems and applications may impose their own constraints on the choice of terminals and terminal configurations. Before using a device with the DTC, you should check that it is supported by the system and the applications with which it will be used.

VPLUS, HP Block and User Block modes can be used with HP terminals or terminals and PCs that can emulate HP terminals.

Asynchronous Connections

Terminals and printers connected to DTCs on the LAN have access to HP 3000 Series 900 systems on the same LAN. The DTC-to-HP 3000 connection uses protocols (AFCP, ADCP) designed to optimize performance in this environment. In addition, AFCP may be routed across an IP network (see page 27 in this chapter).



The diagram above shows the basic connection possibilities: Terminal 1 can only connect to one HP 3000 system. Terminal 2 is connected to a DTC port which is configured for switching, and can therefore access either of the HP 3000 systems.

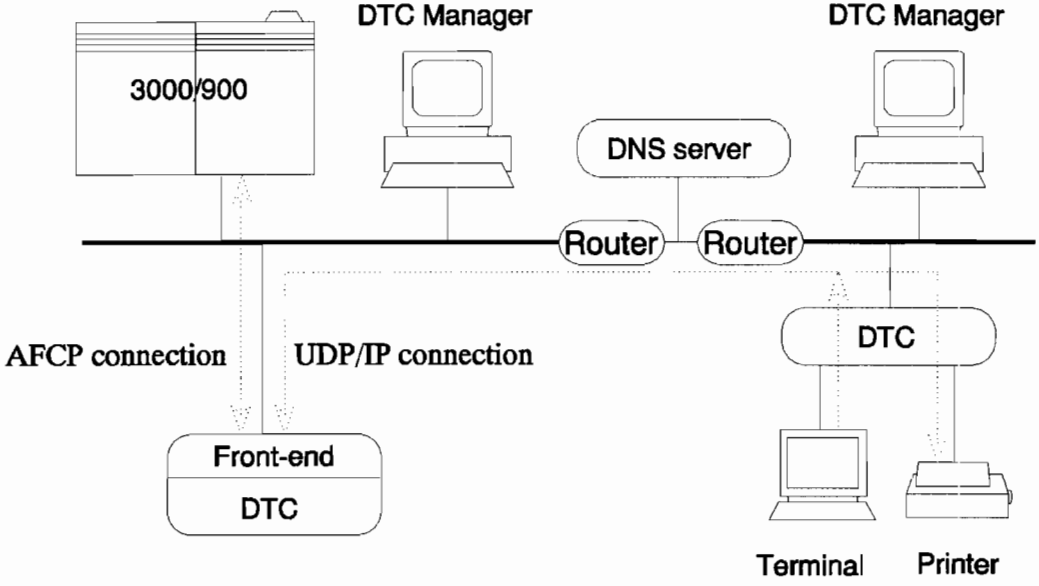
Connections can be established across extended LANs using level 2 bridges that have a high enough bandwidth to support the traffic. However, the protocol used is not routable (it cannot cross level-3 routers), so systems and DTCs must be on the same (bridged) LAN. It may be necessary to adjust transport timers to ensure data integrity and adequate performance on bridged LANs.

Routable AFCP

Routable AFCP allows HP 3000 Series 900 systems to connect to DTCs across a routed IP network. A front-end DTC acts as a protocol converter, converting UDP/IP to AFCP and vice versa. The front-end DTC and its manager must be on the same LAN as the HP 3000 system.

Routable AFCP may be used for the following purposes:

- A DTC-connected terminal user on a remote LAN may log on to the HP 3000 system.
- An HP 3000 user may access a DTC-connected device on a remote LAN.



Routable AFCP Hardware

The DTC 72MX, DTC 16MX, or ARPA Telnet Express may be used as a front-end DTC. No additional hardware is needed.

The DTC 72MX, DTC 16MX, DTC 16, or DTC 48 with memory extension may be used as a remote DTC. No additional hardware is needed.

A Domain Name Server (shown as DNS in the diagram on page 27) is needed to resolve addresses.

Routable AFCP Software

Routable AFCP requires MPE/iX 5.0 General Release version C.50.00 and OpenView DTC Manager 14.2.

Advantages of Routable AFCP

Routable AFCP has the following advantages:

- Connections may be made in both directions, to and from the HP 3000 system.
- A remote device connected by Routable AFCP may be configured and used from the HP 3000 system exactly as though it were a local device.
- A front-end DTC may be shared by several HP 3000 systems.
- Several front-end DTCs may be used by a single HP 3000 system, in which case the load is divided among the DTCs.
- A connection can recover automatically from a front-end DTC power failure.

Restrictions of Routable AFCP

The following restrictions apply to Routable AFCP:

- The HP 3000 system, its front-end DTC, and the front-end DTC's manager, must all be on the same LAN.
- A single connection cannot be split across several front-end DTCs.
- There is no recovery from a remote DTC power failure.

Configuring for Routable AFCP

The DTC's LAN board configuration screen has a check box to enable front-end functionality.

In addition, a Domain Name Server must be configured to support the Routable AFCP connection, and the IP address of the Domain Name Server must be provided in the DNS/IP window during DTC configuration.

The chapter "Configuring for Remote Connections to HP 3000 Series 900 Systems" in *Using HP OpenView DTC Manager* describes how to configure the front-end DTC and the Domain Name Server for Routable AFCP.

ARPA Domain Configuration

It is usually best to configure all front-end and remote DTCs under the same ARPA domain. This has the following benefits:

- Users can give the same connect command for Routable AFCP as for AFCP. They don't have to add the ARPA domain.
- Each MPE/iX host is configured only once in the DNS, regardless of the number of remote DTCs that may be connected to it.
- Each remote DTC is configured only once in the DNS, regardless of the number of host systems or front-end DTCs that may be connected to it.

If you want to keep separate ARPA domains for other purposes, you can use the alias mechanism in the DNS to configure one ARPA domain for the purpose of DTC address resolution.

Multiple Hosts

A front-end DTC may be shared by more than one host system.

Multiple Front-End DTCs

A single host system may use more than one front-end DTC, so that the load is divided among the DTCs.

In the case of logon access (when a terminal accesses the host), a new connection is assigned to one of the front-end DTCs at random. If the connection fails, the user will get the DTC prompt back after a period defined by the AFCP connection establishment timer. In this case, he or she must try again and hope to get a different front-end DTC the next time.

In the case of programmatic access (when the host accesses a device, such as a printer), the host interrogates all of its front-end DTCs, and the first one to reply will be used for the connection. The least loaded DTC can be expected to reply first.

Once a front-end DTC has been chosen for a particular connection, it will be used for the rest of that connection (all packets belonging to one connection will go through the same front-end DTC).

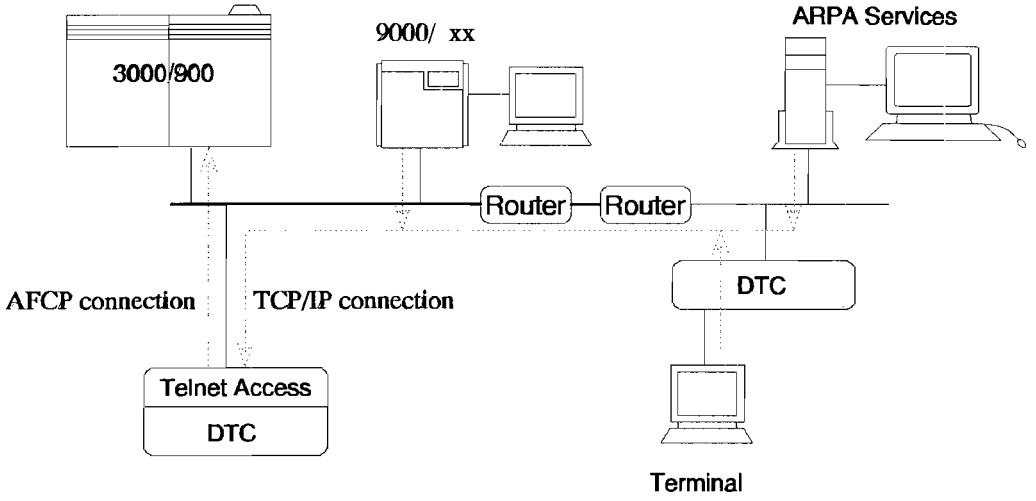
If you wish to specify which front-end DTC is used for each remote DTC, you may define a different ARPA name for each front-end DTC.

