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HP 3000
Series 900
Computers

Configuring Systems for Terminals, Printers, and Other Serial Devices

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Configuring Systems for Terminals, Printers, and Other Serial Devices

32022-61010, E0293

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HP 3000/iX Networking

Configuring Systems for Terminals, Printers, and Other Serial Devices MPE/iX

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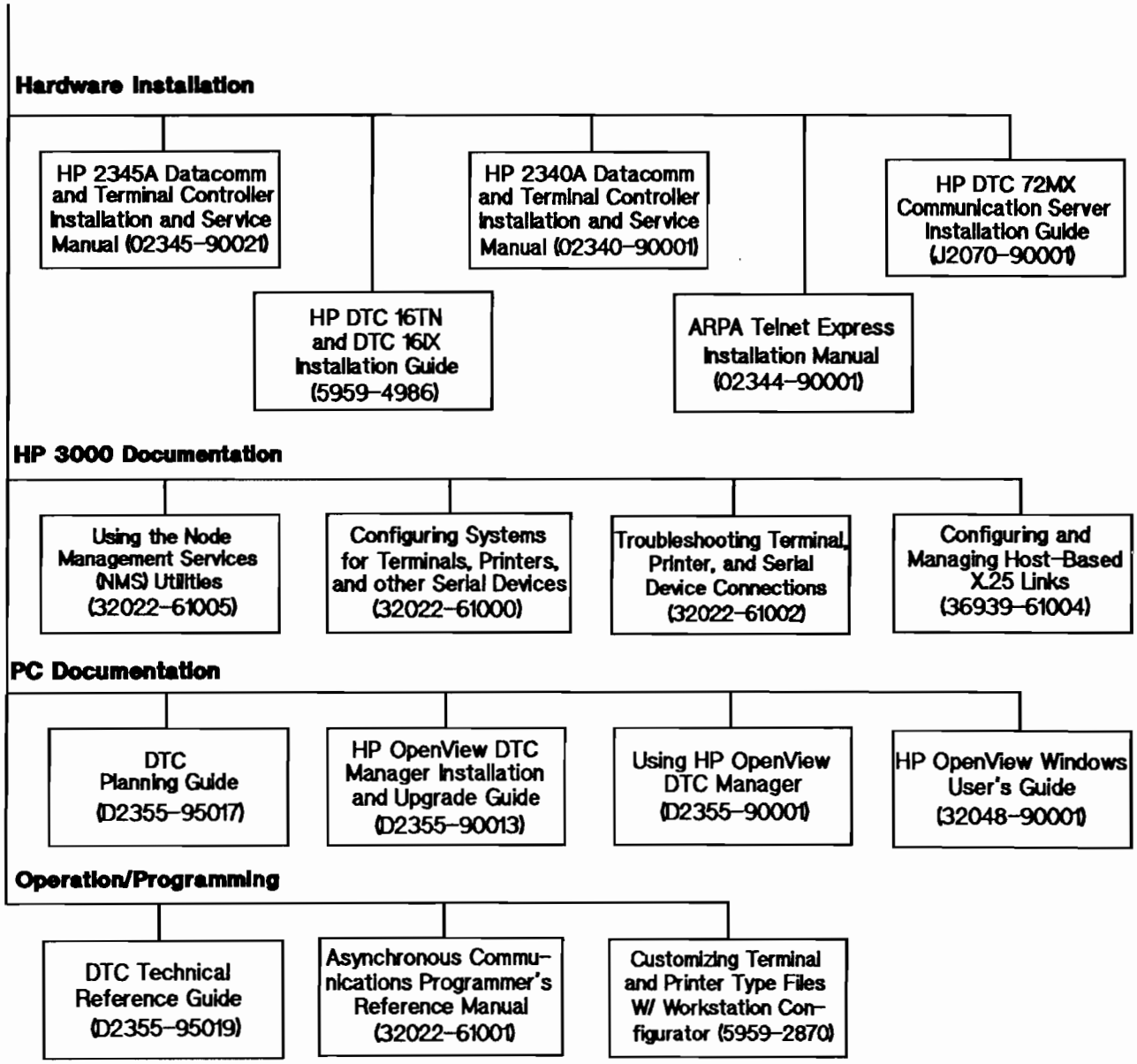
Pages	Effective Date
All	February 1993

Documentation Map

The following documentation map is intended to be a general guideline to the manuals containing information related to the product described in this manual. You may need information from one or all the manuals listed here.



Configuration At a Glance

Before configuring your HP 3000 to use the DTC terminal servers, you must have completed the following tasks. These tasks are not covered in this manual:

Set up your HP 3000 and make sure it is operational. Refer to your HP 3000 installation manual.

Install the DTC terminal servers on your LAN and connect the serial devices to the DTC terminal servers. Refer to your DTC hardware installation guide.

Configuration Overview

The following steps summarize the procedure for configuring your HP 3000 systems to use DTC terminal servers. For detailed information on these steps, refer to Chapter 3.

1. Create your network configuration file `NMCONFIG.PUB.SYS`.
2. Run `NMMGR.PUB.SYS`.
3. Enter your HP 3000 node name, link name, and LANIC slot number.
4. Define each DTC to be connected with the HP 3000.
5. Configure each board in the DTC.
6. Validate your network configuration within NMMGR.
7. Exit NMMGR.
8. Cross-validate with SYSGEN.
9. Reboot your HP 3000 and the DTC terminal servers.

Note If you are using the HP OpenView DTC Manager on the PC to manage the DTCs, you must also configure the OpenView DTC Manager. For more information, refer to *Using HP OpenView DTC Manager* (D2355-90001).

Preface

This manual documents functionality for the MPE/iX 4.5 release for HP 3000 Series 900.

This manual describes how terminals and printers are connected to the HP 3000 Series 900 computer. It includes an explanation of how terminal and printer input/output (I/O) is controlled by the MPE/iX operating system, and presents an overview of both the hardware and software needed to accomplish communications in an asynchronous serial mode.

Step-wise configuration for the HP 3000 and the Datacommunication and Terminal Subsystem (DTS) is presented in this manual.

Printer and terminal type files are discussed, as well as various other topics that impact how communications take place between an asynchronous device and the computer.

PAD configuration is explained in this manual. If you are configuring X.25 networking capabilities on a HP 3000 Series 900 computer using host-based network management, use *Configuring and Managing Host-Based X.25 Links* instead of this manual to configure DTCs and DTC connections.

Note

MPE/iX, Multiprogramming Executive with Integrated POSIX, is the latest in a series of forward-compatible operating systems for the HP 3000 line of computers.

In HP documentation and in talking with HP 3000 users, you will encounter references to MPE XL, the direct predecessor of MPE/iX. MPE/iX is a superset of MPE XL. All programs written for MPE XL will run without change under MPE/iX. You can continue to use MPE XL system documentation, although it may not refer to features added to the operating system to support POSIX (for example, hierarchical directories).

Finally, you may encounter references to MPE V, which is the operating system for HP 3000s, not based on the PA-RISC architecture. MPE V software can be run on the PA-RISC HP 3000s (Series 900) in what is known as *compatibility mode.*

Skills and Tasks

Configuring Systems for Terminals, Printers, and Other Serial Devices will be of greatest value to the person responsible for the overall operation and reliability of an MPE/iX computer. This person is usually called the system administrator or system manager, and needs to be able to prepare devices for operation and to configure the computer to recognize asynchronous devices. This person also needs to configure the computer for either host-based network management or PC-based network management.

Guide To This Manual

This manual is divided into the following chapters and appendixes:

Chapter 1, Introduction, introduces Asynchronous Serial Communications (ASC) and the organization of the hardware and software used by the Distributed Terminal Subsystem (DTS).

Chapter 2, Preparing to Configure Terminal and Printer Connections, explains how to prepare to configure communications between the HP 3000 computer and serial devices, such as terminals and printers. This chapter also provides worksheets to help you in configuration.

Chapter 3, Configuring Device Connections (for Host-Based Management), lists steps to configure terminal and printer connections, when your DTCs are managed by the HP 3000 computer.

Chapter 4, Configuring Device Connections (for PC-Based Management), lists steps to configure communications between the HP 3000 computer and serial devices, when your DTCs are managed by an OpenView Windows Workstation (PC).

Chapter 5, Terminal and Printer Profiles, explains what are terminal and printer profiles, and how to create and modify your own terminal and printer profiles to suit your environment.

Appendix A, Tuning Your DTC, describes the steps to tune your DTC by selecting predefined AFCP and management timer values.

Appendix B, Migrating from Previous Releases, describes the steps to migrate network configuration files from previous MPE/iX and MPE V releases to the current release format.

Appendix C, Describing Asynchronous Devices, describes how devices are viewed by the MPE/iX operating system and how their functionality is affected by the operating system. It also explains how asynchronous serial communications (ASC) controls devices and the flow of information between the system and devices.

Appendix D, Error Messages, lists error messages and causes and actions for each message.

Glossary, provides definition of commonly used terms and concepts.

Helpful Manuals

When using *Configuring Systems for Terminals, Printers, and Other Serial Devices*, these manuals should be available for reference:

Configuring and Managing Host-Based X.25 Network Links (36939-61004). This manual explains how to configure X.25 networking capabilities on a HP 3000 Series 900 system using host-based network management. Host-based X.25 links allow communications over an X.25 network through the DTC/X.25 Network Access card.

Troubleshooting Terminal, Printer, and Serial Device Connections (32022-61002). Use this manual to troubleshoot device connections when the host-based network management option is used. This manual lists TermDSM commands and suggests a strategy for problem resolution.

Using the Node Management Services (32022-61005). This is a reference manual that has detailed information about the NMS Utilities, including NMMGR.

Asynchronous Serial Communications Programmer's Reference Manual (32022-61001). This manual documents a subset of the system-supplied intrinsics available through the native mode of MPE/iX. The intrinsics are those that are particularly useful for the programmatic control of asynchronous devices.

Using HP OpenView DTC Manager (D2355-90001). This manual explains how to configure the Datacommunications and Terminal Controller (DTC) with OpenView DTC Manager. OpenView DTC Manager is the software used to configure, monitor, and control the DTC when the PC-based network management option is used.

DTC Planning Guide (D2355-95017). This manual gives an overview of the DTC family, the management platforms, and the connections possible.

HP OpenView DTC Manager Installation & Upgrade Guide (D2355-90013). This manual describes the installation and upgrade of the DTC Manager and related software, when the DTC is managed by an OpenView Workstation.

DTC Technical Reference Guide (D2355-95019). This manual covers the technical detail of the DTC, including protocol implementations and limitations, explanation of how connections are established, and information on event logging. It is intended for experienced DTC users and programmers.

Contents

Appendix C Describing Asynchronous Devices

Figures

Tables

Syntax Conventions

nonitalics Words in syntax statements which are not in italics must be entered exactly as shown. Punctuation characters other than brackets, braces, and ellipses must also be entered exactly as shown. For example:

```
EXIT;
```

italics Words in syntax statements that are in italics denote a parameter that must be replaced by a user-supplied variable. For example:

```
CLOSE filename
```

[ ] An element inside brackets in a syntax statement is optional. Several elements stacked inside brackets indicates the user may select any one or none of these elements. For example:

```
[A]
[B]   User may select A or B or C or none.
[C]
```

{ } When several elements are stacked within braces in a syntax statement, the user must select one of those elements. For example:

```
{A}
{B}   User must select A or B or C.
{C}
```

... A horizontal ellipsis in a syntax statement indicates that a previous element may be repeated. For example:

```
[,itemname]...;
```

In addition, vertical and horizontal ellipses may be used in examples to indicate that portions of the example have been omitted.

▒ A shaded delimiter preceding a parameter in a syntax statement indicates that the delimiter must be supplied whenever (a) that parameter is included or (b) that parameter is omitted and any other parameter that follows is included. For example:

```
itema[▒itemb][▒itemc]
```

means that the following are allowed:

```
itema
itema,itemb
itema,itemb,itemc
itema,,itemc
```

Δ When necessary for clarity, the symbol Δ may be used in a syntax statement to indicate a required blank or an exact number of blanks. For example:

```
SET[modifier] Δ (variable)
```

underlining Brackets, braces, or ellipses appearing in syntax or format statements which must be entered as shown will be underlined. For example:

```
LET var[[subscript]] = value
```

Output and input/output parameters are underlined. A notation in the description of each parameter distinguishes input/output from output parameters. For example:

```
CREATE (parm1,parm2,flags,error)
```

For clarity, user input is sometimes underlined in examples.

[Key Cap] A string in bold font enclosed by brackets may be used to indicate a key on the terminal's keyboard. For example, **[Tab]** indicates the tab key.

[CTRL]-char Control characters are indicated by **[CTRL]** followed by the character. For example, **[CTRL]-Y** means the user presses the control key and the Y key simultaneously.

1

Introduction

This chapter provides an overview of communications between a HP 3000 Series 900 computer and its asynchronous devices, including the following:

- The types of devices that communicate in an asynchronous serial fashion.
- How devices communicate once they are connected to the Datacommunications and Terminal Controller (DTC).
- Typical configurations for both host-based network management and PC-based network management.

Devices That Communicate Asynchronously

Asynchronous Serial Communications (ASC) is the term used to describe the specific manner in which communications occur between a HP 3000 Series 900 computer and its associated devices. Asynchronous refers to the protocol used to inform the receiving end of a communications link that data is being sent and when the data transmission has completed. Each character is preceded by a special bit, called a start bit, which signals its arrival. The character is then followed by at least one stop bit, (a second special bit) that signals transmission of that character is complete.

The types of devices that communicate asynchronously include the following:

- Terminals.
- Personal computers (PCs) in terminal emulation mode.
- Serial printers.
- Plotters.
- Modems and other devices that use modem signals.

This asynchronous communication scheme supports the following device functionality:

- Device control capabilities provided through the FCONTROL and FDEVICECONTROL file system intrinsics.
- Typeahead facility, which allows terminal users to enter data before a read is posted.
- Block mode applications.
- Customized terminal and printer type files created with the workstation configurator utility.
- Datacommunications and Terminal Controller (DTC) switching capabilities.
- Powerfail session recovery for sessions in character mode (i.e., switched, non-switched, nailed, and non-nailed sessions).

Note

For more information about these device functionalities, refer to Appendix C, "Describing Asynchronous Devices."

How Devices Communicate Once They Are Connected

With the exception of the system console, which has its own access port, asynchronous devices are connected to a HP 3000 Series 900 computer through the Distributed Terminal Subsystem (DTS). DTS includes all of the Datacommunications and Terminal Controllers (DTCs) connected to the local area network (LAN), a LAN interface card (LANIC) connecting each host to the LAN, the LAN cable, and the software that controls all of the DTS hardware. This software resides on the HP 3000 and on the DTC.

During configuration, a relationship is specified between the system's LANIC and each DTC through which asynchronous device connections will be made. A link for the LANIC is defined using the Node Management Configuration Manager (NMMGR) utility. This link provides the asynchronous devices with an entry point to the DTS.

Typical Network Configurations

Note

If you are configuring X.25 networking capabilities on a HP 3000 Series 900 computer using host-based network management, use *Configuring and Managing Host-Based X.25 Links* instead of this manual to configure DTCs and DTC connections.

The DTC makes communication possible across a wide variety of network configurations. The DTC provides the following:

- Asynchronous connections to HP 9000s and third-party ARPA nodes via Telnet.
- Access to X.25 networks.
- Access to HP 3000s via Telnet from HP9000's or third party ARPA nodes.

The networking environment dictates not only the connection options, but also the type of network management used.

If users only need access to a single HP 3000 computer from the terminal, then each DTC can be managed from the HP 3000 computer. This management is referred to as **host-based network management.**

If users need to access more than one system on the LAN, then each DTC must be managed through an OpenView Windows Workstation. This management is referred to as **PC-based network management.**

If X.25 communications is required, then either **PC-based network management** or **host-based X.25 Manager** can be used.

Each of these types of management is described below.

Host-Based Management

DTCs that are configured and managed by an HP 3000 computer function as distributed terminal controllers for the host that manages them.

When host-based management is used, devices connected through a DTC function as though a single cable were connecting the device and the computer to which it is logically attached. In spite of the LAN connections between the host and its DTCs, each DTC functions as an integral part of its host system. The LAN is transparent.

Configuration and control information is maintained on the host, and downloaded from the host to each of the DTCs controlled by it. A DTC communicates only with the host from which it receives its downloaded code, regardless of how many other computers are connected to the same LAN.

A sample network configuration in which host-based management is used is shown in figure 1-1. System A manages DTC 1 and DTC 2, while System B manages DTC 3. Terminals connected to DTC 1 and DTC 2 are able to communicate only with System A, as if a single connection existed between them. Likewise, terminals connected to DTC 3 are only able to establish connections with System B.

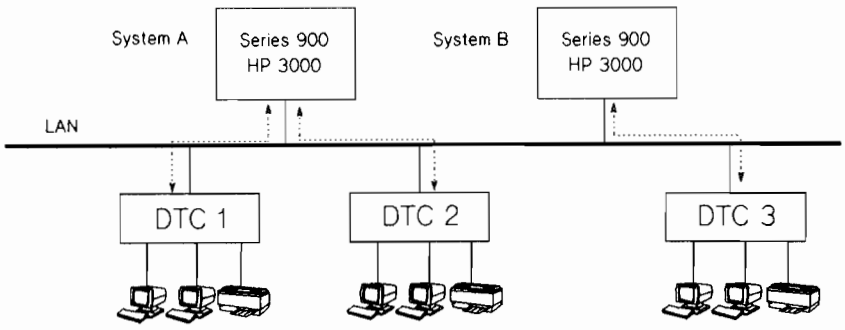


Figure 1-1. LAN with Host-Based Management

PAD Access

DTCs can optionally contain up to three DTC/X.25 Network Access cards. DTC/X.25 Network Access cards connect devices to computers over a Packet Switching Network (PSN), by using a private or public PAD.

A **PAD**, or **Packet Assembler/Disassembler**, is a device that converts asynchronous character streams into packets that can be transmitted over a PSN. Supported devices attached to the DTC can be remotely connected using a PAD.

Figure 1-2 shows PAD access to HP 3000 and other computers using a DTC equipped with the DTC/X.25 Network Access card. Note that only terminals are connected to the public PAD. This is because devices that are opened using the software, such as serial printers, must be connected to a private PAD and must be permanently associated with a reserved **logical device (ldev)** number on the MPE/iX computer that accesses them.

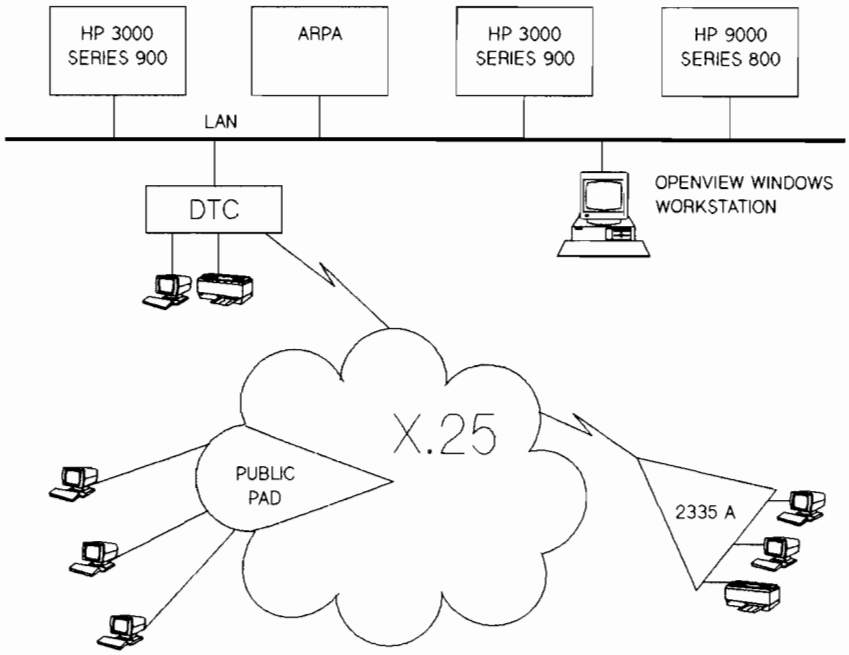


Figure 1-2. DTC/X.25 Network Access for a PAD

X.25 Network Access

X.25 iX System Access, when used in conjunction with DTC/X.25 Network Access, allows you to establish a DTC/X.25 iX Network Access Link, thus connecting an HP 3000 computer to a public or private X.25 PSN. Since X.25 network protocol processing is done by the DTC/X.25 Network Access card instead of by an HP 3000 computer, multiple host systems are able to share the same X.25 network connection.

Figure 1-3 shows a Wide Area Network (WAN) consisting of two LANs joined by an X.25 PSN. Both LANs must include at least one DTC equipped with at least one DTC/X.25 Network Access card. The LANs can be managed by either OpenView Windows Workstations or by the host system.

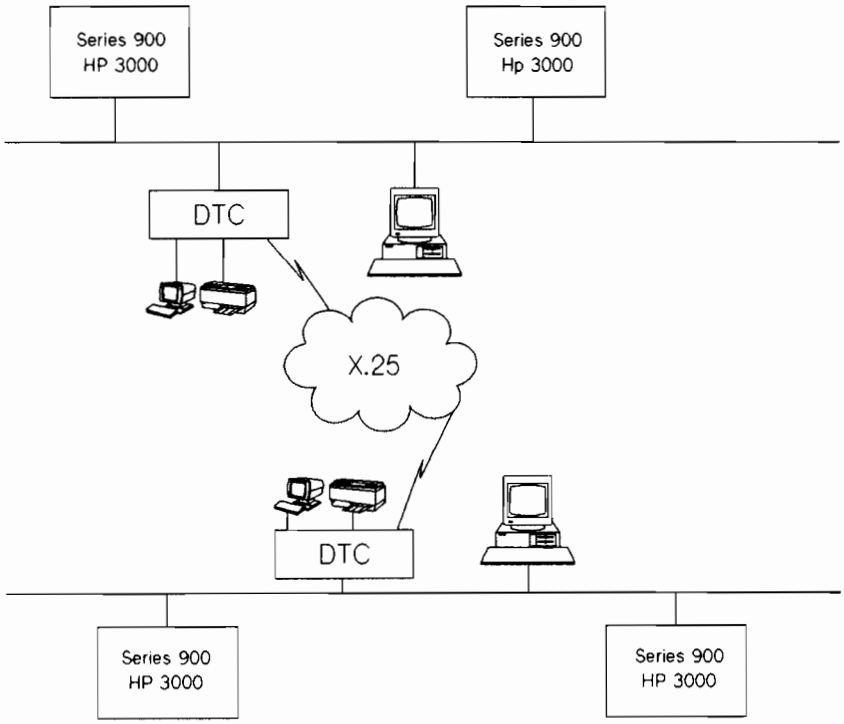


Figure 1-3. DTC/X.25 XL Network Access Link

Telnet/iX Access

Telnet/iX provides connections to MPE systems from terminals connected to systems running ARPA standard Telnet services. Telnet/iX includes a Telnet Access Card (TAC) that resides in the DTC 48 or DTC 72MX and provides protocol conversion between Telnet and AFCP. Equivalent functionality is provided by the Telnet Express Server (HP2344A).

Note A DTC 48 cannot contain both a TAC and an X.25 card.

Figure 1-4 shows a terminal user connected to an ARPA node and using the Telnet service to access an HP 3000 Series 900. The TAC card in the DTC converts the Telnet traffic into TIO traffic for the MPE system.

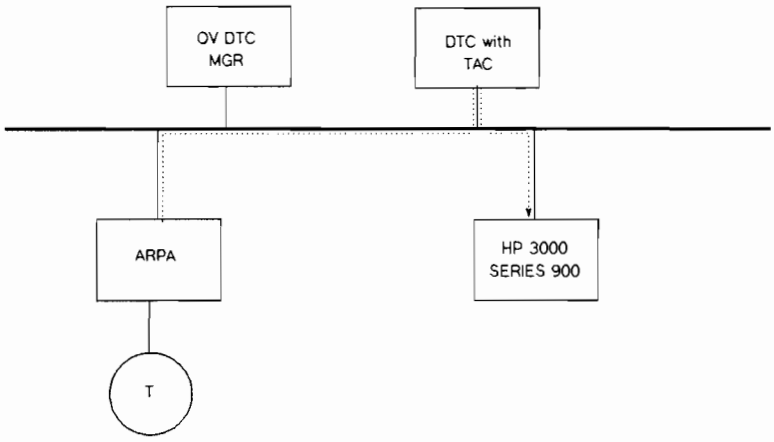


Figure 1-4. Telnet/iX Access

PC-Based Management

DTCs that are configured and managed by an OpenView Windows Workstation are able to function as datacommunications servers for multiple computers on the LAN. These systems can be HP 3000s, HP 9000s, HP 1000s or third-party nodes which run the ARPA standard Telnet service. Configuration and control information for those shared DTCs on the LAN is maintained on an OpenView Windows Workstation running the OpenView DTC Manager software. The OpenView Windows Workstation must reside on the same LAN as the DTCs which it manages.

Multi-System Access

Figure 1-5 shows a sample network configuration. The terminals connected to DTC 1 are configured so that they are able to establish connections to either System A or System B through the **DTC Switching User Interface**. Output devices connected to DTC 1, such as serial printers or plotters, are configured so that they can be opened using the software from either host. Note the presence of the OpenView Windows Workstation on the same LAN with the computers and DTC 1.

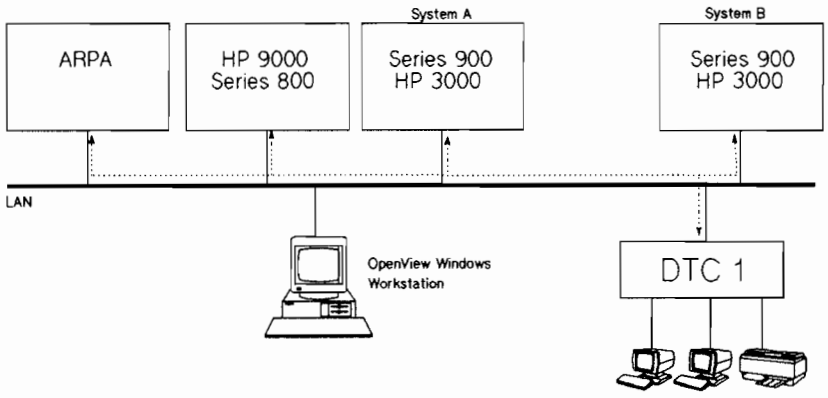


Figure 1-5. DTC Switching

Back-to-Back Access

By arranging DTCs and DTC terminal connections in a special way, terminal users can establish communications with an MPE V computer. This is referred to as **back-to-back** access.

Figure 1-6 shows two DTCs in a simple back-to-back configuration. DTC 1 has terminals connected to it. DTC 2 is connected through one of its ports to the Advanced Terminal Processor (ATP) card in the MPE V computer. A terminal user connected through DTC 1 is able to establish a communications link to the MPE V system by going through DTC 2. Note that the OpenView Windows Workstation is on the same LAN as the DTCs involved in the back-to-back configuration.

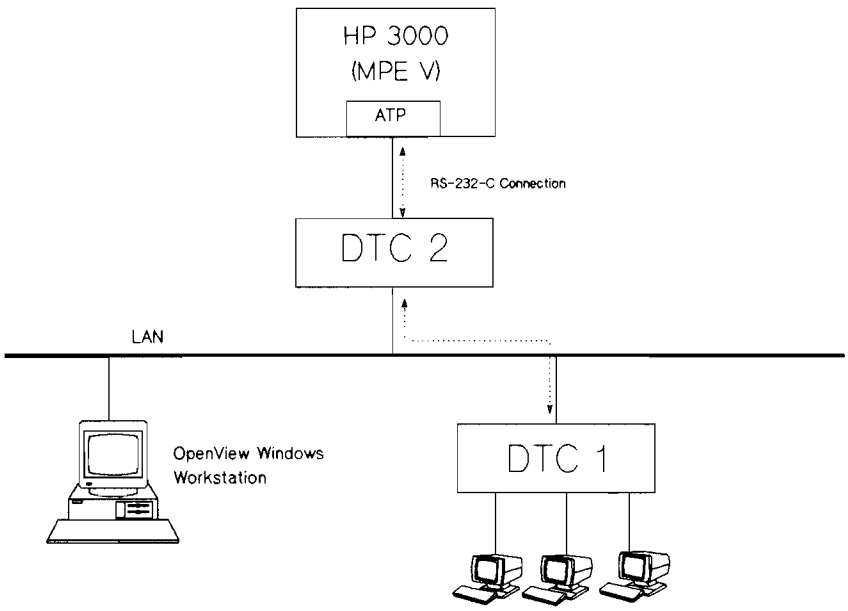


Figure 1-6. DTC Connection to MPE V Host

2

Preparing to Configure Terminal and Printer Connections

This chapter contains information that is needed before configuration of systems for asynchronous device (terminal and printer) connections can begin. It also provides worksheets for you to collect your network configuration data before actual configuration.

Chapters 3 and 4 show step-by-step process for configuring terminals and printers.

Note

If you are configuring X.25 networking capabilities on a HP 3000 Series 900 computer using host-based network management, use *Configuring and Managing Host-Based X.25 Links* instead of this manual to configure DTCs and DTC connections.

Plan the Network

Before configuration can begin, the physical layout and configuration parameters for the systems, the DTCs, the OpenView Windows Workstation, and the connected devices on the LAN must be defined. This information must be translated into terms that the MPE/iX operating system can understand and use.

For example, a node name for the system must be indicated and a link name must be specified. Additionally, the physical path for the LANIC must be identified. Each DTC needs a name and the devices connected to it will have characteristics associated with them.

Once this information is entered in the configuration file (`NMCONFIG.PUB.SYS`), the system can communicate with each device connected to the DTC. HP 3000 Series 900 uses a utility

called NMMGR to enter configuration information into the NMCONFIG.PUB.SYS file.

On the pages that follow, information and worksheets are provided to help define these required configuration parameters.

Figure 2-1 shows the parameters needed for configuration of asynchronous device connections. (A DTC 48 is shown in the example.)

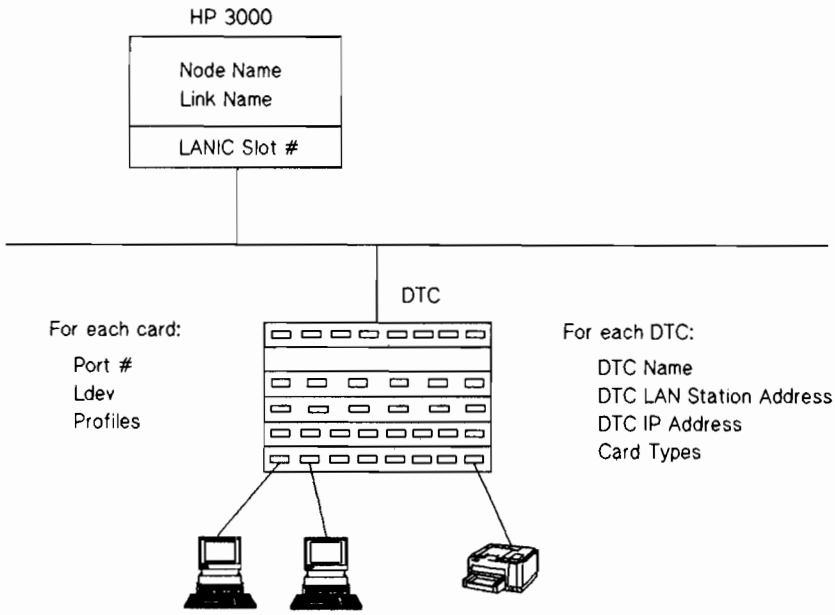


Figure 2-1. HP 3000 and DTC Configuration

Defining the HP 3000 System

The following configuration parameters are required to define the HP 3000 host for asynchronous device connections.

Local Node Name

The name by which the HP 3000 Series 900 computer is known in your network. The format of a node name is *nodename.domain.organization*, where each field can contain 16 or fewer characters (alphanumeric, underscores, or hyphens). The first character of each field must be alphabetic. For example: `ACCOUNTS.MKT2.HP`.

Link Name

The link name that will be used by the HP 3000's Distributed Terminal Subsystem (DTS) when device connections are established. It must start with a letter and can be up to eight alphanumeric characters. `DTSLINK` is the default and should be used for your DTS configuration.

Physical Path of LANIC (Slot # of LANIC Card)

The location of the LANIC (LAN Interface Controller Card) in the system's backplane. The LANIC is an input/output (I/O) card that plugs into the Channel I/O Bus (CIB) of the HP 3000 computer. The location (slot number) of the LANIC within the cabinet must be specified.

The default physical paths (slot numbers) for HP 3000 computers are listed below. These defaults optimize performance and use of the computer's cabinet space. Before moving the LANIC into another slot, consult an HP representative.

HP 3000 Systems	Slot Number
920, 922, 925, 932, 935, or 949 with HPIB	4.3
920, 925, 935, or 949 with ALINK	4.2
9X7, 9X7 LX	56
930	8.4
950, 955, 960, 980	2/4.2

Defining the DTC

The following parameters are required to define each DTC used for connection between the HP 3000 and its asynchronous devices (terminals and printers).

DTC Name

A name for the DTC, up to eight alphanumeric characters, beginning with a letter. Each DTC configured on the system must have a unique name.

DTC LAN Station Address

The local station address of the DTC. The HP 2345A (DTC 48) station address is printed inside the front cover. The HP 2340A (DTC 16) station address is printed on the label located on the upper right-hand corner of the back panel of the DTC. The HP J2070A (DTC 72MX) and J2062A (DTC 16iX) station address is printed on the label located at the lower center of the back panel of the DTC.

A typical LAN address looks like: `08-00-09-1A-11-11`.

DTC Node Name

A fully qualified node name of the DTC, in the form *nodename.domain.organization*, where each field can contain 16 or fewer characters (alphanumeric, underscores, or hyphens). The first character of each field must be alphabetic.

Assign meaningful node names. For example, ACCTS.IXNET.ACCTG and PAY.IXNET.ACCTG are meaningful names for two nodes on the same Local Area Network (LAN) within the accounting department. One node (ACCTS.IXNET.ACCTG) is used by the accounts staff. The other node (PAY.IXNET.ACCTG) is used by the payables staff. The *domain* field is the same because the nodes belong to the same network. The *organization* field is the same because the nodes belong to the same internetwork.

DTC IP Address (optional)

The internet protocol (IP) address of the DTC. The IP address is optional. It is used if your HP 3000 is configured as part of a network and you want the DTC to be able to respond to PING/iX requests.