HP 3000 Telnet Access

The HP 3000 Telnet Access product allows ARPA systems to access MPE/iX systems using the telnet protocol. HP 3000 Telnet Access acts as a protocol converter, converting TCP/IP-telnet to AFCP and ADCP, the On-line Transaction Processing (OLTP)-optimized protocols of MPE/iX systems.

Telnet Access may be used by:

- terminal users on ARPA systems
- DTC-connected terminal users on remote LANs interconnected via level-3 routers
- users of workstations and PCs connected directly to the LAN and running ARPA services



Routers and Bridges and HP 3000 Telnet Access

The telnet protocol is routable via level-3 IP routers, so systems establishing a telnet connection need not be on the same LAN as the MPE/iX system that they are accessing. The Telnet Access product must be on the same LAN as the MPE/iX systems to which it provides access.

Level-2 bridges can be used to extend LANs beyond one segment, if the bandwidth of the bridge is high enough for the LAN traffic.

The connection from the DTC to the HP 3000 uses exactly the same physical path and the same transport protocols as asynchronous terminal connections.

HP 3000 Telnet Access Hardware

There are two HP 3000 Telnet Access products:

- Telnet Access boards, which can be installed in the DTC 48 and DTC 72MX (the boards are physically different)
- the HP ARPA Telnet Express, which is a high-performance version of the Telnet Access board

Note. A Telnet Access board is *only* needed for protocol conversion from TCP/IP-telnet to AFCP. A Telnet Access board is *not* needed for ordinary telnet connections in the ARPA environment.

The Telnet Access board has no external connections, as its sole function is protocol conversion.

Restrictions and Limitations of HP 3000 Telnet Access

Telnet Access provides a one-way protocol conversion, telnet-to-MPE/iX (HP 3000 system) only; you cannot initiate a telnet connection from an MPE/iX system. MPE/iX users can initiate telnet connections direct from their DTC (except in the case of non-upgraded DTC 48/3000 configurations). Note also that DTC management protocols used for communication between the DTC and the DTC Manager are not routable, and need a DTC Manager workstation on each LAN.

Terminal connections that have been established with HP 3000 Telnet Access look like standard DTC terminal connections to the HP 3000: the HP 3000 cannot recognize that HP 3000 Telnet Access is being used. However, the telnet protocol does not support all the features of "standard" MPE/iX terminal I/O, and not all HP 3000 applications run transparently on terminals using telnet. See the *DTC Technical Reference Manual* for more information.

Configuration Limitations

The following configuration limitations apply:

- There is no powerfail recovery.
- It is not possible to use the same name or IP address to access an MPE/iX system through multiple DTCs.
- It is not possible to use the same IP address for telnet and FTP, because MPE/iX handles the FTP connection directly.

Limitations when Using HP 3000 Telnet Access

The following limitations apply when using HP 3000 Telnet Access:

- There is no Telnet Access security. The only ways to prevent people getting access to systems via Telnet Access are to prevent them getting the IP address of the DTC or system, or to stop the Telnet Access board.
- When an application on the HP 3000 sets binary mode, only the host-to-DTC part of the connection is set in binary. Binary must be set manually on the DTC-to-ARPA part of the connection.
- Typeahead is supported, without convenience echo and without "by-pass next data" capability. To enable typeahead, the convenience echo must be disabled, or the echo must be set off.
- Applications using HP Block mode are not supported. Generally, only applications interacting with the terminal in character mode, VPLUS Block Mode or User Block Mode are supported. Applications using Binary Mode are not supported via telnet, but applications that enable Binary Mode without transferring binary data are supported.
- Field mode is not supported, so applications such as Oracle and Ingress will not work across HP 3000 Telnet Access.

- The user cannot re-enter the DTC user interface unless the connection is closed by the MPE/iX system, for example, if the BYE command is entered.
- There is no programmatic access from HP 3000 systems via telnet. This means that printers and other programmatically-accessed devices cannot be connected via telnet to MPE/iX systems.

Configuring for HP 3000 Telnet Access

The NMMGR configuration must contain at least one DTC that is designated as being under PC-based management, otherwise only DTCs that are managed by a host may connect to the MPE/iX system, and HP 3000 Telnet Access will be inactive.

Non-nailed ldevs for HP 3000 Telnet Access connections *must* be configured for modem behavior in NMMGR on the HP 3000.

The chapter "Configuring for HP 3000 Telnet Access" in *Using HP OpenView DTC Manager* describes how to configure the DTC for HP 3000 Telnet Access.

Using Printers Connected via the DTC

Printers and plotters must be configured in NMMGR on the HP 3000 system as nailed devices. You must specify the nodename of the DTC to which the device is attached, and the board number and port number of the connection. You must also create an appropriate Printer-Type file to manage the device. See *MPE/iX: Configuring Systems for Terminals, Printers, and other Serial Devices* for more information. See the chapter "Configuring Printer Ports" in *Using HP OpenView DTC Manager* for examples of how to configure a printer connection.

Printer Sharing

When DTC-connected printers are shared by multiple systems, it is important that you carefully analyze how the printers will be used, and by how many systems, to ensure the reliability of your printer connections. The printer port configuration must allow more than one session to be enabled. We recommend that you use HP printers that respond to status requests (check the specifications of your printer to see if it supports status requests). If the printer cannot respond to a status request, data may be lost, because the host system sending data to the printer has no way of knowing if the printer is capable of printing it.

See the chapter "Configuring Printer Ports" in *Using HP OpenView DTC Manager* for more information.

MPE/iX Functionality and Configuration

MPE/iX includes the following functionality for devices connected asynchronously to the DTC:

- device control capabilities provided through the FCONTROL and FDEVICECONTROL file system intrinsics
- typeahead support
- full support for block mode applications
- customized terminal type and printer type files (created using the Workstation Configurator utility)

Note that although the DTC can be configured to allow the terminal user to open multiple connections, MPE/iX supports multiple sessions from a terminal only from MPE/iX 3.0. If in doubt about multisession support, contact your HP representative.

Your MPE/iX system must be configured with enough non-nailed ldevs to support all the *sessions* that you expect (not just the number of terminals). A device configured as a nailed device can have open one session only per system, which will be nailed. A mixture of nailed and non-nailed sessions is not allowed.

Non-nailed ldevs for HP 3000 Telnet Access connections *must* be configured for modem behavior in NMMGR on the HP 3000.

Not all of this functionality is available for devices connected via PAD support or Telnet Access.

Configuration of HP 3000 Systems

The network configuration information needed by HP 3000 systems to initialize and control devices connected via DTCs resides in a special configuration file (`NMCONFIG.PUB.SYS`) on the HP 3000 system, created using **NMMGR**. This file is created on the host HP 3000 system independently of the DTC configuration created on the DTC Manager workstation. However, some of the information configured on the host must also be entered in DTC configurations on the DTC Manager workstation.