An IP address has four fields of decimal numbers:

XXX.XXX.XXX.XXX

where *XXX* is a number from 0 to 255. An IP address has two parts: a network portion (the initial nine digits) and a node portion (the

last 3 digits). The *network* portion must be the same for all nodes on the network; the *node* portion must be unique for all nodes on the network. Examples of IP addresses for two DTCs on the same network:
C 192.191.191.008
C 192.191.191.009.

You can obtain a Class B or Class C IP address from:

Government Systems, Inc.
ATTN: Network Information Center
14200 Park Meadow Drive
Chantilly, VA 22021
(800) 365-3642 or FAX: (703) 802-8376

DTC Cards (or DTC Boards)

The number and types of connector cards in the DTC. (The cards are also referred to as **boards**.) DTC 16 can have up to 3 cards, DTC 48 up to 6 cards, and DTC 72MX up to 4 cards.

DTC 16iX has its port connectors built directly onto its backplane, and it does not have removable cards. You need not specify the number or type of cards for a DTC 16iX.

The valid card types are:

For DTC 16 and DTC 48:

D for direct connect cards (up to 8 ports per card),
M for modem connect cards (up to 6 ports per card),
X for DTC/X.25 Network Access cards (for X.25 connection).

For DTC 72MX:

L for the LAN card, pre-installed in slot 0
A for asynchronous processor boards (up to 24 ports per card for direct and modem connections)
X for DTC/X.25 Network Access cards (for X.25 connection).

DTC Event Logging

For each DTC, you may specify which event logging class is to be enabled. Event logging class 1 logs catastrophic events and will always be enabled. Class 2 logs critical events; class 3 logs non-critical events; classes 4 and 5 log informative events and class 6 provides statistical information. It is recommended that you only enable classes 4 through 6 when you encounter problems, because they will generate a substantial amount of events logged.

Defining the DTC Connector Cards (or Boards)

Connector cards (also called **boards**) in the DTC allows terminals and printers to be connected to the DTC for communication with an HP 3000 Series 900.

For each connector card in a DTC, you must define the characteristics of its ports for connection to terminals and printers. The following parameters are required:

Card Number

The card number specifies which card in the DTC is being configured.

DTC 16s allow 2 connector cards, labeled card # 0 and card # 1, with the third slot (card # 2) reserved for a DTC/X.25 Network Access card.

DTC 48s allow up to 6 connector cards, labeled card # 0 to 5.

DTC 72MXs allow up to 3 connector cards plus a LAN card that is preinstalled in slot 0; the connector cards are labeled card # 1 through 3.

For all the DTCs, card # 0 resides at the bottom of the DTC and card # 1 resides above it, and so on.

Note that DTC 16iX does not have connector cards. Its port connectors are built directly onto its backplane.

Direct or Modem Connect

You must specify whether a direct or modem connection is used for the ports in a card. Direct connections are used for devices that reside near the DTC. Modem connections are essential for communications over telephone lines.

Port Number

Each port on a connector card is assigned a number, starting with port # 0 on the left most side of the card.

Logical Device Number (LDEV)

Each port needs a logical device (ldev) number assigned to it, if the DTC is managed by an HP 3000. The ldev number is used by MPE/iX to designate devices. Devices with ldevs permanently assigned to them are called **nailed** devices. Printers as well as devices that will be programmatically accessed must be nailed devices.

If the DTC management is PC-based (i.e., managed by an OpenView Windows Workstation), you may have ports without

ldev numbers assigned to them; hence they are **non-nailed** devices. Non-nailed devices have ldev numbers that are assigned from a pool of available ldev numbers for the duration of the device connection to the system. Terminals are examples of non-nailed devices for PC-based management.

Terminal and Printer Profiles

Each port needs a profile assigned to it. A profile defines a set of characteristics for a terminal or printer. The sample configuration file on the HP 3000 supplies several terminal and printer profiles for use. (Table 5-1 and Table 5-2 in Chapter 5 list these terminal and printer profiles.) You may also create your own terminal and printer profiles.

It is suggested that you use default profiles TR10D96 for direct connect terminals and PR18D96 for direct connect printers or PR22D24 for HP printers with status checking. For PAD terminals and printer, use the defaults TR24PAD and PR26PAD, respectively

The name of the profile can be up to eight characters long and must start with a letter, followed by letters and numbers. At any one time, up to 256 profiles can be configured per system.

Terminal Profiles

A terminal profile defines these terminal characteristics:

- The terminal type used (10, 18, 24). A terminal type is a collection of characteristics that cause a terminal to act or react in a specific way.

  Terminal type 10 are used for Hewlett-Packard terminals and Hewlett-Packard personal computers running in terminal emulation mode. It supports block mode data transfer and can detect data transmission errors through the use of parity checking.

  Terminal type 18 is used for non-Hewlett-Packard devices. Block mode data transfer is not supported. By default, parity checking is not used.

  Terminal type 24 is used for PAD terminals.

- The line speed in bits per second.
- The record width in characters (bytes).
- Whether the terminal is attached to a modem.

- Whether hardware handshake is used. (For DTC 16iX and DTC 72MX only.)
- Whether the terminal can use the :HELLO command to logon to the HP 3000.
- Whether the terminal will use a native language character set.
- For PAD terminals: whether X.29 parameters will be set at connection time; the setting of data forwarding parameters; and so on.
- The device class names associated with the terminal.

Refer to Chapter 5, "Terminal and Printer Profiles," for more information on terminal profiles and the steps to create and modify terminal profiles.

Printer Profiles

A printer profile defines these printer characteristics:

- The printer type file used (18, 21, 22, or 26). A printer type file is a collection of characteristics that cause a printer to act and react in specific ways.

  Printer type 18 is used for application printers. An application printer is controlled by a program running on an MPE/iX computer. Printer type 18 responds to an XOFF character sent from a printer.

  Printer type 21 is used for remote spooled printers. These are asynchronous printers that can use the MPE/iX spooler.

  Printer type 22 is used for remote spooled printers. These are asynchronous printers that can use the MPE/iX spooler, but not with modems.

  Printer type 26 is used for remote spooled printers connected to a network. These are printers that can be spooled and connected through a modem to a statistical multiplexer or printers connected to a PAD.
- The line speed in bits per second.
- The record width in characters (bytes).
- Whether the printer is attached to a modem.

- Whether the printer is initially spooled.
- Whether the printer will use a native language character set.
- The device class names associated with the printer.

Refer to Chapter 5, "Terminal and Printer Profiles," for more information on printer profiles and the steps for creating and modifying printer profiles.

Configuring With NMMGR

NMMGR, the Node Management Configuration Manager, is the utility used by HP 3000 Series 900 to configure asynchronous device connections. The parameters described previously in this chapter are entered in NMMGR through a screen-by-screen user interface. These parameters are then stored by NMMGR into the HP 3000 network configuration file NMCONFIG.PUB.SYS.

To invoke NMMGR, type the following command at the MPE prompt:

```
NMMGR.PUB.SYS
```

Figure 2-2 shows the screen flow for configuring terminals and printers in NMMGR. Parameters entered in each NMMGR screen are listed to the right of the screen. [*function*] denotes the function key used at a screen to invoke the next screen on the flowchart.

Chapters 3 and 4 show the step-by-step process for configuring terminals and printers using NMMGR, for host-based and PC-based management, respectively.

Note

In addition to the DTS subsystem, NMMGR is used to configure other network subsystems on the HP 3000 Series 900, such as NS (Network Services), IBM, and OSI. NMMGR provides many functions and utilities that are beyond the scope of this manual. Refer to *Using the Node Management Services* (32022-61005) for detailed information on NMMGR.

NMMGR DTS/DTC Flowchart

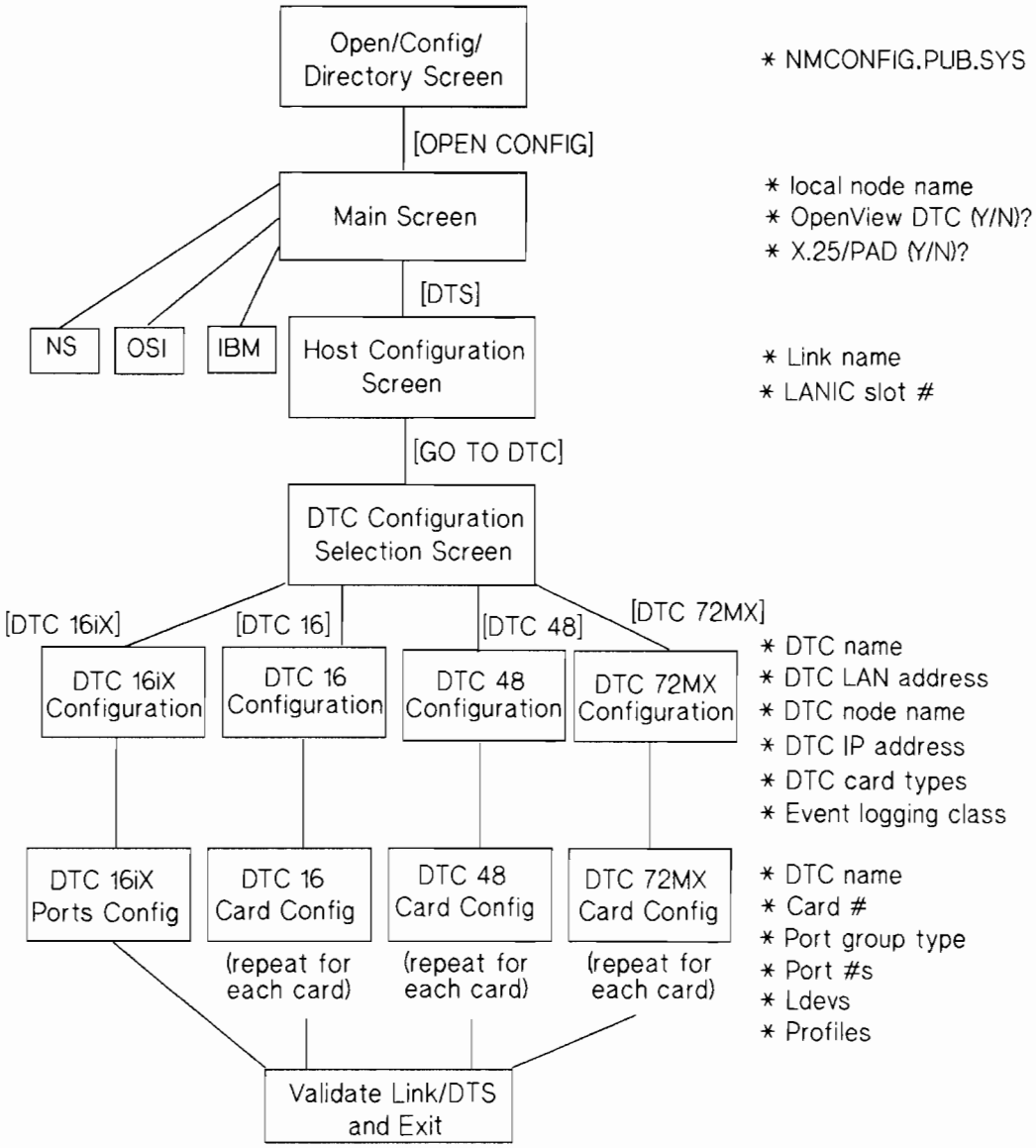


Figure 2-2. NMMGR DTS/DTC Screen Flow

Configuration Worksheets

Before you proceed to NMMGR, it is recommended that you use the worksheets provided here to gather the necessary configuration information. Make copies of these worksheets and fill in the parameter information, then use these worksheets to guide you through configuration in NMMGR.

Figure 2-3 shows which part of the configuration is covered by the worksheets.

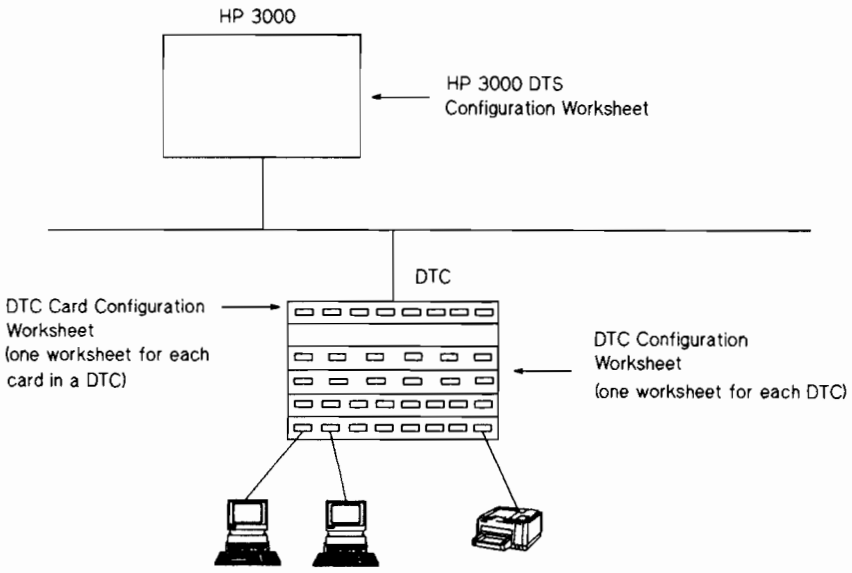


Figure 2-3. Configuration Worksheets

HP 3000 DTS Configuration Worksheet

Local node name *(node.domain.organization)*: _____

Link name (default - DTSLINK): _____

Physical path of LANIC (LANIC slot #): _____

The following fields used in PC-Based Management only

Number of non-nailed terminals: _____

Non-nailed terminal profile name: _____

Number of non-nailed PAD terminals: _____

Non-nailed PAD terminal profile name: _____

NOTE: These are the number of non-nailed terminals and non-nailed PAD terminals that can logon to the computer at one time. Non-nailed devices do not have ldev assigned to them, and use a ldev from a pool of available ldevs for their session. Non-nailed devices are only supported in PC-based management.

Figure 2-4. DTC Configuration

DTC Configuration Worksheet

(Use one worksheet for each DTC)

DTC Type (check one): DTC16iX ☐ DTC16 ☐ DTC48 ☐ DTC72MX ☐

DTC Name: _____

DTC LAN station address: __-__-__-__-__-__

DTC node name *(node.domain.organization)*: _____

DTC IP address: _____

Card Type as Installed in the DTC:

CARD #	TYPE *
0	_____
1	_____
2	_____
3	_____
4	_____
5	_____

Event Logging Class Enabled (Y or N):

1	_____
2	_____
3	_____
4	_____
5	_____
6	_____

NOTE:

DTC Card Type Can Be:

For DTC16 & DTC48: D (for direct), M (for modem), X (for X.25)

For DTC72MX: L (for LAN), A (for Async, direct & modem), X (for X.25)

For DTC16iX: not applicable

Number of Cards:

DTC16: 3 cards (0 - 2)
DTC48: 6 cards (0 - 5)
DTC72MX: 4 cards (0 - 3)

Figure 2-5. DTC Card Configuration

DTC Card Configuration Worksheet

(Use one worksheet for each card in a DTC)
(Use one worksheet for each DTC16ix)

DTC Type (check one): DTC16iX ☐ DTC16 ☐ DTC48 ☐ DTC72MX ☐

DTC Name: _____

Card number: _____

Port #	Ldev	Profile	Direct or modem	NOTE:
0				6 ports for modem connect (DTC16 & DTC48)
1				
2				
3				
4				
5				
6				8 ports for direct connect (DTC 16 & DTC48)
7				
8				
9				16 ports for DTC16iX (for both direct and modem connect)
10				
11				
12				
13				
14				24 ports for DTC72MX (for both direct and modem connect)
15				
16				
17				
18				
19				
20				
21				
22				
23				

3

Configuring Device Connections (for Host-Based Management)

Note If you use OpenView DTC Manager to manage your DTCs, refer to Chapter 4 instead of this chapter.

This chapter provides step-by-step instructions for configuring terminal and printer connections on the HP 3000 Series 900, hereafter referred to as the host. Before configuring, see chapter 2, "Preparing to Configure Systems for Asynchronous Device Connections".

This chapter contains configuration information for host-based management (i.e., when the DTCs are managed by the HP 3000 host). For information on configuring for PC-based management, refer to Chapter 4, "Configuring Device Connectionss (for PC-Based Management)." PC-Based Management means that you use an HP OpenView Workstation (PC) to manage your DTCs.

Note If you are configuring X.25 networking capabilities on a HP 3000 Series 900 computer using host-based network management, use *Configuring and Managing Host-Based X.25 Links* instead of this manual to configure DTCs and DTC connections.

Network Configuration Overview

Information required for network configuration on the host is contained in one file. The name of this configuration file is `NMCONFIG.PUB.SYS`.

When building a new configuration file, it is not necessary to define every field. This is because a sample configuration file is

supplied with the MPE/iX operating system. The sample configuration file is called NMSAMP1.PUB.SYS. Hewlett-Packard recommends using the sample file as a template for initial configuration.

Caution

Use the sample configuration file for **first** time configurations only. Information previously configured using NMMGR, and stored in NMCONFIG.PUB.SYS, will be overwritten when the sample file is copied to NMCONFIG.PUB.SYS.

The NMCONFIG.PUB.SYS file can be modified using NMMGR. Only one configuration file can be active at a time and the active file must be called NMCONFIG.PUB.SYS. Accordingly, modified or new configuration files must be copied to NMCONFIG.PUB.SYS before they can be used by the system.

Copy the Sample File

Use NMSAMP1.PUB.SYS as a template for first time configuration. This file is supplied with the MPE/iX operating system. Do not modify NMSAMP1.PUB.SYS. Instead, copy the sample configuration file into NMCONFIG.PUB.SYS and then modify the file as necessary.

To copy NMSAMP1.PUB.SYS into NMCONFIG.PUB.SYS, enter these commands at the MPE/iX prompt (:):

```
HELLO MANAGER.SYS,PUB
FILE CONFIG=NMCONFIG.PUB.SYS;DEV=1
FCOPY FROM=NMSAMP1.PUB.SYS;TO=*CONFIG;NEW
```

Note

"DEV=1" must be specified in the FILE equation to specify that the NMCONFIG.PUB.SYS file is to be stored to system disk 1.

Modify the Network Management Configuration File

The network management configuration file (NMCONFIG.PUB.SYS) contains information that is referenced during system boot-up. A step-by-step procedure for creating or updating the host's network management configuration file follows.

Note

Before modifying the NMCONFIG.PUB.SYS file, make a backup copy of it. If the modifications made to the configuration file are successful, purge the backup copy.

Step 1: Begin the Configuration Process

Run the NMMGR program. Node manager (NM) and network administrator (NA) capabilities are required to run this program. To run NMMGR, enter the following command at the MPE prompt and then press the **[Return]** key.

```
NMMGR.PUB.SYS
```

Note

You must be logged on to the SYS account to run NMMGR.

Step 2: Open the Network Management Configuration File

The Open Configuration/Directory File screen is displayed (see figure 3-1). This screen lets you specify the configuration and backup file names.

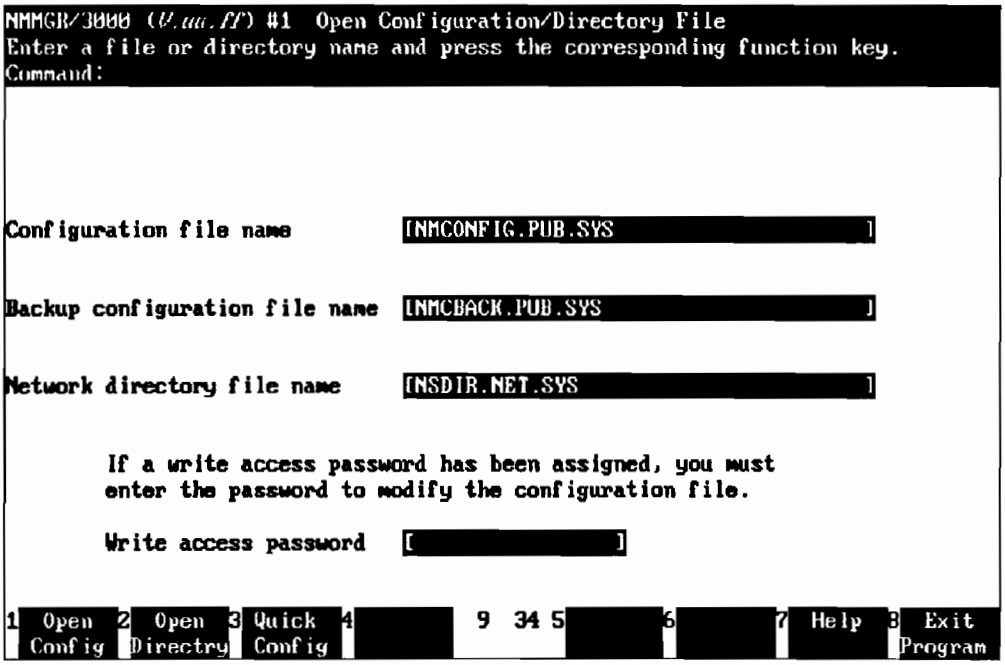


Figure 3-1. The Open Configuration/Directory Screen

Follow the steps listed here to enter data for this screen. Refer to "Fields" subsection on the next page for detailed information about each field on the screen.

1. NMCONFIG.PUB.SYS is the name required by the software. Verify that this name is displayed in the `Configuration file name` field.
2. Verify that the name of the correct backup configuration file is in the `Configuration file name` field. The default is NMCBACK.*group.account*.
3. Press the **[Open Config]** function key.
4. If the configuration file you are opening does not exist, the following message will appear on the message line at the top of the screen:

```
Config file does not exist; press Open Config again to
create it.
```

Press the **[Open Config]** key again to confirm the creation of the file you specified.

Note that the **[Quick Config]** key is only used to change port configuration for existing ports. Do not use it for first time configuration.

Fields

`Configuration file name`

The only valid configuration file name the system recognizes for use by the network subsystem is `NMCONFIG.PUB.SYS`.

You can create or modify a configuration file using a different name and save it as an **offline configuration file**. You can use offline configuration files as a means of creating and storing configurations that you want to use in the future. When you are ready to use an offline configuration file, rename it as `NMCONFIG.PUB.SYS`, validate it within NMMGR, cross-validate it with SYSGEN, and reboot the system.

`Backup configuration file name`

A backup file name must be specified whenever a configuration file is opened or created. The default backup configuration file name is `NMCBACK.PUB.SYS`. The backup file will be automatically updated with the contents of the configuration file each time the configuration file is successfully validated.

`Network directory file name`

The Network directory file must be configured for each new X.25 node (unless you will only be accessing the node using direct level 3 access). This field is only used for X.25 network management. The network directory contains information that one X.25 node needs in order to communicate with other X.25 nodes. The only network directory file name supported by HP is `NSDIR.NET.SYS`.

`Password`

The password is an optional feature. If a password has been assigned, you must enter it in the password field to update the configuration file. It is possible to open the file without using an assigned password, but the file will be in read only mode and NMMGR will not accept any changes.

If a password has not been assigned, you should ignore the password field. If you want to assign a password for the system you are configuring, refer to *Using the Node Management Service* (32022-61005).

Step 3: Configure the Local Node Name

The Main screen is displayed after you press the **[Open Config]** key (see figure 3-2). This screen lets you specify the HP 3000 host's name. It also asks whether you are using the HP 3000 host or an OpenView Windows Workstation (PC) for DTC management, and if you are using X.25 or PAD.

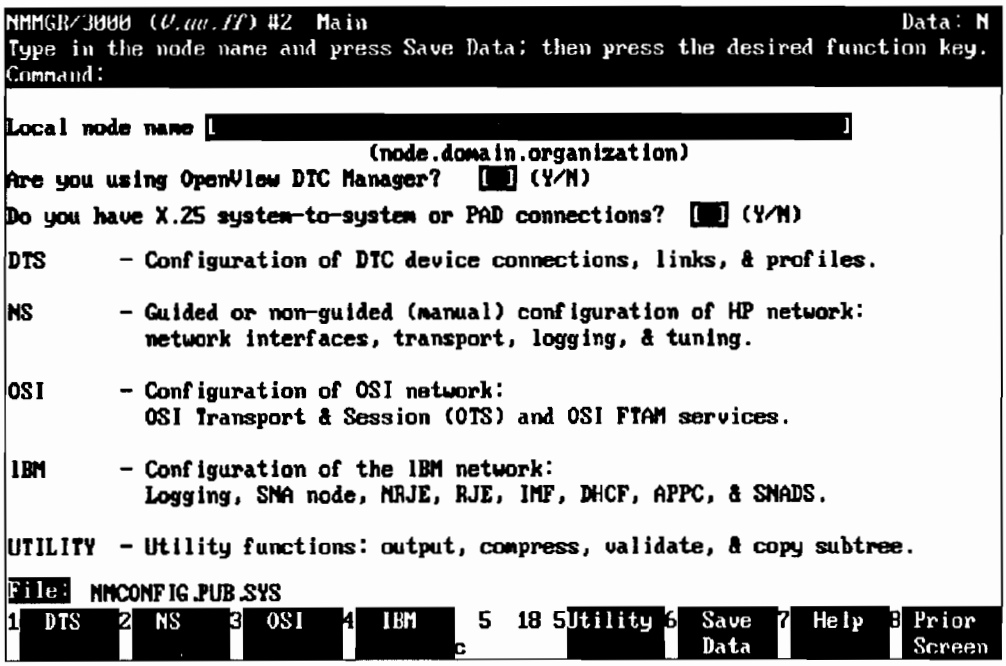


Figure 3-2. The Main Screen

1. Assign a node name to the HP 3000 host in the "local node name" field. Use the format *nodename.domain.organization*.

   If your HP 3000 host is the only computer in your network, you may enter any node name. If you have several computers on your network, you must make sure the node names for each host are unique. Refer to Chapter 2 for more information on node name.

2. In the field after the question, "Are you using the OpenView DTC Manager?", enter an N.

   This means that you will **not** use the OpenView DTC Manager (i.e., use a PC to manage your DTCs). Instead, you will use the HP 3000 host to manage your DTCs.

If you specify "Y" for using OpenView DTC Manager refer to Chapter 4, "Configuring Device Connections (for PC-Based Management)."

3. In the field after the question, "Do you have X.25 system-to-system or PAD connections?", enter an N for no.

   If you have X.25, refer to the *Configuring and Managing Host-Based X.25 Links* manual.

4. After you enter the information on the screen, press the **[Save Data]** function key to save your entries.

5. After the data is saved (the Data flag in the upper right-hand corner is Y), press the **[DTS]** function key.

Step 4: Configure the Link

The Host Configuration screen is displayed when you press the **[DTS]** function key at the Main screen (see figure 3-3).

This screen is used to configure the Datacommunications and Terminal Subsystem (DTS) on the HP 3000. DTS defines the interaction between the system and any asynchronous devices, such as terminals and printers.

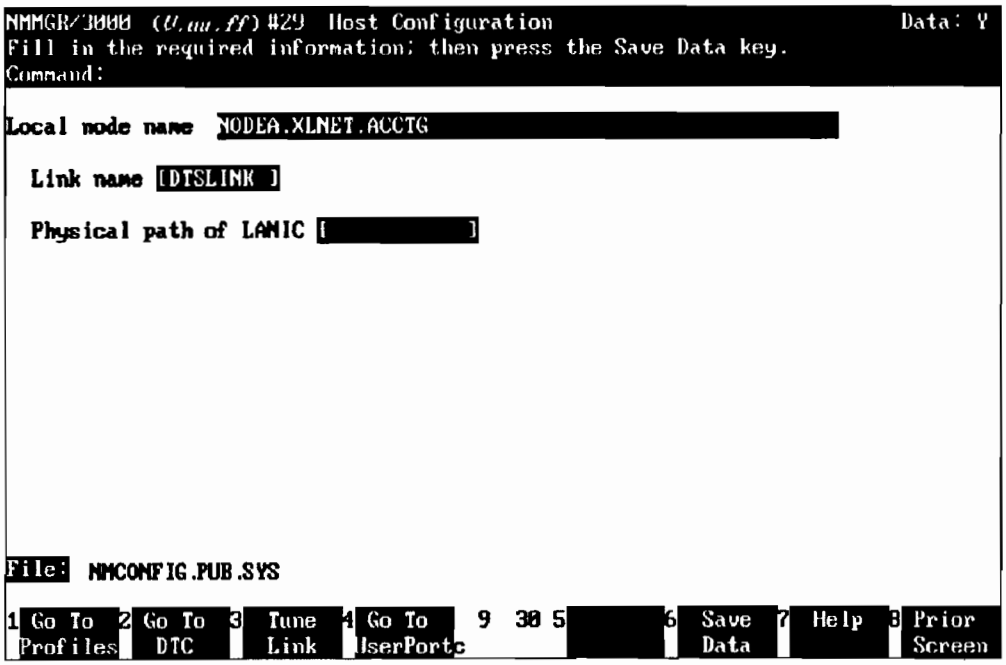


Figure 3-3. Host Configuration Screen (Host-based)

1. "Local node name" is a display-only field. Verify that it is correct.
2. The "Link name" field displays DTSLINK. This is used by the HP 3000 DTS subsystem. Use this default.
3. In the "Physical path of LANIC " field, type the slot number for the LANIC card in the host.

   See the list on the next page for commonly used slot numbers.
4. Press the **[Save Data]** function key.

   Press the **[Go to DTC]** function key to proceed to Step 5: Select DTC Type.

Note

The **[Go To UserPort]** key is used to configure the user port (default ldev 21) on the NIO console. Pressing this key takes you to the HP Support Modem Port Screen for configuring the ldev, the line speed, modem type, and parity of the user port. The configuration of user port is only supported for NIO LAN console card only (e.g., HP 3000 Series 9X7 and 9X7 LX). Refer to "How Operation Modes Set Functionality" in Appendix C for more information on the user port.

Fields

`Physical path of LANIC`

This is the location of the DTS LANIC in the system's backplane.

The default physical path (slot numbers) for HP 3000 computers are listed below. These defaults optimize performance and use of the computer's cabinet space. Before moving the LANIC into another slot, consult an HP representative.

HP 3000 Systems	Slot Number
920, 922, 925, 932, 935, or 949 with HPIB	4.3
920, 925, 935, or 949 with ALINK	4.2
9X7, 9X7 LX	56
930	8.4
950, 955, 960, 980	2/4.2

Step 5: Select DTC Type

The DTC Configuration Selection Screen (see Figure 3-4) is displayed when you press the **[Go To DTC]** key at the Host Configuration Screen. Here you specify the type of DTC to configure.

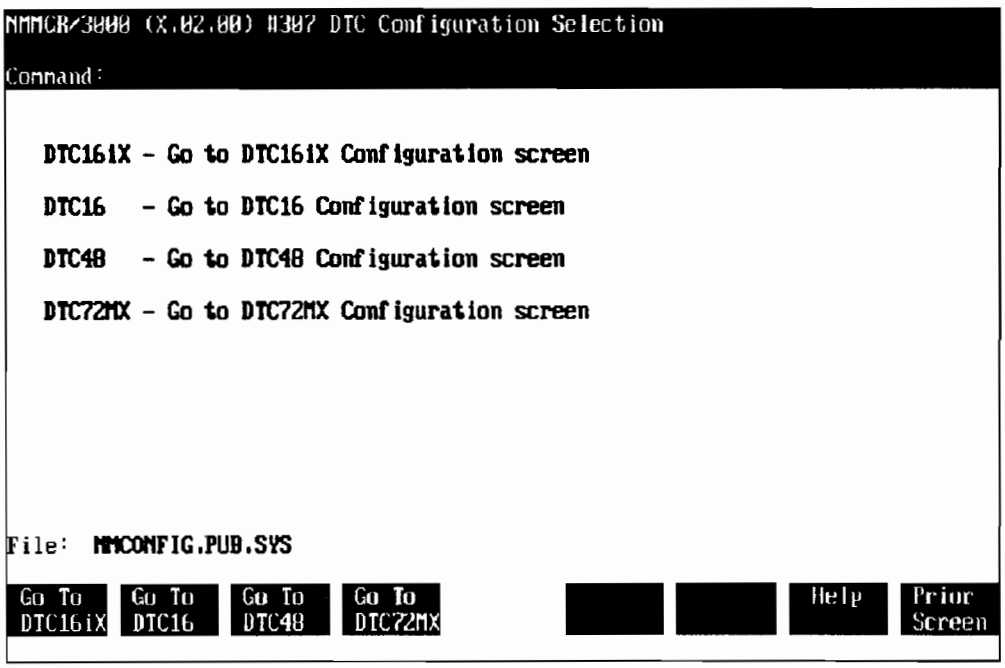


Figure 3-4. DTC Configuration Selection Screen

1. Select the DTC type by pressing one of the function keys: **[DTC16iX]**, **[DTC16]**, **[DTC48]**, or **[DTC72MX]**

   NMMGR will take you to the configuration screen for the specified DTC type.

Step 6: Specify DTC Configuration

The DTC Configuration screen is displayed after you select the DTC type at the DTC Configuration Selection screen. Figure 3-5 shows the DTC Configuration screen for a DTC 72MX. (DTC Configuration screens for DTC 16iX, DTC 16, and DTC 48 vary slightly).

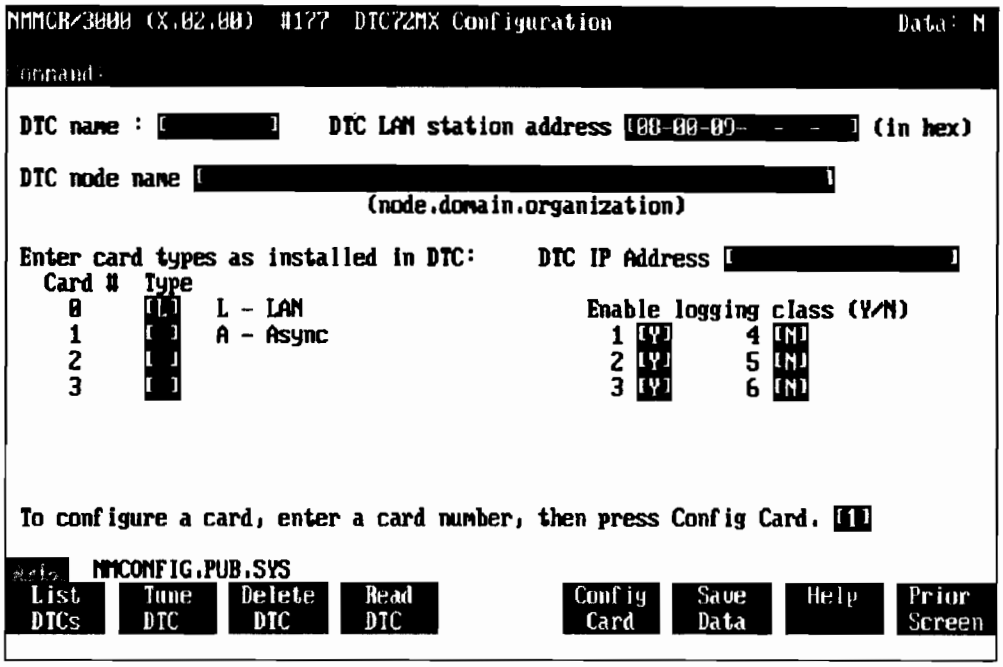


Figure 3-5. DTC Configuration Screen

1. Enter the DTC's name in the "DTC name" field.

   The DTC name can be up to eight alphanumeric characters, beginning with a letter. *The DTC name must be unique on the network.*

2. Enter the DTC's LAN address in the "DTC LAN station address" field.

   The LAN address can be found on a label inside the front cover or on the back panel of the actual DTC box.