5

Asynchronous Connections to ARPA Systems

This chapter discusses the use of the telnet protocol, by which the DTC provides LAN-based distributed terminal connections for any computer system running ARPA services. Such systems include:

- the HP 9000 series of computers running the HP-UX operating system
- other systems running UNIX
- certain non-UNIX systems for which ARPA services are also available

The same connectivity is available for remote terminals via PAD support on DTCs equipped with X.25 boards.

DTCs used for ARPA connections can be managed by three management platforms:

- **HP DTC Manager/UX**
- **HP OpenView DTC Manager**
- **HP DTC 16RX Manager**

The telnet protocol used to connect DTC-based terminals to host systems does not permit programmatic access by host systems to DTC-connected devices. However, HP DTC Device File Access (DDFA) is a software package for HP 9000 systems that allows access to printers, plotters and other asynchronous devices that are connected to a DTC. You can also write your own software to access printers using Berkeley sockets. Contact your HP representative for more information.

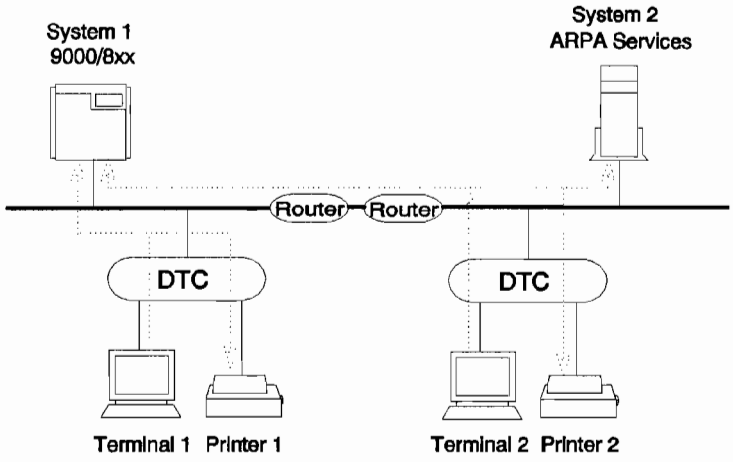
Terminals, printers and modems can be connected via the DTC. Each DTC port can be configured with a name or with an IP address for addressing and for the system to identify the calling port. Backplane multiplexers can be used for direct terminal connections to a system that also has DTC-based connections.

To support terminal access via a DTC, the host system needs a LAN interface (hardware and software) and ARPA services installed. For HP 9000 (HP-UX) systems, Version 7.0 (or later) of the HP-UX operating system is required.

The example below shows the basic connection possibilities:

- terminal 1 and printer 1 are dedicated to system 1, and cannot access or be accessed by other systems
- terminal 2 can access any system on the LAN
- printer 2 can be accessed by either system.

As TCP/IP is routable, connections can be established across level-3 routers. However, the DTC management protocols and the DTC downloads are not routable, so a DTC management platform is needed for each LAN or extended LAN. There is one exception to this rule: DTC 16RX management is routable.



Using Printers with HP-UX Systems

Programmatic access is not available for telnet connections, as telnet does not provide the necessary functionality. However, the DDFA software package for HP 9000 Series 300, 400, 700 and 800 systems enables these systems to open programmatic access across the DTC to devices such as printers. DDFA uses TCP intrinsics and services to allow systems to establish connections across the LAN with devices connected to DTC ports.

Two types of printers can be used:

- **Dumb printers**. These are printers that do not have a "status request" mechanism.
- **Status Request Printers**. The status request mechanism allows the system to interrogate directly-connected printers to get their status before and after printing. The printer responds to the system's status requests with a value that indicates its condition.

Printer Sharing

When DTC-connected printers are shared by more than one system, it is important that you carefully analyze how the printers will be used, and by how many systems, to ensure the reliability of your printer connections. The printer port configuration must allow more than one session to be enabled. We recommend that you use HP printers that respond to status requests (check the specifications of your printer to find out whether it supports status requests). If the printer cannot respond to a status request, output may be lost, because the host system may send data to the printer when the printer is not ready to receive.

Even if the printer supports status requests, there are other factors to be managed. See the chapter "Configuring Printer Ports" in *Using HP OpenView DTC Manager* for more information.

HP DTC Device File Access

The DDFA utility allows HP-UX systems and user-written applications using standard HP-UX structures to access DTC ports. DDFA requires the telnet feature of ARPA

services. DDFA provides an interface to DTC ports via the LAN, which is similar to the interface used for local mux ports.

See *DTC Device File Access Utilities and Telnet Port Identification* and the **ddfa** man pages on HP-UX systems for more information on DDFA.

HP OpenSpool/UX

HP OpenSpool/UX is a network interface program used to communicate with printers connected via modems or other communications hardware. The DTC can be used with HP OpenSpool/UX. See *HP OpenSpool/UX Spooler Administrator's Guide and Command Reference* for more information.

Connections to Non-HP Systems via Telnet

The DTC implements telnet over TCP/IP, and it is theoretically possible to establish a telnet session from a DTC-connected terminal to any system on the network running telnet (ARPA services). However, TCP and IP are implemented to follow "recommendations", and not every implementation has quite the same interpretation of the recommendations. Therefore, there may be problems establishing connections to systems running certain implementations of telnet/TCP/IP.

For a complete list of the system configurations that have been tested and are supported by HP, refer to the DTC Family Technical Data in the *HP Networking Communications Specification Guide*. An ongoing test plan means more systems are being added to the list. For other cases, a test package is available to test the compatibility of the host system's telnet/TCP/IP implementation with the DTCs. For up-to-date information on tested and supported configurations, and for complete details of the test package, consult your HP representative.

6

X.25 and PAD Connections

The Wide-Area Network (WAN) connections that can be handled by the DTC include:

- DTC PAD support, whereby asynchronous devices connected to a remote PAD connect to a system across a public packet-switching X.25 network (PSN) via a DTC X.25 card
- X.25 system-to-system links for HP 3000 systems running NS X.25/iX Network Link

When X.25 access is required to a single HP 3000 system, you can manage the DTC from the host, using the HP 3000-based/iX X.25 management software available with the FOS (Fundamental Operating System). For other X.25 access, you must manage the DTC from the PC-based DTC Manager.

X.25 on the DTC conforms with the 1980 and 1984 CCITT X.25 recommendations.

PSN Subscription

To connect to a PSN, you must first take out a subscription with the network administration to define the characteristics of your connection. When you configure the DTC's X.25 levels 1, 2, and 3, you *must* use the values on your PSN subscription.

Modem Eliminators

Modems and modem eliminators attached to the DTC's X.25 boards *must* be externally powered – that is, they must not derive *any* power from the board.

PAD Support

The PAD support feature allows terminals connected to remote PADs to access LAN-based systems via the DTC. Security lists can be implemented to prevent access by unauthorized PAD devices. X.25 levels 1, 2 and 3 must be configured for PAD access to be implemented.

PAD Support Limits and Restrictions

The DTC PAD support facility supports packet sizes of 128, 256, or 512 bytes only. If you are going to configure for PAD support you must subscribe for one of these values, and configure the X.25 board's level 3 configuration to use it.

Viewed from the host system, a terminal connection established via PAD Support is almost indistinguishable from a connection established by an asynchronously-connected terminal. Terminals can access all the DTC functionality available to local, asynchronously-connected terminals, except that remote terminals cannot open multiple, concurrent sessions. The following table lists other restrictions and limitations.