3. Type in the DTC's node name in the "DTC node name" field.

   Use the format *nodename.domain.organization*, where *nodename* identifies the DTC. If there is more than one DTC on the network, the *nodename* of each DTC must be unique.

The following are examples of valid DTC node names on the same network:

```
ALPHA.ACCTG.TEKLAB
BETA.ACCTG.TEKLAB
```

Note that "DTC name" and "DTC node name" are two different fields. However, it is acceptable (and common) to use the *nodename* part of the "DTC node name" as the "DTC name", such as:

```
DTC name = ALPHA
DTC node name = ALPHA.ACCTG.TEKLAB
```

4. (Optional) Enter an IP address for the DTC, if you want this DTC to be able to respond to PING/iX requests. Otherwise, leave the "DTC IP Address" field blank.

   Refer to Chapter 2 for more information on IP addresses.

5. Verify that the cursor is in the "Type" field under "Enter card types as installed in the DTC." Enter the card type for each card in the DTC The valid card types are listed on the screen.

   Note that DTC 16iX does not have cards since its port connectors are built directly onto the DTC backplane.

   Refer to Chapter 2 for more information on card types for each DTC.

6. Enable the event logging classes that you want. It is recommended that you enable classes 1 through 3 and disable classes 4 through 6. See "DTC Event Logging" in Chapter 2 for information on these event logging classes.

7. Press the **[Save Data]** function key.

8. To configure a card in the DTC, enter the number of the card you want to configure in the "To configure a card, enter a card number ..." field at the bottom of the screen.

   Press the **[Config Card]** function key. Proceed to Step 7: Configure DTC Cards.

   To configure the ports on a DTC 16iX, simply press the

[Config Ports] function key. Proceed to Step 7: Configure DTC Cards.

9. If all the cards in the DTC have been configured, select a new DTC to configure by entering the DTC's name in the DTC name field and press the **[Read DTC]** function key. Repeat the above steps for every DTC to be managed by the HP 3000 host.

Note

You may use the **[Tune DTC]** key on the DTC Configuration Screen to change the AFCP and Management timers for the DTC, if needed. Refer to Appendix A for steps to do this.

Step 7: Configure DTC Cards

When you press the **[Config Card]** key at the DTC Configuration screen, NMMGR will display the corresponding card configuration screen for the specified card in the DTC. Figure 3-6 shows an example of a Card Configuration screen for DTC 72MX for asynchronous connect card. (Screens vary slightly for DTC 16iX, DTC 16, and DTC 48).

The corresponding screen for a DTC 16iX is called a Port Configuration Screen since DTC 16iX have port connectors built directly onto the backplane and does not have connector cards.

Use this screen to configure the ports in the specified card. On this screen, logical device (ldev) numbers and profile names are associated with individual ports on the card.

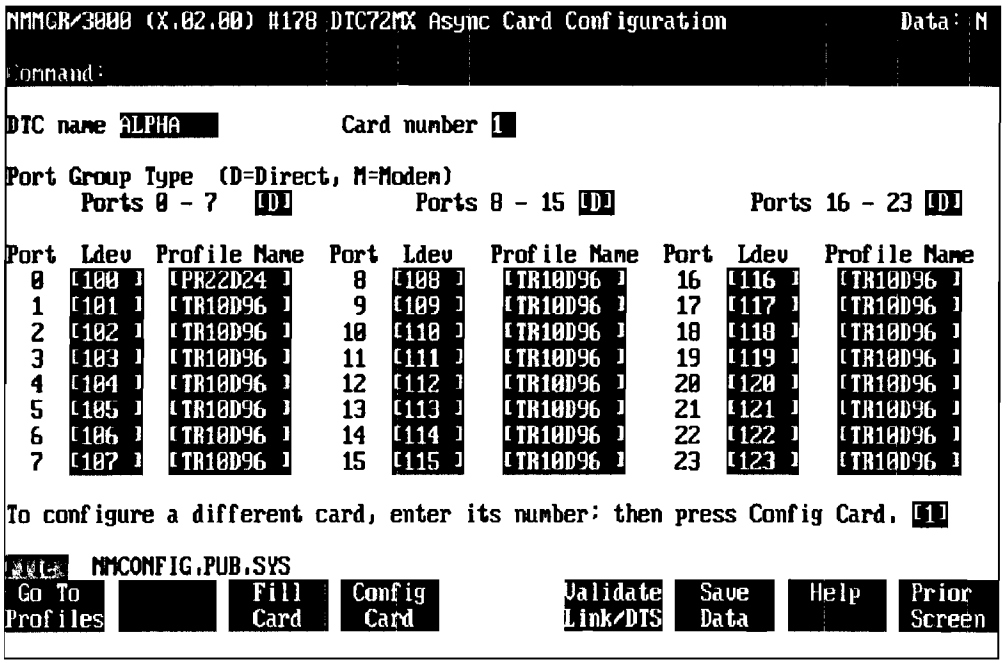


Figure 3-6. DTC Card Configuration Screen

1. Verify that the DTC name and card number displayed are correct.
2. Enter the port group type. The valid types are D for direct connect and M for modem connect. (For DTC 72MX and DTC 16iX only.)
3. Press the **[Tab]** key to move the cursor to the first port on the card. Enter an ldev number for this port in the "Ldev" field.

Ldev numbers used for each port on the DTC must be unique.

For example, you can use ldev number 100 for port 0 of the first card, and increment the ldev number by 1 for each consecutive port.

So a DTC 72MX with 3 asynchronous cards (a total of 72 ports) would be assigned ldev numbers 100 through 123 for the 24 ports on the first card, 124 through 147 for the ports on the second card and 148 through 171 for the ports on the third card.

For the second DTC, you would start with an ldev number greater than 171.

4. Enter the profile name for each port in the "`Profile Name`" field.

   A profile for the port defines the characteristics of the device to be connected to that port.

   For direct terminals ports, the suggested profile to use is `TR10D96`. For direct printer ports, the suggested profile to use is `PR18D96` (or `PR22D24` for HP printers with status checking).

   Tables 5-1 through 5-4 in Chapter 5 list terminal and printer profiles supplied by the system. You may also create your own profiles. Refer to Chapter 5, "Terminal and Printer Profiles," for more information on profiles.

5. Repeat above two steps for every port in this card.

Note

To reduce typing ldev numbers and profiles on the screen, you can use the **[Fill Card]** key to automatically assign ldev numbers and profile names. First, enter an ldev number and profile name for port 0, then press **[Fill Card]**; the system will automatically assign incremental ldev numbers to each subsequent port on the screen and copy the specified profile for each port.

The **[Clear Display]** key on your keyboard will clear the part of your screen that is below the cursor position. You may use this key and the **[Fill Card]** key to quickly modify a screen.

6. Press the **[Save Data]** function key to save the data on the screen.

Caution

Before you exit this screen, make sure you press **[Save Data]** if you want to keep the data on the screen; otherwise your screen input will be lost. This occurs even if you temporarily exit the screen to read **[Help]** information.

7. To configure another card in the DTC, use the cursor keys to move to the field at the bottom of the screen: "`To configure a different card, enter its number,...`". Enter the card number of the card you want to configure.

8. Press the **[Config Card]** function key. The corresponding screen for the card number entered in the last step will be displayed.

9. If all the cards have been configured, press the **[Prior Screen]** function key to return to the DTC Configuration Selection screen to select another DTC to configure. Otherwise, if every DTC has been configured, press the **[Validate Link/DTS]** function key to validate the configuration file.

Note

At any one time, up to 1700 ldev numbers can be configured per system. The largest valid ldev number to use is 2175

Step 8: Validate the Configuration File

The network management configuration file must be validated inside NMMGR before it can be processed by SYSGEN.

1. To validate the configuration file, press the **[Validate Link/DTS]** key at the Card Configuration Screen, or type `validate` at the command line on top of any NMMGR screen and press **[Enter]**. (Note that the **[Enter]** key is not the carriage return key.)

   The DTS validation procedure starts by displaying the following on the system console:

   ```
   ->Validation of DTS/LINK started. <-

   NOTE: After successful validation, run SYSGEN to
   cross-validate the DTS configuration with the
   System configuration

   NOTE: In order for any TIO changes to take effect,
   you must reboot the system.

   -> Validation of DTS/LINK finished. <-
   ```

   If errors were encountered in the configuration file, the validation procedure will print out the total number of errors found.

2. After successful validation, exit NMMGR.

   You can exit by pressing **[Prior Screen]** until you exit, or type `exit` at the command line on top of any NMMGR screen and press **[Enter]**.

Step 9: Cross-Validate with SYSGEN

Cross validation ensures that conflicts do not exist between the network configuration file (NMCONFIG.PUB.SYS) and the system configuration file that was generated through the SYSGEN utility. After the configuration file created using NMMGR is validated, it must be cross-validated with the file created with SYSGEN.

To cross-validate the network management file and the system configuration file, enter these commands at the MPE/iX prompt (:):

```
:          sysgen
sysgen>     io
io>        hold
io>        exit
sysgen>    keep
Keeping to GROUP.CONFIG.SYS
Purge old configuration (yes/no)? yes
sysgen>    exit
```

Refer to the MPE/iX manual, *System Startup, Configuration, and Shutdown Reference Manual* (32650-90042), for information on SYSGEN.

Step 10: Reboot the Host and the DTC

The MPE/iX system and the DTC must be rebooted after initial configuration and after the network management configuration file has been modified.

To reboot the MPE/iX system, enter these commands at the MPE/iX prompt (:):

```
:    [CTRL]-A
=    SHUTDOWN
=    [CTRL]-B
=    RS
```

Answer YES to the question: `Restart the system?`.

After displaying shutdown messages, the system will display the ISL prompt. Type the following command to start the system:

ISL> START NORECOVERY

Note

[CTRL]-A means press the [CTRL] key and hit the A key simultaneously.

Shutdown normally takes several minutes.

To reboot the DTC, turn off the power and then turn on the power again for the DTC. You should reboot the DTC *after* rebooting the MPE/iX system.

4

Configuring Device Connections (for PC-Based Management)

This chapter describes NMMGR configuration that you need to perform for PC-based management (i.e., when the DTCs are managed by an OpenView Windows Workstation). For information on configuring for host-based management, refer to Chapter 3.

Note

If you are configuring X.25 networking capabilities on a HP 3000 Series 900 computer using host-based network management, use *Configuring and Managing Host-Based X.25 Links* instead of this manual to configure DTCs and DTC connections.

If you have PC-based management for your DTCs, most of the configuration is done on the OpenView DTC Manager.

However, you still need to use NMMGR to configure the following information:

- DTS information on the HP 3000, such as: the HP 3000's node name, the link name, and the physical path of the LANIC (the slot number where the LAN Interface Card resides on the HP 3000).
- The maximum number of non-nailed terminals and PAD terminals that can log onto the HP 3000 system at one time.

Note

If you want the current HP 3000 system to be able to accept DTC connections through a Telnet Express Server (HP 2344A), i.e., connections from terminals on systems running ARPA, you must configure the profile for the non-nailed terminals to be a modem profile.

- DTC information. For each DTC with **nailed** ports that will communicate with the HP 3000, you need to configure DTC information in NMMGR; such as: DTC name, DTC node name, and types of cards in the DTC.
- Port configuration for each **nailed** device, such as printers, and terminals that will be accessed programmatically.

Note

The following parameters configured with OpenView DTC Manager and NMMGR must match:

- The HP 3000's node name.
- The DTC's node name.
- The DTC's card type and configuration.
- The PAD device name and the PAD device type, if one is used.

Configuring with NMMGR

The steps for configuring PC-based management is very similar to that for host-based management, as described in detail in Chapter 3. For more information on the steps and fields listed in this chapter, refer to the corresponding section in Chapter 3.

Copy the Sample File

Network information is stored in a configuration file called NMCONFIG.PUB.SYS. If you do not already have a NMCONFIG.PUB.SYS file, create a copy of NMCONFIG.PUB.SYS from the sample configuration file supplied on the HP 3000, NMSAMP1.PUB.SYS.

Modify the Network Management Configuration File

Use NMMGR to enter asynchronous device connection information into NMCONFIG.PUB.SYS. The procedure for updating the configuration file follows.

Step 1. Begin the Configuration Process

To run NMMGR, enter the following command at the MPE/iX prompt and then press the **[Return]** key.

```
NMMGR.PUB.SYS
```

Note

You must be logged on to the SYS account to run NMMGR.

Step 2: Open the Network Management Configuration File

After you invoke NMMGR, the Open Configuration/Directory File screen is shown, allowing you to specify the configuration file name. (See Figure 4-1.)

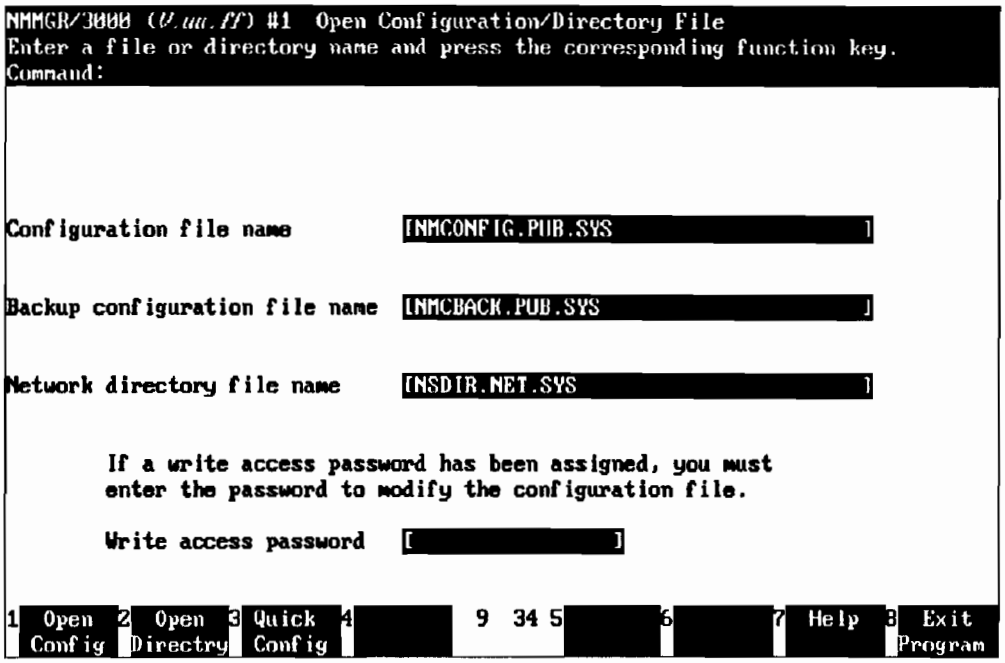


Figure 4-1. The Open Configuration/Directory Screen

1. Use the default configuration file name, NMCONFIG.PUB.SYS.
2. Enter a backup configuration file name. The default is NMCBACK.PUB.SYS.
3. Use the default network directory file NSDIR.NET.SYS for X.25 network management, if you have X.25 connection.
4. The Password field is optional. Refer to the *Using the Node Management Service* (32022-61005) manual if you want to set a password.
5. Press the **[Open Config]** key.

Note that the **[Quick Config]** key is only used to change port configuration of existing ports. Do not use it for first time configuration.

Step 3: Configure the Local Node Name

The Main screen is displayed (see Figure 4-2). This screen lets you specify the HP 3000's node name. It also asks whether you are using the HP 3000 or an OpenView Windows Workstation to manage the DTCs, and if you are using X.25 or PAD.

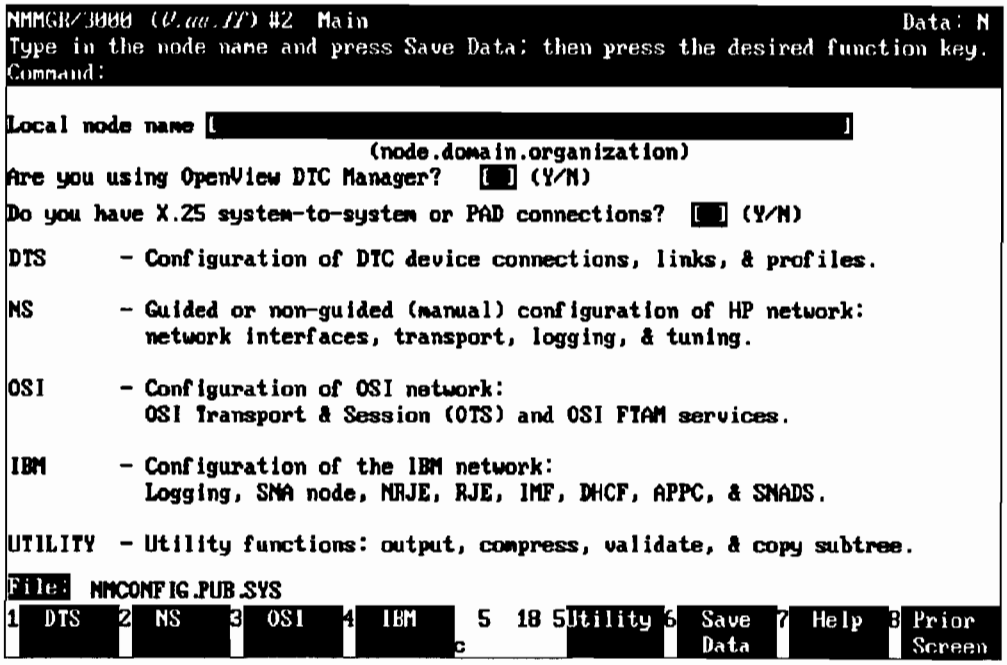


Figure 4-2. The Main Screen

1. Assign a node name to the HP 3000. Make sure this node name is the same as the one you specified for this computer in the OpenView DTC Manager.
2. Enter Y to the question, "Are you using the OpenView DTC Manager?."
3. If you have PAD or X.25, enter Y to the question, "Do you have X.25 system-to-system or PAD connections?."
4. Press the **[Save Data]** key.
5. Press the **[DTS]** key.

Step 4: Configure the Link

The Host Configuration screen is displayed when you press the **[DTS]** key at the Main screen (see Figure 4-3.).

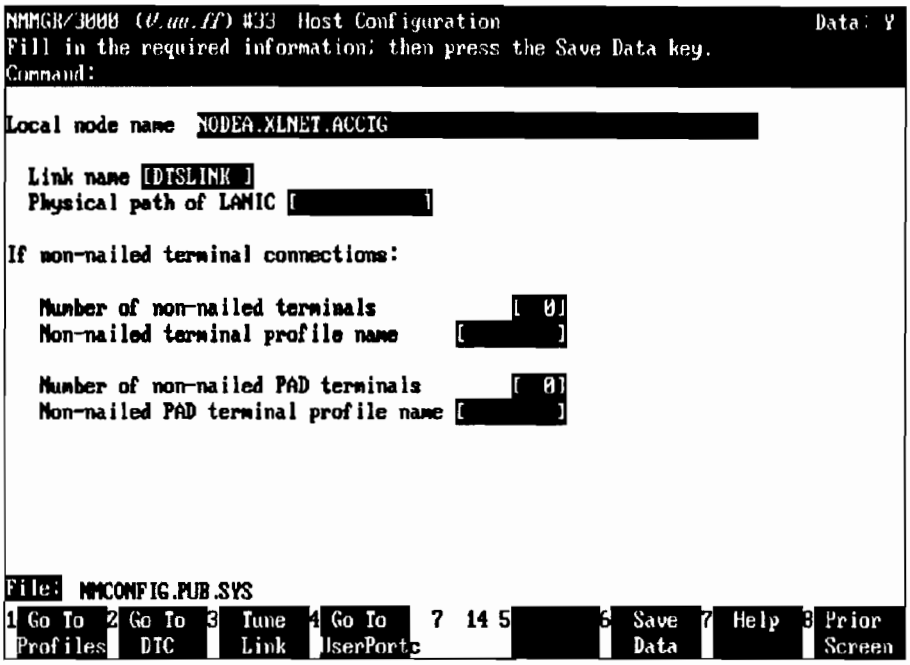


Figure 4-3. The Host Configuration Screen (PC-Based)

1. "Local node name" is a display-only field. Verify that it is correct.
2. Use the default link name, DTSLINK.
3. Enter the slot number of the LANIC in the "Physical path of LANIC" field. See Chapter 2 for a list of suggested slot numbers to use.
4. Enter the maximum number of non-nailed terminals allowed on the HP 3000 and the profile to use for these terminals.

   Currently, the maximum number of non-nailed terminals allowed on an HP 3000 system is 1700

Note

If you want the HP 3000 system to be able to accept connections from terminals on ARPA systems via a Telnet Express Server, you must use a modem profile for the non-nailed terminals, such as `TR10U24`. Note that you may use direct connect devices on a port with a modem profile.

See Table 5-1, Terminal Profiles, for a list of available profiles. You may also create your own profile. For more information on profiles, refer to Chapter 5, "Terminal and Printer Profiles."

5. Enter the maximum number of non-nailed PAD terminals allowed on the HP 3000 and the profile to use for these PAD terminals.

   Currently, the maximum number of non-nailed PAD terminals allowed on an HP 3000 is 1700.

6. Press the **[Save Data]** key.

This concludes NMMGR configuration for PC-based management for this HP 3000 computer if this computer will not be accessing any nailed devices.

If the HP 3000 computer needs to access nailed ports in one or more DTCs, press the **[Go To DTC]** key and proceed to Step 5 to configure the nailed ports. Note that printers are nailed devices, so you need to configure any DTC that has printer ports.

Step 5: Select DTC Type

The DTC Configuration Selection screen (see Figure 4-4) is displayed when you press the **[Go To DTC]** key at the Host Configuration screen. Here you specify the type of DTC to configure. You only need to configure DTCs with **nailed** ports that will be accessed by this HP 3000 computer.

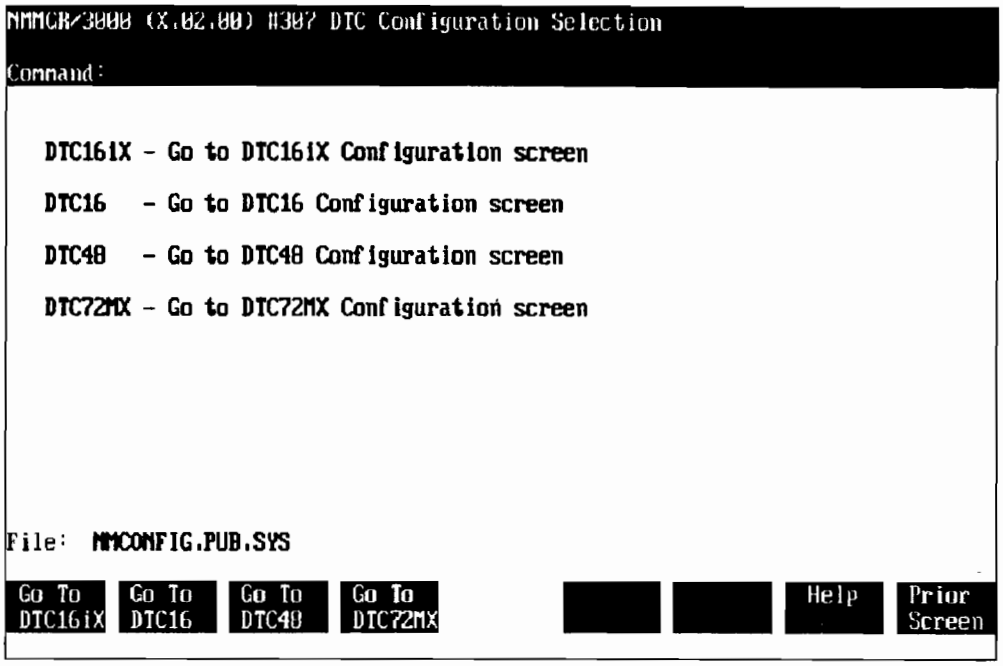


Figure 4-4. The DTC Configuration Selection Screen

1. Select the DTC type by pressing one of these function keys: **[DTC16iX]**, **[DTC16]**, **[DTC48]**, or **[DTC72MX]**.

NMMGR will take you to the corresponding configuration screen for the specified DTC type.

Note

DTC 16iX is currently not supported for PC-based management systems.

Step 6: Specify DTC Configuration

The DTC Configuration screen is displayed after you select the DTC type. Figure 4-5 shows a DTC Configuration screen for a DTC 48. (DTC 72MX screens vary slightly.)

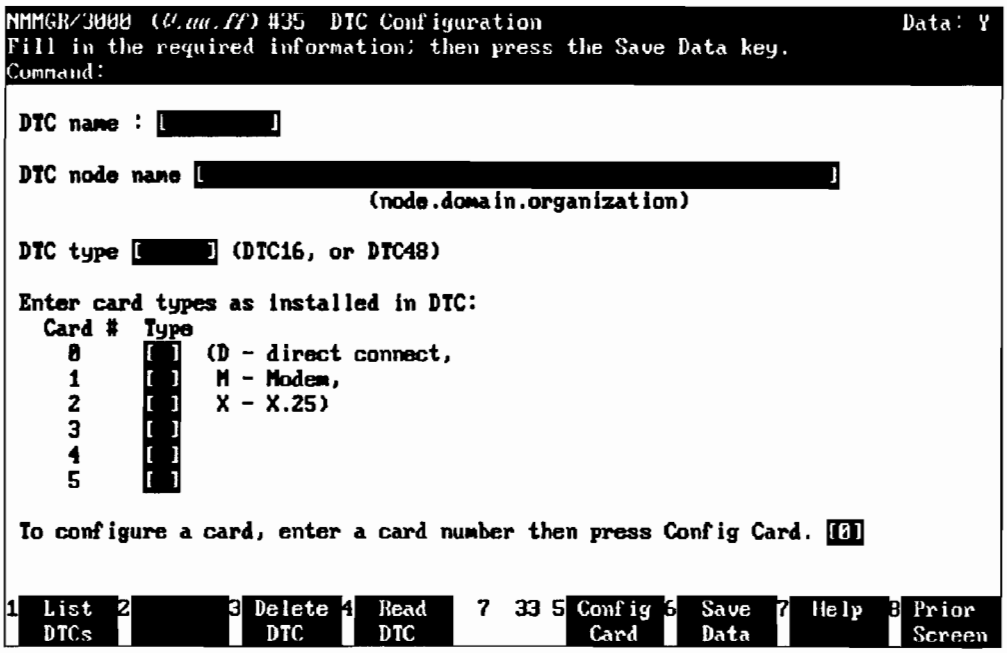


Figure 4-5. The DTC Configuration Screen

1. Enter the DTC name in the "DTC name" field.
2. Enter the DTC's node name in the "DTC node name" field.
3. Enter the card type for each card in the DTC **with nailed devices**. (Printers and any terminal that will be accessed programmatically are nailed devices.)
4. Press the **[Save Data]** function key.
5. To configure a card in the DTC, enter the card number in the "To configure a card, enter a card number ..." field.

   You only need to configure a card if the card contains nailed devices. Press the **[Config Card]** function key. Proceed to Step 7: Configure DTC Cards.
6. If all the cards with nailed ports in the DTC have been configured, select a new DTC to configure by entering the DTC's name in the "DTC name" field and press the **[Read**

DTC] function key. Repeat the above step for each DTC with nailed devices that will be accessed by this HP 3000 computer.

Note

You may use the **[Tune DTC]** key on the DTC Configuration Screen to change the AFCP and Management timers for the DTC, if needed. Refer to Appendix A for steps to do this.

Step 7: Configure DTC Cards

When you press the **[Config Card]** key at the DTC Configuration screen, NMMGR will display the corresponding card configuration screen for the specified card in the DTC. Figure 4-6 shows an example of a Card Configuration screen for DTC 48. (Screens for DTC 72MX vary slightly.)

Note

You only need to configure **nailed** ports (such as printer ports) in the DTC. If you do not have nailed ports on a card, you can skip this step.

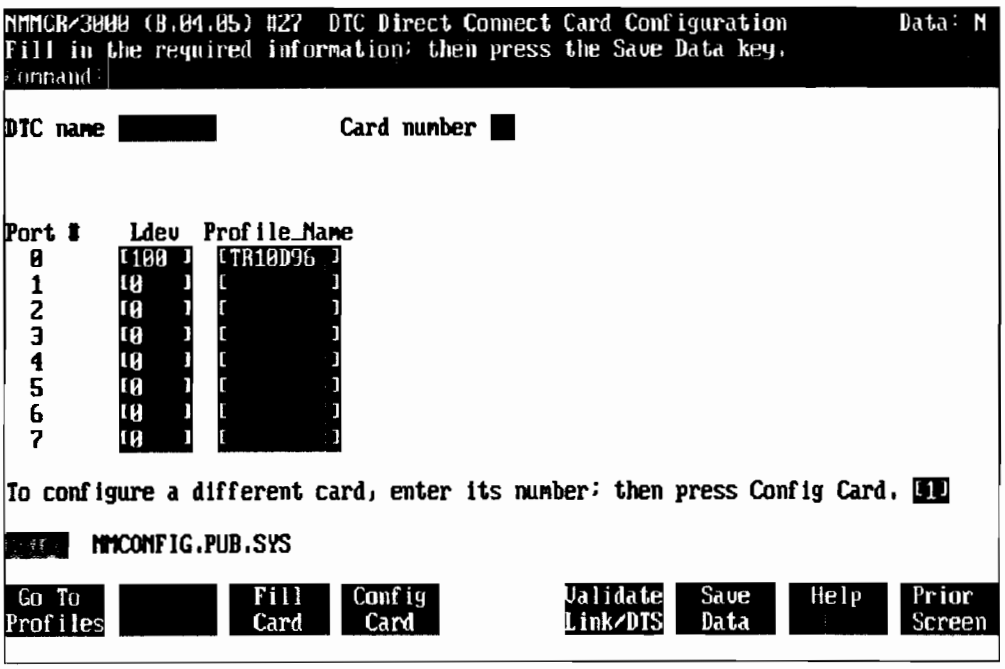


Figure 4-6. The DTC Card Configuration Screen

1. Verify that the "DTC name" and "Card number" displayed are correct.

2. Use the **[Tab]** to move the cursor to the first **nailed** port on the card. Enter the ldev number and profile for each nailed device.

   Ldev numbers used for each port on the DTCs must be unique. Up to 1700 devices may be configured on an HP 3000 Series 900. The largest valid ldev number is 2175.

A profile for the port defines the characteristics of the device to be connected to that port. For direct terminal ports, the suggested profile to use is TR10D96. For direct printer ports, the suggested profile to use is PR18D96 (or PR22D24 for HP printers with status checking). Refer to Chapter 5 for more information on profiles.

3. Press the **[Save Data]** key.

4. Enter the card number of a different card that needs to be configured in the "To configure a different card, enter a card number, ..." field on the screen.

5. Press the **[Config Card]** function key. The corresponding screen for the card number entered in the last step will be displayed.

6. If all the cards with nailed ports have been configured, press the **[Prior Screen]** key to return to the DTC Configuration Selection screen to select another DTC with nailed ports to configure. Otherwise, if every DTC has been configured, press the **[Validate Link/DTS]** key to validate the configuration file.

Step 8: Validate the Configuration File

The network management configuration file must be validated inside NMMGR before it can be processed by SYSGEN. Validation is started when you press the **[Validate Link/DTS]** key or type in `validate` at the command line on top of any NMMGR screen and press **[Enter]**.

After successful validation, exit NMMGR by pressing the **[Prior Screen]** key until you exit the screens, or type `exit` at the command line and press **[Enter]**. (Note **[Enter]** is not the carriage return key.)

Step 9: Cross-validate With SYSGEN

Cross validation with SYSGEN ensures that conflicts do not exist between the network configuration file and the system configuration file. The SYSGEN dialog is initiated by entering SYSGEN at the MPE/iX prompt.

To cross-validate the network management file and the system configuration file, enter these commands at the MPE/IX prompt:

```
:          sysgen
sysgen>     io
io>        hold
io>        exit
sysgen>    keep
Keeping to GROUP.CONFIG.SYS
Purge old configuration (yes/no)? yes
sysgen>    exit
```

Refer to the MPE/iX manual, *System Startup, Configuration, and Shutdown Reference Manual* (32650-90042), for information on SYSGEN.

Step 10: Reboot the Host

The MPE/iX system must be rebooted after initial configuration and anytime the network management configuration file (NMCONFIG.PUB.SYS) has been modified.

To reboot the MPE/iX system, enter these commands at the MPE/iX prompt (:):

```
:    [CTRL]-A
=    SHUTDOWN
=    [CTRL]-B
=    RS
```

Answer YES to the question: `Restart the system?`.

After displaying shutdown messages, the system will display the ISL prompt. Type the following command to start the system:

ISL> START NORECOVERY

Note

[CTRL]-A means press the [CTRL] key and hit the A key simultaneously.

Shutdown normally takes several minutes.

5

Terminal and Printer Profiles

This chapter describes what are terminal and printer profiles and how to create and modify your own profiles. The process is similar for both host-based and PC-based management. Differences between host-based and PC-based management will be noted.

What is a Profile

A profile is a grouping of device connection specifications and characteristics that can be associated to devices. Profiles can be associated to terminals, printers, and PAD terminals and printers.

The sample configuration file on the HP 3000 Series 900 supplies several terminal and printer profiles for use. You may also create your own profiles.

At the end of this chapter, Tables 5-1 and 5-2 list terminal and printer profiles supplied by the HP 3000 Series 900, respectively.