	Supported	Comments
Character mode	Yes	
VPLUS Block mode	Yes	
Typeahead	Yes	No echo, no bypassing typeahead buffer.
Binary Transfer	Yes	The application must also be configured for binary transfer. On HP 3000 systems, MPE/iX release 4.5 or later must be installed.
HP Block mode	No	
User Block mode	No	

There are differences in the way transmission occurs over PAD connections that cause differences in the way certain device control operations take place. See the *Asynchronous Serial Communications Programmer's Reference Manual* for a summary.

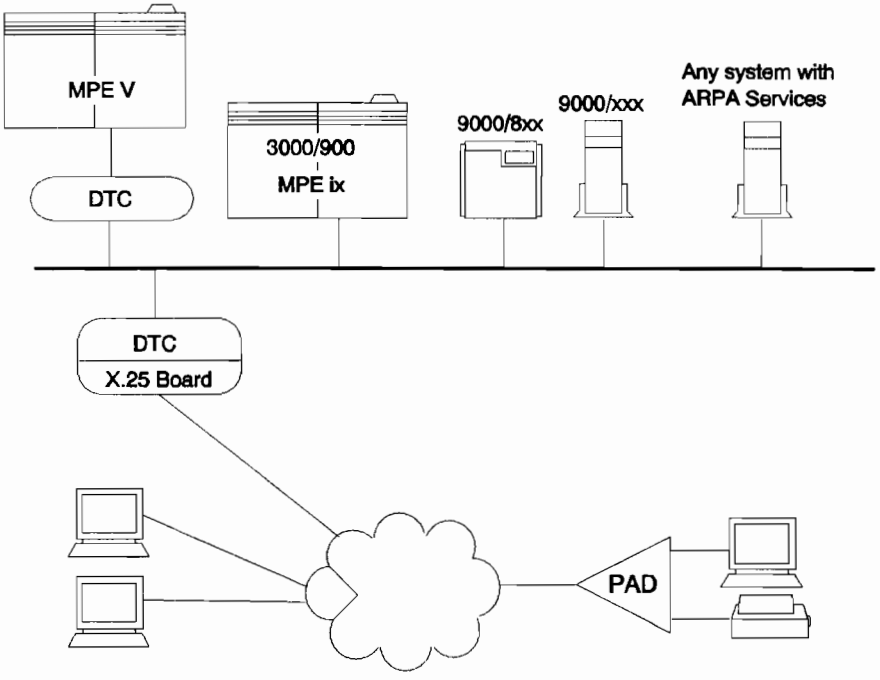
Devices can be accessed programatically only if they are connected to a private PAD. The devices must support XON/XOFF. Devices to be accessed programmatically by HP 3000 systems must be configured as nailed devices in NMMGR.

Remote Terminal Access via X.25 and DTC PAD Support

The PAD Support feature of DTC X.25 allows the DTC to manage terminal connections to local LAN-based systems from remote devices connected to a public or private PAD. Also, LAN-based systems can programmatically open connections to devices connected to remote PADs.

Users connecting via PAD and X.25 have the same system switching facilities as local, asynchronously-connected users – if you choose to allow them to use those features. PAD support also includes extensive security features, including restricted access to systems, and checking of remote (calling) addresses.

MPE/iX systems can programmatically access remote devices, such as printers, if they are connected to private PADs, such as the HP 2334/2335A X.25 Multiplexers. ARPA systems can programmatically access remote devices such as printers connected to a private PAD, by using the HP DTC Device File Access (DDFA) software. Programmatic access to devices connected to public PADs is not possible.

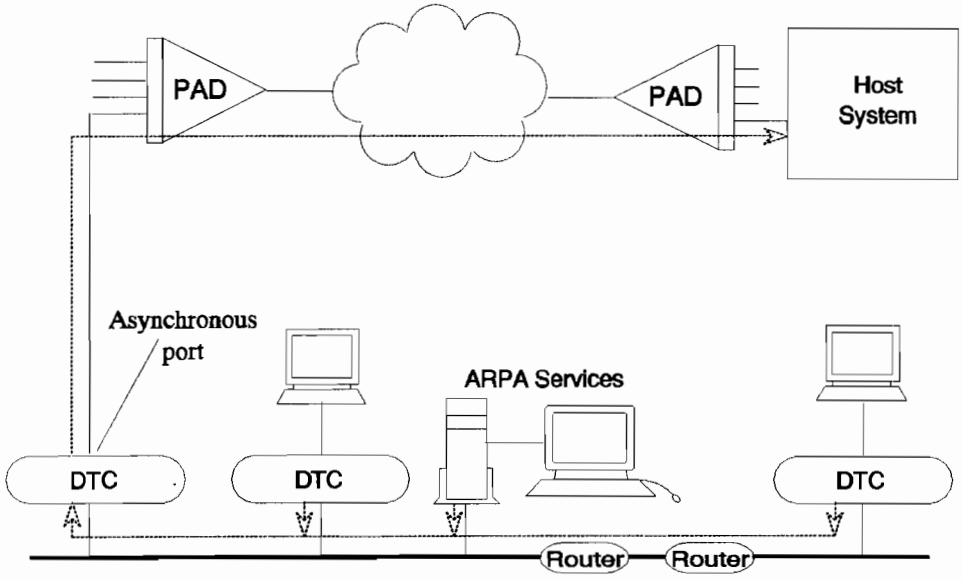


DTC Solution for PAD Emulation

This configuration is really a form of extended switching, and does not use the DTC's PAD and X.25 facilities. It has been included in this section as its function is ultimately to provide PAD services.

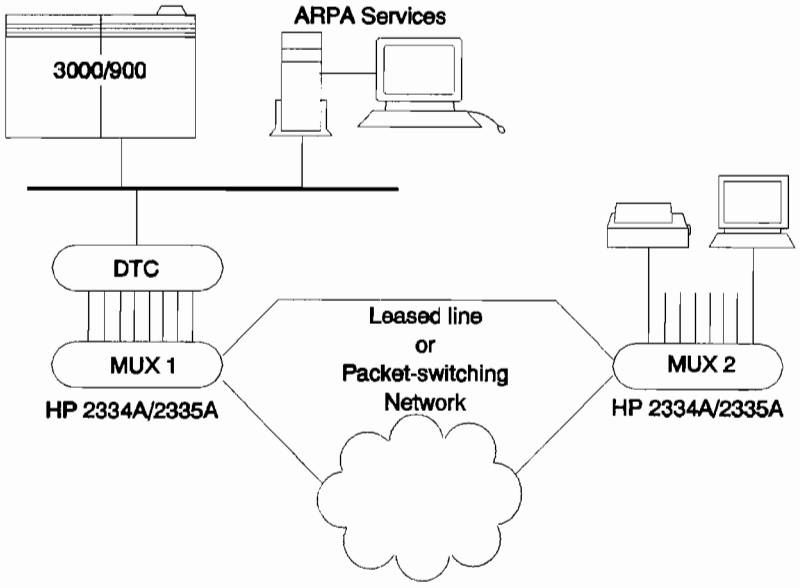
The DTC solution for PAD emulation is a type of extended switching connection that uses the HP 2334/2335 X.25 multiplexers to provide PAD facilities to DTC-connected terminals.

In its simplest form, a terminal connected to one asynchronous port of a DTC connects to another asynchronous port of the same DTC that is connected to a PAD and hence to an X.25 link. It is also possible for a terminal connected to another DTC to establish a connection to the PAD via an extended switching connection. If the port the PAD is connected to is assigned an IP address, it can be accessed by terminals via level 3 routers.