Profile Name

Each profile is identified by a profile name. The name can be up to eight characters long and must start with a letter followed by letters and numbers. At any one time, up to 256 profiles can be configured per system.

The profiles supplied by the HP 3000 configuration file follow a naming convention. For example, TR10D96 denotes a terminal profile (TR) of terminal type 10 (10), for direct connect (D), with line speed of 9600 bps (96). Printer profiles starts with PR, such as PR18D96.

Terminal Profiles

Terminal profiles define terminal characteristics for terminals and PCs running in terminal emulation mode.

A terminal profile defines the following terminal characteristics:

- The terminal type file used (10, 18, 24).

  A terminal type file is a collection of characteristics that cause a terminal to act or react in a specific way. For more information, see `Terminal type file` under "Terminal Profile Screen," later in this chapter.

- The record width in characters (bytes).
- The line speed, in bits per second.
- Whether the terminal is attached to a modem.
- The type of modem used, if any.
- Whether the terminal can use the `:HELLO` command to logon to the HP 3000.
- Whether the terminal will use hardware handshake. (Supported on DTC 16iX and DTC 72MX only.)
- The type of parity that will be used if parity is enabled.
- Specifies whether auto speed and parity sensing will occur at logon for terminals using this profile.
- Specifies whether the terminal will be reset after a DTC is powered on or after the connection is re-established.
- Specifies whether native language devices will be used.
- For PAD terminals, specifies whether several X.29 parameters will be set at connection time.
- For PAD terminals, specifies the setting of X.3 parameters.
- For PAD terminals, specifies the setting of data forwarding parameters.
- The device class names associated with the terminal.

Terminal profile characteristics are described in detail under "Terminal Profile Screen," later in this chapter.

Printer Profiles

Printer profiles define printer characteristics for printers. A printer profile defines these printer characteristics:

- The printer type file used (18, 21, 22, or 26).

  A printer type file is a collection of characteristics that cause a printer to act and react in a specific way. It defines the relationship between the printer and the MPE/iX operating system. For more information, see `Printer type file` under "Printer Profile Screen," later in this chapter.

- The line speed in bits per second.
- The record width in characters (bytes).
- Whether is printer is attached to a modem.
- The type of parity that will be used, if parity is enabled.
- Whether the printer is initially spooled.
- Whether the printer will use a native language character set.
- Whether hardware handshake is used. (Supported on DTC 16iX and DTC 72MX only.)
- For PAD printers: specifies whether several X.29 parameters are set at connection time.
- For PAD printers: specifies whether at connection time the PAD is set to default X.3 printer parameters, and whether changes to X.3 parameters may be made after connection establishment.
- The device class names associated with the printer.

Printer profile characteristics are described in detail under "Printer Profile Screen," later in this chapter.

Creating and Modifying Profiles

The DTS Profile Selection screen (see Figure 5-1) lists the profiles available in your configuration file. (To reach this screen, press the **[Go to Profiles]** key at the Host Configuration screen or the Card Configuration screen.) From this Profile Selection screen, you may review, add, delete, or modify profiles.

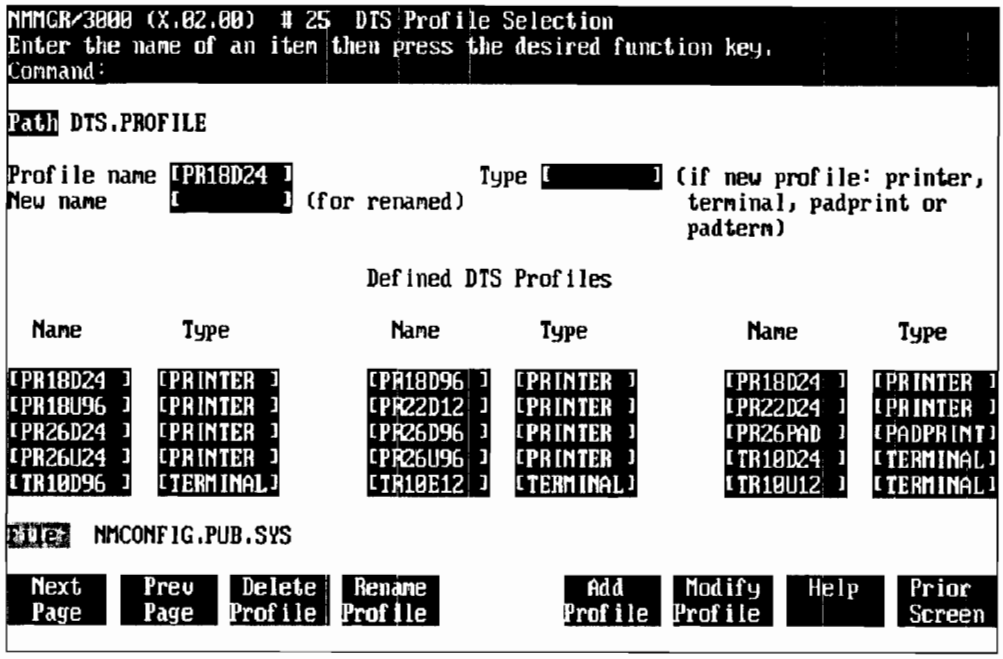


Figure 5-1. DTS Profile Selection Screen

1. To review, add, delete, rename, or modify a profile, go to the Profile Selection screen.
2. Enter the profile name in the `profile name` field.
3. If you are *deleting a profile*, press the **[Delete Profile]** key. You are done. Exit this screen by pressing the **[Prior Screen]** key.
4. If you are *renaming a profile*, enter the new profile name in the `New name` field and press **[Rename Profile]**. You are done. Exit this screen by pressing the **[Prior Screen]** key.
5. If you are *adding a profile*, enter the profile type in the `Type` field. Valid profile types are: `terminal`, `printer`, `padterm`,

padprint. Press the **[Add Profile]** key. Proceed to Step 7 below.

6. If you are *modifying or reviewing a profile*, press the **[Modify Profile]** key. Proceed to the next step below.

7. The appropriate profile screen will be displayed, showing the settings of the specified profile.

   Examples of Terminal Profile screen, Printer Profile screen, PAD Terminal Profile screen, and PAD Printer Profile screen are shown on the next few pages.

8. Review the profile settings. Use the **[Tab]** key to move around the fields in the screen. Make changes as needed by typing over the current values.

9. If you want to save the changes, press the **[Save Data]** key.

10. To return to the Profile Selection screen, press the **[Prior Screen]** key.

11. To exit the Profile Selection screen, press the **[Prior Screen]** key again.

Fields

Profile name — The name of the profile to be reviewed, added, modified, deleted, or renamed.

Type — Required only if adding a new profile. Specifies whether the profile is to be a terminal, printer, PAD terminal, or PAD printer profile.

New name — The new name for the profile. Required only when renaming a profile.

Defined DTS Profiles — Display only. Lists the name and type of existing profiles. If more than 15 profiles exist, they are listed on additional pages of this screen. Use the **[Next Page]** key to move forward on the pages and the **[Prev Page]** key to move back on the pages of the screen.

Profile Screens

The rest of this chapter lists the profile screens for the available profile types: terminal, printer, PAD terminal, and PAD printer. The fields in each screen are explained. The default values are listed on the screens.

Terminal Profile Screen (Host-Based)

The Terminal Profile screen is used to define characteristics associated with a terminal profile. Figure 5-2 shows a Terminal Profile screen for host-based management. The PC-based Terminal Profile screen varies slightly, see Figure 5-3,Terminal Profile screen (PC-Based).

```
NMMGR/3000 (X.02.00) #23 Terminal Profile                          Data: N
Fill in the required information; then press the Save Data key.
Command:
PATH:DTS.PROFILE.TR10D96

Terminal type          [10]  (10, 18, or 24)
   or terminal type file name [                    ]

Line speed           [9600 ]  (300, 1200, 2400, 4800, 9600, 19200, or 38400 bps)
Record width          [80  ]  (1... 2048 bytes)
Modem type              [0]   (0 - none, 1 - US, 2 - European)
Modem behavior          [0]   (0 - none, 1 - DCE, 2 - DTE, 3 - DCE high)
Parity               [NONE]   (none, even, odd, 0's, or 1's)
Speed/Parity Sensing?   [N]   (Y/N)     Allow :HELLO logon?  [Y] (Y/N)
Reset HP terminal?      [N]   (Y/N)     NLIO device?         [N] (Y/N)
Hardware handshaking?   [N]   (Y/N)

If configuring device classes, enter names below.  If additional names are
required, press Go To CLASSES, otherwise press Prior Screen.
   Device class   [          ] [          ] [          ] [          ]
      names       [          ] [          ] [          ] [          ]

 Go To
 CLASSES                                                  Save   Help   Prior
                                                          Data          Screen
```

Figure 5-2. Terminal Profile Screen (Host-Based)

Fields

`Terminal type` The terminal type being associated with the profile.

A terminal type file is a collection of characteristics that cause a terminal to act and react in a specific way. It defines the relationship between the terminal and the MPE/iX operating system. Three terminal type files are supplied with MPE/iX: terminal type 10, terminal type 18, and terminal type 24.

Terminal Type 10

Use terminal type 10 for Hewlett-Packard terminals and Hewlett-Packard personal computers running in terminal emulation mode. This file enables the XON/XOFF protocol (both receive and transmit). It supports block mode data transfers and can detect data transmission errors through the use of parity checking. This terminal type file can work with some non-Hewlett-Packard devices, but none of them are supported.

Note

The system console uses terminal type 10, but it does not have the same functionality as other terminals connected and configured as terminal type 10.

Terminal Type 18

Use terminal type 18 for non-Hewlett-Packard devices. It differs from terminal type 10 in the following ways:

- Block mode data transfers are not supported.
- Data protection is supplied through the XON/XOFF protocol. By default, parity checking is not used.
- The read trigger character is not recognized.

Terminal Type 24

Use terminal type 24 for PAD terminals. Limitations apply to operations over PAD connections. For example, the following functions are not supported:

- Block mode applications.
- HP Block Mode applications.
- Parity generation, programmatically.
- Parity checking, programmatically.

For more information on supported PAD operations, refer to the *Asynchronous Serial Communications Programmer's Reference Manual.*

`Terminal type file name` Instead of using the default terminal types 10, 18, or 24, you may create your own terminal type and save it in a file. To create a customized terminal type, use the Workstation Configurator, `TTUTIL.PUB.SYS`. Refer to the *Customizing Terminal and Printer Type Files with Workstation Configurator* (5959-2870) for more information.

`Line speed` The line speed, in bits per second. Supported speeds are 300, 1200, 2400, 4800, 9600, 19200, and 38400. (Line speed 38400 is supported for direct connect devices on DTC 16iX and DTC 72MX only, and the device must also support this speed.)

`Record width` The number of characters for each record. For HP terminals, the record width is usually 80 (the width of the screen).

`Modem type` Specifies the type of modem used in the connection.
`0` means that modems will not be used.
`1` means that a US modem will be used.
`2` means that a European modem will be used.

`Modem behavior` The DTC supports the following types of modem behaviour. They define the protocol used to establish a modem link between the DTC port and the attached device.

`0` means no modem used.

`1` specifies DCE modem behavior. Used for terminal connections. It uses a 2 minute timer to establish the link, and the DTC may disconnect if a carriage return is not received within a 2 minute interval.

`2` specifies DTE modem behavior. Used for termtype 26 supported on MPE/iX for remote printer access.

`3` specifies DCE modem behavior, except that it does not use a 2 minute timer to establish the link. The DTC does not disconnect the link after a 2 minute interval and the port remains open for connection establishment. (This option is supported on DTC 16iX and DTC 72MX only.)

`Parity` The type of parity that will be used if parity is enabled for this profile. Choices are none, even, odd, 0's, or 1's.

Speed/Parity Sensing?	Specifies whether auto speed and parity sensing will occur at logon for terminals using this profile.
Allow :HELLO logon?	Specifies whether the :Hello logon will be accepted from the terminals.
Reset HP terminal?	Specifies whether or not the terminal will be reset after the DTC is powered on or after the connection is aborted or re-established (for HP terminals only).
NLIO device?	Specifies whether native language devices will be used.
Hardware handshake?	Specifies whether hardware handshake will be used. Hardware handshake uses modem signals CTS and RTS to pace the data transfer from the DTC to the attached device. (Supported on DTC 16iX and DTC 72MX only.) Hardware handshaking is only allowed for direct connections, when modem type = 0.
Device class names	Device classes provide a means of accessing devices associated with a profile. Each device class name is up to eight alphanumeric characters beginning with a letter. Up to 450 device class names may be associated with a profile. Use the **[Go to CLASSES]** key to move to an Additional Device Class Names screen to add more device classes.

Terminal Profile Screen (PC-Based)

Figure 5-3 shows a Terminal Profile screen for PC-based management. Note that you only need to configure a terminal profile for **nailed** terminals if you are using PC-based management. Nailed terminals are ports with permanent LDEVs assigned to them and can be accessed programmatically.

```
NMMGR/3000 (X.02.00) #24 DTS Terminal Profile                    Data: Y
When Data Flag is "N," press "Save Data" to create the data record
Command:
PATH: DTS.PROFPC.TR10D24

Printer type              [10]  (10, 18, 24)
   or printer type file name  [                              ]

Record width              [80 ]  (1... 2048 bytes)
Modem type                [0]   (0 - none, 1 - US, 2 - European)
Allow :HELLO logon?       [Y]   (Y/N)
NLIO devices?             [N]   (Y/N)

If configuring device classes, enter up to eight device class names in the
field below.  If additional names are required, press the Go To CLASSES,
otherwise, press Prior Screen.

   Device class     [        ] [        ] [        ] [        ]
      names         [        ] [        ] [        ] [        ]

FILE:  NMCONFIG.PUB.SYS
 Go To
CLASSES                                                 Save    Help   Prior
                                                        Data           Screen
```

Figure 5-3. Terminal Profile Screen (PC-Based)

Note

The Terminal Profile screen used for PC-based management contains a subset of the fields used by host-based management (see Figure 5-2). Refer to the previous subsection for an explanation of the fields.

The reason PC-based terminal profiles contain less fields is that most terminal characteristics are defined in the OpenView DTC Manager (on the PC).

Printer Profile Screen (Host-Based)

The Printer Profile screen is used to define the characteristics associated with a printer profile. Figure 5-4 shows a Printer Profile screen for host-based management. PC-based management Printer Profile screen varies slightly, see Figure 5-5.

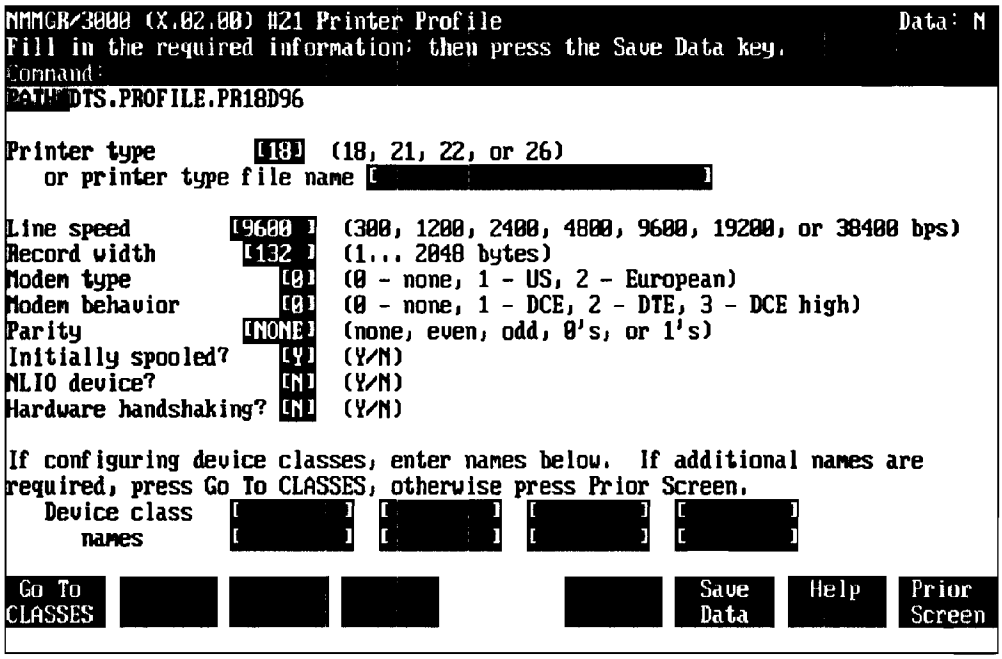


Figure 5-4. Printer Profile Screen (Host-Based)

Fields

`Printer type` The printer type being associated with the profile.

A printer type file is a collection of characteristics that cause a printer to act and react in specific ways. It defines the relationship between the printer and the MPE/iX operating system. Four printer type files are supplied with MPE/iX: printer type 18, printer type 21, printer type 22, and printer type 26.

Printer Type 18

Use printer type 18 for spooled and application printers, without status checking. An application printer is controlled by a program running on an MPE/iX computer. The program performs the following functions:

- Opens the printer.
- Writes to the printer.
- Initializes the printer before each listing.
- Spools output to the printer.
- Sends messages to the system console or the user's terminal.
- Checks the status of the printer. (Only some printers can supply this information.)
- Closes the printer.

Printer type 18 responds to an XOFF character sent from a printer. The XOFF protocol stops the flow of data to the printer so data cannot be lost. However, the printer cannot send an XOFF character if it is unplugged, turned off, or loses power. In these instances, data is lost.