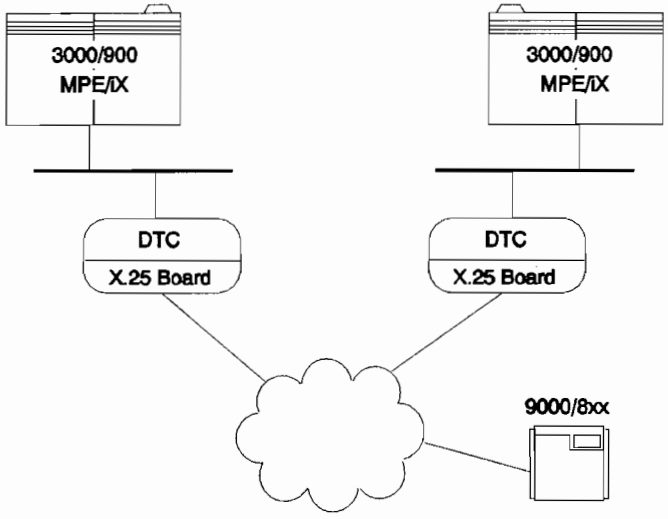
Multiplexed Connections via PSN or Leased Line

The HP 2334A Plus/ HP 2335A X.25 multiplexers can be used to multiplex up to sixteen asynchronous devices via leased lines or X.25 networks. This configuration requires the use of modem ports on the DTC. The DTC ports must be configured as terminal or printer ports, according to the corresponding remote device, and, on the port configuration screen, the **Attached Device** field should be set as HP 2334/35.



X.25 System-to-System Networking

HP 3000 systems on the same LAN as a DTC with X.25 can use the DTC's X.25 connection for wide-area system-to-system communications to other systems on the network. Each DTC X.25 board can be configured to manage up to 32 LAN-based systems, and remote access can be controlled by listing remote systems that are allowed to establish calls. The X.25/iX System Access product (HP 36939A) must be installed on each HP 3000 system using DTC X.25 for system-to-system networking. X.25/iX System Access is not required on your HP 3000 systems for terminal connections via PAD Support.



For more complete information on X.25 networking with HP 3000 systems, refer to the *HP 3000/iX Network Planning and Configuration Guide* and the *NS3000/iX Configuration Planning and Design Guide.*

PAD support and system-to-system networking can run simultaneously on a DTC X.25 board.

System Access

Connections via PAD Support

Users of remote terminals connecting via the DTC's PAD support use X.25 addresses to establish the connection to the DTC. When you configure PAD support on the DTC, you configure a PAD switching information table, which maps X.25 addresses to local systems. If remote end users use one of these X.25 addresses, they are automatically connected to the corresponding system. The PAD Security configuration can be used to enforce this restriction.

Users connecting via PAD support can only open one session at a time.

PAD Access to Multiple Systems

There are two methods of giving PAD-connected terminal users access to multiple systems:

- For each system to which they are to connect, you map an X.25 address to the system nodename in the PAD switching information table. Users use the appropriate X.25 address to connect to the system. This method ensures that PAD users are restricted to the systems to which you explicitly allow them access. When users log off from the system, they are returned to the PAD prompt, not to the DTC user interface. Up to 32 systems can be configured in this way.
- You may also configure an X.25 address that gives access to the DTC user interface. PAD users connected to the DTC user interface can connect to any system on the LAN in the same way as asynchronously-connected terminal users connecting from the DTC user interface, using system names or IP addresses. Note, however, that PAD users cannot use the escape-from-data-transfer facility of the DTC to suspend a system session and return to the DTC user interface. They must log-off the system to return to the user interface.

PAD Support also has security features that check incoming calls on the basis of the calling X.25 address.

7

Extended Switching Connections

The DTC can be used to provide access to devices that do not have connections to the LAN. These connections are refered to as **extended switching connections** in this manual, though they may also be called **back-to-back connections** in other documentation. The basic configuration possibilities are shown in this chapter.

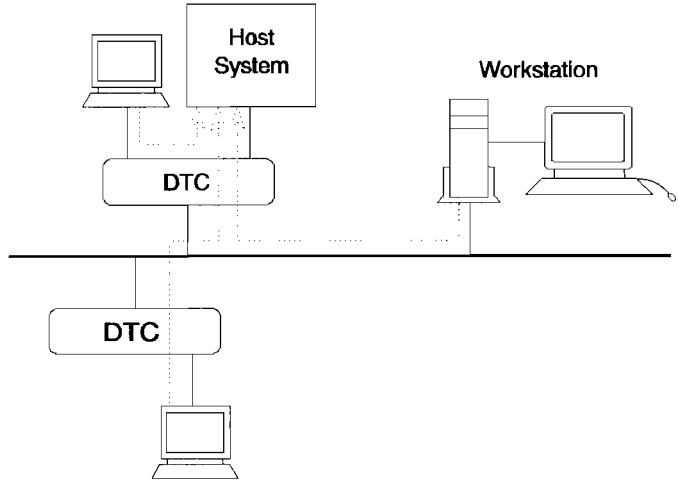
DTC ports can be configured to allow the device attached to them to connect to one system or to many systems. If more than one DTC is used in an extended switching connection, a valid IP address is required in each DTC's LAN configuration, as DTC-to-DTC connections use TCP/IP across the LAN. In the DTC 48/3000, a non-routable implementation of TCP/IP is used for extended switching connections.

See chapter 12, "Configuring Extended Switching Connections" in *Using HP OpenView DTC Manager* for further information.

Extended Switching Connections to Asynchronous Systems

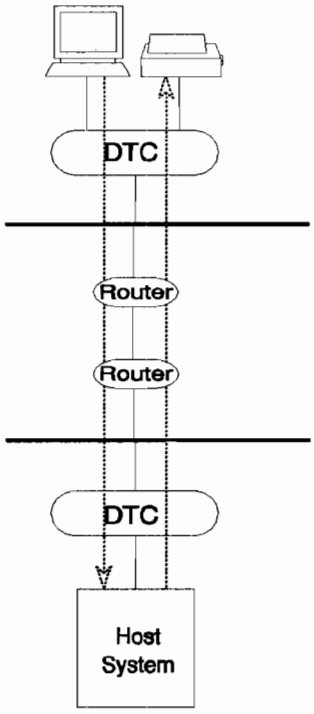
This section looks at extended connections to asynchronous host system ports. There are two possibilities:

- Extended switching connections can provide access to devices that do not have direct LAN access. This configuration allows non-MPE/iX, non-ARPA (telnet) systems to be integrated into a DTC network. DTC asynchronous ports can be connected to host system asynchronous ports, providing connectivity to host systems other than the HP 3000 Series 900 systems. In this configuration, terminals and printers connected to the same DTC or to another DTC on the LAN are supported, and so are terminal and printer connections via the DTC's PAD support facility.
- DTC asynchronous ports can be connected to system multiplexers. From the host side, the connection looks like a standard, non-multiplexed connection. A terminal connected to any DTC on the LAN can connect to these ports and open a session on the system. Connections can be established across level-3 routers using DTC port IP addresses or destination TCP port address.



Routable Back-to-Back Configurations

Each port on a DTC can be assigned an IP address, which can be used to address the device connected to the port via level 3 routers. The connection will work in either direction, either to the host port's IP address, or to the device port's IP address.



8

Single System Access and Terminal Switching

The DTC allows terminal users to access multiple systems, using different name resolution protocols and transport mechanisms, all of which may remain invisible to the terminal user. How easy – or difficult – it is for terminal users to establish connections with the system they want to use depends on how the network and the DTC are configured.

This chapter describes the three basic connection possibilities:

- **no system access**, in which it is not possible to establish a connection from the device connected to the port
- **single system access**, in which the user can only connect to one system
- **terminal switching**, in which the user can connect to any system on the LAN and can have more than one connection open at once.

No System Access

A port can be configured with logon disabled, making it impossible to open a connection from a terminal connected to the port. This feature is intended for ports that must always be available to programmatic access by systems that need to send data to them. For example, connections to terminals that are opened by the system to ensure security.

Single System Access

If terminal users are going to access only one system on the LAN, you can configure the DTC so that the DTC user interface becomes invisible to these users.

Asynchronous ports can be configured so that when the terminal user presses the Enter key, the connection with the host system is established automatically; the user has no access to, and never sees, the DTC user interface.

Remote terminal users connecting via the DTC's PAD support use X.25 addresses to establish connections to the DTC. PAD support on the DTC can be configured so that if remote end users use one of these X.25 addresses, they are automatically connected to the corresponding system.

Telnet connections to MPE/iX systems can be made, using Telnet Access for protocol conversion, so that users who enter the IP address assigned in the Telnet Access configuration to an HP 3000 system are automatically connected to the system.

Terminal Switching and Multiple, Simultaneous Access

Terminal switching access allows terminal users to connect to any system on the LAN from the DTC user interface. Terminal switching works both for connections established by the terminal, and for programmatic access to DTC-connected devices by host systems.

Multiple, simultaneous access is the ability of a device connected to a DTC port to be simultaneously associated with multiple sessions, jobs or processes on one or more hosts, with only one host at a time having control of the device.

Access to multiple systems is possible for any terminal connection to a port that is allowed terminal switching. Only asynchronously-connected terminals may open multiple, simultaneous sessions. All sessions on a port must be either user-initiated or system-initiated: it is not possible to have a combination of the two.

When terminal switching is enabled, terminal users have access to the DTC user interface, from where they can use the `connect` command to access any system on the LAN. A default host system can be configured to which the user is connected simply by typing `connect` at the DTC prompt. The terminal user may still open connections to other systems by using the `connect` command.

The escape-from-data-transfer character leaves the current application open and returns to the DTC user interface. The escape-from-data-transfer character is only valid in character mode, and cannot be used in PAD connections.

Note that when a connection is established on a host port that is busy, the connection is rejected unless the host port has a non-default configuration allowing more than one session. In this case the connection is queued and the user gets the "Connection established" message. However, there is no indication that the connection is queued, and it can appear that the connection is hung when it is, in fact, queued.

Automatic Connection

Modem-connected ports can be configured so that as soon as the DTC senses modem signal activity on that port, it automatically establishes a connection to the default host system. The user can still use the escape-from-data-transfer character to return to the DTC user interface to access other systems. When the session is closed, the terminal user is returned to the DTC user interface.

You may also specify in the configuration a default host system for an asynchronous port. The user is connected to the default host simply by typing `connect` at the DTC prompt. The terminal user may still open connections to other systems.

MPE/iX Restrictions and Limitations

The following limitations apply to multiple, simultaneous connections to an MPE/iX system:

- If a DTC port is associated with a nailed device on a particular system, the first user-initiated session will get the nailed ldev and subsequent requests to that system will be rejected.
- If a DTC port is associated with a nailed device on a particular system, the first system-initiated session will get the nailed ldev and subsequent requests to that system will, depending on the host port configuration, be either rejected or queued.

The DTC implements no form of security checking on connections established by asynchronously-connected terminals.

Connections via Routable AFCP

Routable AFCP connections to or from MPE/iX systems are made using a Domain Name Server. The Domain Name Server must be properly configured with the names and addresses of the HP 3000 system and the front-end and remote DTCs.

Local connections and Routable AFCP connections provide the same facilities to the user.

Connections via HP 3000 Telnet Access

Telnet connections to MPE/iX systems (using Telnet Access or Telnet Express) are either made from the DTC user interface or use a switching table where the IP address of an HP 3000 is mapped to the HP 3000 system name. If the IP address and host name are configured in the switching table, the connection to the system is established automatically on the basis of the IP address, and the user does not see the DTC user interface.

PAD Restrictions and Limitations

Users connecting via PAD support can only open one session at a time.

9

Protocols, Bridges, Routers, Hubs and Flow Control

This chapter gives an overview of the LAN protocols used by the DTC, and gives guidelines on the use of devices such as hubs and routers with the DTC.

Extended LAN environments need careful planning, because various restrictions apply to different communications and management protocols used by the DTC and HP OpenView DTC Manager.

The *DTC Technical Reference Manual* explains how protocols have been implemented in the DTC, including details of limitations and restrictions. It also explains name-address resolution and the LAN naming and addressing systems used.

Protocols

The DTC uses both IEEE 802.3 and Ethernet protocols for LAN communications, depending on the connection. The two protocols are compatible and can coexist on the same LAN hardware. Connections from DTCs to HP 3000/900 systems use IEEE 802.3: other connections use Ethernet. The DTC is shipped with a predefined LAN address, valid for both 802.3 and Ethernet LANs.

The DTC can be connected to:

- ThinLAN (10BASE2)
- ThickLAN (10BASE5)
- EtherTwist twisted pair (10BASE-T) networks

DTCs and DTC Manager workstations are not compatible with and cannot be connected directly to token-ring (IEEE 802.5) networks.

Connections via the DTC are established using several protocols:

- AFCP connections are established on the basis of the NS nodename using the address resolution protocol TIO Probe.
- Routable AFCP connections (for HP 3000 systems) are established on the basis of the ARPA name of the HP 3000 host (for logon access) or the NS nodename of the remote DTC (for programmatic access). A Domain Name Server must be used.
- TCP connections are established on the basis of the IP address of the nodes:
  - ARP is used to map IP addresses to Ethernet addresses.
  - DNS is used to find a server to map DNS names to IP addresses.
- TCP connections in back-to-back configurations are made using:
  - Name Lookup Protocol (NLP)
  - ARP, if a port IP address is configured

RMP, a proprietary HP protocol, is used for management communications between the HP OpenView DTC Manager workstation and the DTCs it manages.

TCP/IP, AFCP and RMP may be optimized to suit network topologies.

Bridges

Bridges connect LAN segments at level 2 of the ISO model, and are protocol-transparent. Bridges do not alter the contents of the frames in any way, they merely take the frames they receive on one network and retransmit them on the other network.

You can use bridges on DTC LANs between DTCs and hosts, and between DTCs and DTC Manager workstations. If a DTC is intended mainly to serve one or a limited number of host systems, it is a good idea to place the DTCs and the host systems on the same LAN segment, to isolate the LAN traffic. In some cases, it may be necessary to adjust some of the parameters used by the LAN protocols implemented by the DTC.

Routers

Routers operate at up to ISO layer 3, and allow users to select the optimum route for sending data within a network.

The DTC's implementation of the telnet protocol runs on industry-standard TCP/IP, and is fully IP-routable. Terminals connected to a DTC can use the telnet protocol to connect to systems supporting telnet on any network accessible by IP routing from the DTC. In certain cases it may be necessay to adjust the TCP timers in the DTC. See *Using the HP OpenView DTC Manager* for more information.

The AFCP protocol used by DTCs to communicate with HP 3000 systems can be routed by means of a gateway (a front-end DTC). See page 27 of this manual, and *Using the HP OpenView DTC Manager*, for more information.

The DTC management protocols, used for communications between the DTC and the DTC Manager workstation, are not routable. This means the DTC Manager workstation must be on the same network as the DTCs it is managing.

Hubs

Hubs are devices that allow the connection of many EtherTwist or StarLAN nodes to another type of LAN, such as ThickLAN or ThinLAN.

There are no special limitations or restrictions to using hubs with the DTC.

Hardware Handshake

Hardware handshake provides a way of controlling the flow of data received and transmitted by the DTC, using the RTS/CTS (105/106) signals.

Hardware handshake was introduced in release 14.0 of the DTC, and is only available on the DTC 16TN, DTC 16iX, DTC 16MX and DTC 72MX direct-connect ports (**Modem Behavior** = **None**) and modem ports with U. S. behavior (**Modem behavior** = 1, 3 or 5).

See the *DTC Cabling and Racking Guide* for information on cabling and pinouts for hardware handshake.

Principle of Operation

When the device connected to the DTC asserts CTS, it is indicating that it is ready to accept data from the DTC. If CTS is not asserted, then the DTC should not send data to the device.

When the DTC asserts RTS, it is indicating that it is ready to accept data from the device. If RTS is not asserted, then the device should not send data to the DTC.

10

Supported Devices

This chapter lists the devices that HP has tested for use in a DTC environment. HP's on-going test program means that other devices may have been tested since this manual was published: contact your HP representative for up-to-date information.

Supported PCs

- 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 the following points:

- The PCs were tested using HP AdvanceLink 2392 terminal emulation software, and XON/XOFF flow control was used.
- VPLUS, HP Block and User Block modes can be used with PCs that can emulate HP terminals.
- Other PCs from IBM and Compaq have been tested and are known to work with the DTC, but are not supported by HP.

The DTC provides only a transport mechanism for connection to the system; different systems and applications may impose their own constraints on the choice of PC, terminal emulation software, and the configuration of both. Before using any of these PCs or any terminal emulation software, ensure that it is supported for the system and application with which it will be used.

Supported Terminals

- HP 2622A (with ROM 3199 or later), 2623A (ROM 3223 or later), 2624B (ROM 3139 or later), 2625A, 2627A (ROM 1818-3487 or later): none of these terminals can be connected via modems
- HP 2392A, 2393A, 2394A, 2397A, 2398A
- HP 700/92, 93, 94, 96, 97, 98
- HP 700/22, 32, 41, 43, 44, 60
- HP 3081A, 3082A/B
- C1010C AB2 Simplified Chinese HP 700/92A keyboard
- C1010J ABJ Japanese HP 700/92A keyboard
- C1010T ABO Traditional Chinese HP 700/92 keyboard

Note the following points:

- The terminals were tested using XON/XOFF flow control.
- VPLUS, HP Block and User Block modes can be used with HP terminals or terminals that can emulate HP terminals.

All the terminals listed (except the HP 26XX series terminals) can be connected to the DTC via asynchronous modems based on the V.22 *bis* standard. Modem control must be configured individually on the DTC ports, in the port configuration screen of DTC Manager.

- If terminals are to be connected to MPE/iX systems via the DTC, modem behavior needs to be configured in NMMGR on the systems concerned. The modems that have been tested and are supported for asynchronous connections to the DTC are listed later in this chapter.
- The DTC provides only a transport mechanism for connection to the system; different systems and applications may impose their own constraints on the choice of terminals, and on terminal configurations. Before using any of these terminals, ensure that it is supported for the system and application with which it will be used.

Supported Printers and Plotters

- HP 7550A/B Plotter
- HP 2225D ThinkJet printer
- HP 2227A, 2228A QuietJet printer
- HP 2276A, 2277A DeskJet printer
- HP 2932A, 2933A, 2934A Impact printer
- HP 2562C, 63A/B/C, 64B/C, 66C, 67C Line impact dot matrix printers
- HP 2235C Rugged Writer
- HP 2684D/P, 2686A/D Laser
- HP 33440A/F, 33447A/F, 33449A, 33459A
- LaserJet printer family (modem connections are not supported by the LaserJet printer family)
- HP 33471A

HP 3000 systems only:

- C1200A Dot matrix
- C1202A 1A9 Highspeed serial printer
- C1602A Paintjet color
- C2354A 840 LPM line impact printer
- C2356A 1100 LPM line impact printer

Note the following points:

- All the devices were tested using XON/XOFF flow control.
- To use a printer or plotter, your system must be able to access the device programmatically. The following systems can use DTC-connected printers and plotters.
  - HP 3000 Series 900 systems – devices must be configured as nailed devices
  - HP 9000 Series 300, 400, 700 and 800 systems – using the HP DTC Device File Access utility
  - asynchronously connected systems (extended switching configurations)
- All the printers listed in this chapter (except the HP LaserJet printers) can be connected to the DTC via asynchronous modems based on the V.22 *bis* standard.

Modem control must be configured individually on the DTC ports, in the port configuration screen of DTC Manager.

- If printers are to be connected to MPE/iX systems via the DTC, modem behavior must be configured in NMMGR on the systems concerned.

Two types of printers can be used:

- **Dumb printers**. These are printers that do not have a "status request" mechanism. Dumb printers:
  - may be either HP or non-HP
  - must support XON/XOFF
  - may support modem signals
  - may support ASCII 8-bit transfer

  DTC 16 and DTC 48 only: if the printer supports flow control using modem signals, this must be disabled if the printer is connected to the DTC modem interface, as the DTC does not support modem flow-control.

- **Status Request Printers**. The status request mechanism allows interrogation of directly-connected printers to get their status before and after printing. The printer responds to the host's status requests with a value that indicates its condition.

Supported Repeaters and Hubs

- HP Repeater, HP 92223A
- HP ThinLAN Hub, HP 28645A
- HP EtherTwist Hub, HP 28684A (StarLAN 10 Hub)
- HP EtherTwist Hub Plus, HP 28688A
- HP EtherTwist Hub/8, HP 28691A
- HP Fiber-Optic Hub Plus, HP 28682A

Definitions:

Repeaters connect LAN segments at the physical link layer (level 1) of the ISO model, and provide signal amplification.

Hubs allow the connection of several devices into one LAN node.

Supported Bridges

- HP 10:10 LAN Bridge, HP 28648B, HP 28673A and HP 28681A
- HP Remote Bridge, HP 28674A

In all cases, the use of bridges is not recommended if the LAN is heavily loaded and is losing more than 1% of large (1500 byte) packets.

Definition:

Bridges operate up to level 2 of the ISO model, and are protocol-transparent.

Supported Routers

- HP Router, HP 27270A
- HP Router ER, HP 27285A

Definition:

Routers operate up to ISO layer 3, and enable users to select the optimum route for sending data within a network.

Other Supported LAN Devices

- VitaLink TransLAN III and 350
- Siecor EOT-322 Fiber Optic Transceiver
- CISCO Gateway Server
- Proteon P9100+ Router

Note that certain restrictions may apply to some of these devices: contact your HP representative for more information.

Supported Modems

- HP 35016A
- HP 35141A
- HP 37212A
- Bell 212A
- Hayes Smartmodem 1200 or HP 92205A
- Hayes Smartmodem 2400 or HP 92205B
- Racal-Milgo MPS1222
- AJ 1212 AD1
- HP 92205J
- Multitech Multimodem V32-MT932EF
- Alcatel MD9633T110

Other modems may have been tested in certain countries, in particular modems intended for use in one country only: contact your HP representative for more information.

Modems and modem eliminators connected to the DTC's X.25 boards *must* be externally powered – that is, they must not derive *any* power from the board.

Supported PADs

- HP 2334A PAD/Statistical Multiplexer
- HP 2335A PAD/Statistical Multiplexer

Supported Dataswitches and PBXs

- MICOM INSTANET 6000 Series 40
- EQUINOX DS15
- GANDALF PACX 2000
- AT&T System 85
- NTI Meridian SL-1

To use the any of these devices you need to purchase NetAssure support services to gain Field Response Center support for your configuration.

Applications and Data Transfer Modes

The following table shows the data transfer modes supported for certain types of connection.

	VPLUS Block Mode	HP Block Mode	User Block Mode	Line Mode	Field Mode	Character Mode
Asynchronous connections to MPE/iX	Y	Y	Y	Y	Y	Y
Extended Switching	Y	Y	Y	Y		Y
PAD Support connections to MPE/iX	Y		Y	Y		Y
HP 3000 Telnet Access	Y		Y	Y		Y
Asynchronous connections to ARPA systems	(1)		(1)			Y
PAD Support Connections to ARPA systems	(1)		(1)			Y

Note (1) Block mode is unusual on UNIX, but possible with an HP terminal.

See the *DTC Technical Reference Manual* for more information.

Character Mode

In character mode, the editing and echo are done by the application. Each character requires one packet to the system and one packet from the system for the echo.

Block Mode

Block mode includes the following:

- VPLUS mode
- HP Block mode
- User Block mode
- Line Block mode.

The editing and echo are done by the terminal. Data is sent to the DTC when the ENTER key is pressed. Data is split into packets before being sent to the system.

Examples include:

- NMMGR
- PM/3000
- MM/3000

Line Mode

Characters are sent by the terminal as soon as they are entered. The editing and echoing are done by the DTC. The characters are buffered in the DTC, split into packets and sent to the system either when an EOR is entered, when the byte count is reached or when the read timer expires.

Examples include:

- MPE CI
- HPDESK

Field Mode

Field mode is a derivative of line mode, and works in the same way. Editing and echoing are done by the DTC, but the DTC splits the escape sequences received as well as the data from the terminal into packets.

Examples include:

- Oracle
- Ingres
- Sybase.

11

Bibliography

This bibliography lists all the DTC documentation and other documentation that might be useful when installing, configuring and managing DTCs. It provides a brief outline of some of the manuals, and says which manuals are needed for which tasks.

The information in this chapter was correct when it was printed, but it is possible that some part numbers will change during the lifetime of this manual.

The DTC Hardware Installation Manuals

HP 2345A Datacommunications and Terminal Controller Installation and Service Manual (02345-90021)

Installing the DTC 48.

HP 2340A Datacommunications and Terminal Controller Installation and Service Manual (02340-90001)

Installing the DTC 16.

HPJ2070A DTC 72MX Communication Server Installation Guide (J2070-90001)

Installing the DTC 72MX.

HPJ2060A/J2062A/J2063A HP DTC 16xx Family Installation Guide (5959-4986)

Installing the DTC 16TN, DTC 16iX and DTC 16MX.

HPJ2064A DTC 16RX Routable Communications Server Installation Guide (J2064-90001)

Installing the DTC 16RX.

ARPA Telnet Express Installation Manual (02344-90001)

Installing the HP ARPA Telnet Express.

DTC Cabling and Racking Guide (5961-0373)

Installing the DTC in racks and cabinets, and details of cable pinouts for the DTC.

DTC Manager Documentation

HP OpenView DTC Manager 14.2 Installation and Upgrade Guide (D2355-90013)

This manual explains how to install and update the DTC Manager software on the PC.

DTC Planning Guide (D2355-95017)

This manual gives an overview of the DTC family, the management platforms, and the connections possible. It does not go into technical detail, but provides the level of information needed to understand the DTC and the way it can be used. This manual is not tied to any one management platform.

Using HP OpenView DTC Manager (D2355-90001)

This manual is specific to the PC-based HP OpenView DTC Manager (DTC Manager). It explains how to use the DTC manager to configure and manage DTCs. It gives examples of configuring different types of connections, and explains how to manage DTCs and their connections.

DTC Technical Reference Manual (5961-9820)

This manual covers the technical detail of the DTC, including protocol implementations and limitations, explanations of how connections are established, and information on event logging. In general, this manual is not tied to any one management platform, though some of the information, for example the presentation of event log data, is specific to the PC-based DTC Manager.

The DTC Manager Online Help System

The DTC Manager online help system explains each field of each screen, giving default values, restrictions, and important points to note. It also explains how to perform certain procedures.

Other Documents for PC-based Management

HP OpenView Windows 7.2 SNMP Platform User's Guide (5961-9883)

This manual contains information on installing and using HP OpenView Windows.

Microsoft Windows User's Guide

Information on how to use the Microsoft Windows graphical environment, and how to install Microsoft Windows.

The following manual may be needed during the installation of the DTC Manager software on the PC.

ARPA network layer software documentation

Information on how to configure ARPA on the PC, and how to use the ARPA configuration software.

HP 3000 Series 900 Documentation

Some of the following HP 3000 Series 900 manuals are cross-referenced in the DTC Manager documentation, others contain useful information and should be available for reference. For a complete list of HP 3000 system documentation, consult one of the manuals listed below.

Using the Node Management Services (32022-61005)

Detailed information about the NMS utilities, including NMMGR.

Configuring Systems for Terminals, Printers and Other Serial Devices (32022-61001)

How to prepare devices for operation, and how to configure the system to include asynchronous device connections.

How to configure the system to allow connections to and from remote devices via PAD support.

Asynchronous Serial Communication Programmer's Reference Manual (32022-61001)

Introduction to asynchronous serial communications, the Distributed Terminal Subsystem (DTS) and basic data communication concepts.

Using file system intrinsics to control asynchronous devices programmatically.

Comparison of serial device connection to MPE V and MPE/iX systems.

Customizing Terminal and Printer Type Files Using the Workstation Configurator (5959-2870)

How to create or modify terminal type or printer type files.

Troubleshooting Terminal, Printer and Serial Device Connections (32022-61002)

Solving problems with connections to MPE/iX systems.

The following manuals may also be useful.

MPE/iX Commands Reference Manual Volume 1 (32650-90003)

MPE/iX Commands Reference Manual Volume 2 (32650-90003)

System Startup, Configuration and Shutdown (32650-90042)

HP 3000/iX Network Planning and Configuration Guide (36922-61023)

Configuring and Managing Host-Based X.25 Links (36939-61004)

Managing Host-Based X.25 Links Quick Reference Card (36939-61003)

HP 36923A LAN 3000/XL Link and Terminal LAN Link Hardware Reference Manual (36921-90001)

LAN Cable and Accessories Installation Manual (5955-7680)

Central Bus Programmable Serial Interface Installation and Reference Manual (30263-90001)

HP 28684A EtherTwist Hub & HP 28688A EtherTwist Hub Plus Installation Steps (5090-2637)

HP 9000 (HP-UX) Documentation

You can obtain the part numbers of these manuals in the current edition of *Finding HP-UX Information*, which gives full details of all HP-UX and HP 9000 documentation.

For configuring and managing the DTC:

Using the HP DTC Manager/UX (J2120-62000)

Installing and configuring the HP-UX-based DTC management software.

Managing DTCs from an HP-UX platform.

DTC Device File Access Utilities and Telnet Port Identification (B1041-90012)

Configuring and using the HP DTC Device File Access utility.

Using the HP DTC 16RX Manager (J2496-90000)

Installing and configuring the DTC 16RX Manager software.

For information about HP 9000 systems:

Installing and Administering LAN/9000

Installing and Administering ARPA/9000

Information on ARPA Services.

Information on installing and administering DDFA.

Installing and Updating HP-UX

System Administration Tasks

Finding HP-UX Information

Master list of all manuals on HP-UX and on all HP 9000 products.

Documentation on Other Network Devices

HP 2335A X.25/84 Multiplexer Reference Manual (02355-90021)

Configuring an HP 2335A PAD

Cables for HP 2335A PAD.

12

Glossary of Terms

See the glossary in the *DTC Technical Reference Manual.*

Index

E

F

H

I

J

L

M

N

O

P

R

Printed in France - 08/94

Customer Order No.
D2355-95017

Manufacturing No.
D2355-95026
Mfg. number is for HP internal use only

D2355-95026