Printer Type 21

Use printer type 21 for remote spooled printers. These are asynchronous printers that can use the MPE/iX spooler.

Printer type 21 uses the XON/XOFF protocol and status checking. Status checking means an HP printer that respond to the interrogation string: **[Esc]** ? XON.

In addition, data transmission errors can be detected (but not corrected) using parity checking.

Printer Type 22

Use printer type 22 for local spooled printers. These are asynchronous printers that can use the MPE/iX spooler, but not with modems.

Printer type 22 supports the same data protection methods (the XON/XOFF protocol and status checking) as printer type 21, except for parity checking.

Printer Type 26

Use printer type 26 for remote spooled printers connected to a network. These are printers that can be spooled and connected through a modem to a statistical multiplexer or printers connected to a PAD. Printer type 26 builds on printer type 22, with additional features to cope with delays that occur over a buffered connection.

The status request is sent and the time begins. If there is no reply, the timer is reset. This is repeated 10 times.

If the status request detects an error condition, for example the printer runs out of paper, a system console message is displayed and the retry is done only one more time. If there is no reply or an error occurs, the connection is closed and the spooler stopped.

The XOFF timer is also retried 10 times. After the last entry, the connection shuts down and data is refused. In addition to status request and XOFF changes, all closed connection requests from the computer are not acted upon for 10 seconds. This avoids having to reestablish the remote connection between spoolfiles printed back-to-back.

`Printer type file name` Instead of using the default printer type files 18, 21, 22, or 26, you may create your own customized printer type and store it in a file. Use the Workstation Configurator, `TTUTIL.PUB.SYS` to create your own printer type files. Refer to the *Customizing Terminal and Printer Type Files with Workstation Configurator* (5959-2870) for more information.

`Line speed` The line speed, in bits per second. Supported speeds are 300, 1200, 2400, 4800, 9600, 19200, or 38400. (Line speed 38400 is supported for direct connect devices on DTC 16iX and DTC 72MX only, and the device must also support this speed.)

`Record width` The number of characters for each record. For HP printers, the record width is usually 132 (the width of the line).

`Modem type` Specifies the type of modem used in the connection.
`0` means that modems will not be used.
`1` means that a US modem will be used.
`2` means that a European modem will be used.

Modem behavior The DTC supports the following types of modem behavior. They define the protocol used to establish a modem link between the DTC port and the attached device.

0 means no modem used.

1 specifies DCE modem behavior. Used for terminal connections. It uses a 2 minute timer to establish the link, and the DTC may disconnect if a carriage return is not received within a 2 minute interval.

2 specifies DTE modem behavior. Used for termtype 26 supported on MPE/iX for remote printer access.

3 specifies DCE modem behavior, except that it does not use a 2 minute timer to establish the link. The DTC does not disconnect the link after a 2 minute interval and the port remains open for connection establishment. (This option is supported on DTC 16iX and DTC 72MX only.)

Parity The type of parity that will be used, if parity is enabled for devices using this profile. Choices are none, even, odd, 0's, or 1's.

Initially spooled? Specifies whether the profile will be initially spooled.

NLIO device? Specifies whether native language devices will be used.

Hardware handshake? Specifies whether hardware handshake will be used. Hardware handshake uses modem signals CTS and RTS to pace the data transfer from the DTC to the attached device. (Supported on DTC 16iX and DTC 72MX only.) Hardware handshaking is only allowed for direct connections, when modem type = 0.

Device class names Device classes provide a means of accessing devices associated with a profile. Each device class name is up to eight alphanumeric characters beginning with a letter.

Up to 450 device class names may be used for a printer profile. Use the **[Go To CLASSES]** key to go to an Additional Device Class Names screen for entering additional device class names.

Printer Profile Screen (PC-Based)

Figure 5-5 shows a Printer Profile screen used for PC-based management.

```
NMMGR/3000 (X.02.00) #22 DTS Printer Profile                    Data: Y
When Data Flag is "N," press "Save Data" to create the data record
Command:
PATH: DTS.PROFPC.PR22D12

Printer type              [22]  (18, 21, 22, or 26)
   or printer type file name [                          ]

Record width              [132 ]  (1... 2048 bytes)
Modem attached ?          [0]   (0 - none, 1 - US, 2 - European)
Initially spooled?        [Y]   (Y/N)
NLIO devices?             [N]   (Y/N)

If configuring device classes, enter up to eight device class names in the
field below.  If additional names are required, press the Go To CLASSES,
otherwise, press Prior Screen.

   Device class   [        ] [        ] [        ] [        ]
      names       [        ] [        ] [        ] [        ]

PUB: NMCONFIG.PUB.SYS
 Go To
CLASSES                                          Save    Help   Prior
                                                 Data           Screen
```

Figure 5-5. Printer Profile Screen (PC-Based)

Note

The Printer Profile screen used for PC-based management contains a subset of the fields used by the Printer Profile screen used for host-based management (see Figure 5-4). Refer to the previous subsection for an explanation of the fields.

The reason PC-based printer profiles contain less fields is that most printer characteristics are defined in the OpenView DTC Manager (on the PC).

Note that the field "Modem attached?" is the same as "Modem type" in the host-based Printer Profile screen.

PAD Terminal Profile (Host-Based)

The PAD Terminal Profile is used to define the characteristics associated with a PAD terminal profile. Note that this screen is used for host-based management only. For PC-based management, you should use the regular PC-BasedTerminal Profile screen shown in Figure 5-3 for PAD terminals.

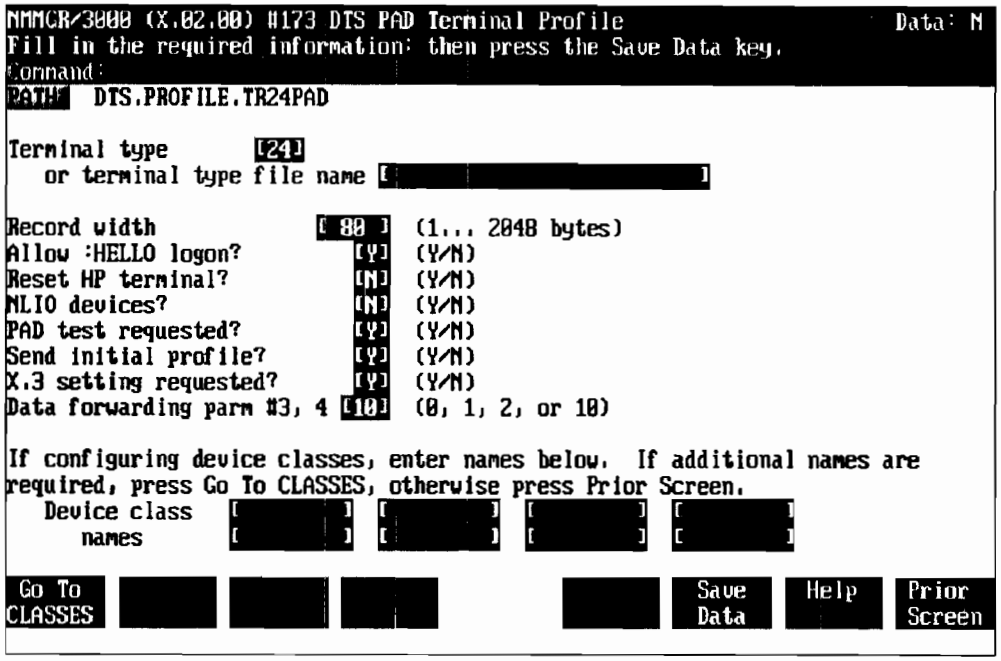


Figure 5-6. PAD Terminal Profile Screen (Host-Based)

Fields

`Terminal type` — The terminal type being associated with the profile. The only valid terminal type for PAD terminal profiles is terminal type 24.

`Terminal type file name` — A terminal type file created with the Workstation Configurator utility (`TTUTIL.PUB.SYS`), to be associated with the profile instead of the system-supplied terminal type. Enter the fully qualified file name (*filename.group.account*). Refer to the *Customizing Terminal and Printer Type Files with Workstation Configurator* for more information on `TTUTIL.PUB.SYS`.

`Record width` — The number of characters for each record. For HP terminals, the record width is usually 80 (the width of the screen).

`Allow :Hello logon?`	Specifies whether `:Hello logon` will be accepted from the terminals.
`Reset HP terminals?`	Specifies whether or not the terminal will be reset after the DTC is powered on or after the connection is aborted or re-established (for HP terminals only).
`NLIO device?`	Specifies whether native language devices will be used.
`PAD test requested?`	Specifies whether the DTC will set and read several X.29 parameters at connection establishment time to determine the PAD's behavior.
`Send initial profile?`	Specifies whether at connection establishment, the PAD is set to default X.3 terminal parameter values.
`X.3 setting requested?`	Specifies whether changes to X.3 parameters may be made after connection establishment.
`Data forwarding parm #3 and #4`	The data forwarding setting tells the PAD when a packet must be sent to the PDN. This setting is only used for reads where `EOR` and `AEOR` are not the carriage return key. On normal reads, the data forwarding parm #3 is 2 (for the carriage return key) and parm #4 is 0. Parm #4 sets the idler timer in 1/20 second increments. A value other than zero will force a packet transmission to the PDN after the defined time, unless no data has been entered. A value of zero will send packets when the PAD buffer is full.
`Device class names`	Device classes provide a means of accessing devices associated with a profile. Each device class name is up to eight alphanumeric characters beginning with a letter. Up to 450 device class names may be used for a printer profile. Use the **[Go To CLASSES]** key to go to an Additional Device Class Names screen for entering additional device class names.

PAD Printer Profile (Host-Based)

The PAD Printer Profile screen is used to define the characteristics associated with a PAD printer profile. This profile screen is used for host-based management only. For PC-based management, you should use the regular PC-based Printer Profile screen shown in Figure 5-5 for PAD printers.

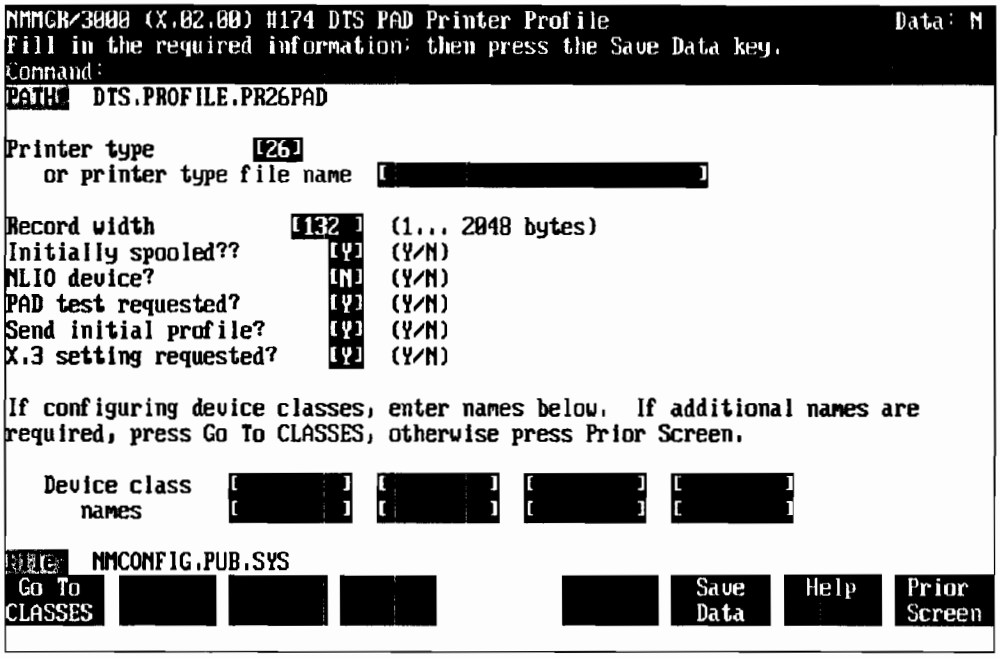


Figure 5-7. PAD Printer Profile Screen (Host-Based)

Fields

`Printer type` — The printer type being associated with the profile. Use printer type 26 for PAD printer profiles.

`Printer type file name` — A printer type file created with the Workstation Configurator utility (`TTUTIL.PUB.SYS`), to be associated with the profile instead of the system-supplied printer type. Enter the fully qualified file name (*filename.group.account*). Refer to the *Customizing Terminal and Printer Type Files with Workstation Configurator* for more information on `TTUTIL.PUB.SYS`.

`Record width` — The number of characters for each record. For HP terminals, the record width is usually 132 (the width of the line).

`Initially spooled?`	Specifies whether the printer will be initially spooled.
`NLIO device?`	Specifies whether native language devices will be used.
`PAD test requested?`	Specifies whether the DTC will set and read several X.29 parameters at connection establishment time to determine the PAD's behavior.
`Send initial profile?`	Specifies whether at connection establishment, the PAD is set to default X.3 printer parameter values.
`X.3 setting requested?`	Specifies whether changes to X.3 parameters may be made after connection establishment.
`Device class names`	Device classes provide a means of accessing devices associated with a profile. Each device class name is up to eight alphanumeric characters beginning with a letter. Up to 450 device class names may be used for a printer profile. Use the **[Go To CLASSES]** key to go to an Additional Device Class Names screen for entering additional device class names.

System Supplied Terminal and Printer Profiles

Tables 5-1 through 5-4 list the terminal and printer profiles supplied by the MPE/iX system for host-based and PC-based management. You may choose these profiles for your terminal and printer onfiguration. You may also create your own profiles.

Table 5-1. Host-Based Terminal Profiles

Profile Name	Characteristics	Suggested Devices
TR10D24	Terminal type 10 Record width of 80 bytes Parity: none Speed/Parity Sensing? N Reset HP Terminals? N Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected directly Set at 2400 bps
TR10D96	Terminal type 10 Record width of 80 bytes Parity: none Speed/Parity Sensing? N Reset HP Terminals? N Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected directly Set at 9600 bps
TR10E12 TR10U12	Terminal type 10 Record width of 80 bytes Parity: none Speed/Parity Sensing? N Reset HP Terminals? N Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected to modem port Set at 1200 bps

Table 5-1. Host-Based Terminal Profiles (continued)

Profile Name	Characteristics	Suggested Devices
TR10U24	Terminal type 24 Record width of 80 bytes Parity: none Speed/Parity Sensing? N Reset HP Terminals? N Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected to modem port Set at 2400 bps
TR24	Terminal type 24 Record width of 80 bytes Parity: none Speed/Parity Sensing? N Reset HP Terminals? N Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected to a PAD Set at 9600 bps
TR24PAD	Terminal type 24 Record width of 80 bytes Allow :HELLO logon? Y Reset HP Terminals? N NLIO devices? N PAD test requested? Y Send initial profile? Y X.3 setting requested? Y Data forward parm #3,4? 10 No device classes assigned	Supported HP terminals Connected to a PAD

Table 5-2. PC-Based Terminal Profiles

Profile Name	Characteristics	Suggested Devices
TR10D24	Terminal type 10 Record width of 80 bytes Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected directly
TR10D96	Terminal type 10 Record width of 80 bytes Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected directly
TR10E12 TR10U12	Terminal type 10 Record width of 80 bytes Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected to modem port
TR24	Terminal type 24 Record width of 80 bytes Allow :HELLO logon? Y NLIO devices? N No device classes assigned	Supported HP terminals Connected to modem port

Table 5-3. Host-Based Printer Profiles

Profile Name	Characteristics	Suggested Devices
PR18D24	Printer type 18 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Printers with no status checking Connected directly Set at 2400 bps
PR18D96	Printer type 18 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Printers with no status checking Connected directly Set at 9600 bps
PR18U24	Printer type 18 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Printers with no status checking Connected to modem port Set at 2400 bps
PR18U96	Printer type 18 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Printers with no status checking Connected to modem port Set at 9600 bps
PR22D12	Printer type 22 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Supported HP printers with status checking Connected directly Set at 1200 bps
PR22D24	Printer type 22 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Supported HP printers with status checking Connected directly Set at 2400 bps

Table 5-3. Host-Based Printer Profiles (continued)

Profile Name	Characteristics	Suggested Devices
PR26D24	Printer type 26 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Supported HP printers Connected directly Set at 2400 bps
PR26D96	Printer type 26 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Supported HP printers Connected directly Set at 9600 bps
PR26PAD	Printer type 26 Record width of 132 bytes Spooled No NLIO devices PAD test requested? Y Send initial profile? Y X.3 setting requested? Y No device classes assigned	Supported HP printers Connected to a PAD
PR26U24	Printer type 26 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Supported HP printers Connected to a modem port Set at 2400 bps
PR26U96	Printer type 26 Record width of 132 bytes Spooled No NLIO devices Parity: none No device classes assigned	Supported HP printers Connected to a modem port Set at 9600 bps

Table 5-4. PC-Based Printer Profiles

Profile Name	Characteristics	Suggested Devices
PR22D12	Printer type 22 Record width of 132 bytes Spooled No NLIO devices No device classes assigned	Supported HP printers with status checking Connected to modem port
PR22D24	Printer type 22 Record width of 132 bytes Spooled No NLIO devices No device classes assigned	Supported HP printers with status checking Connected to modem port
PR26	Printer type 26 Record width of 132 bytes Spooled No NLIO devices No device classes assigned	Supported HP printers Connected to modem port

Tuning Your DTC

This appendix describes the steps for tuning your DTC by selecting AFCP and management timers that are appropriate for your DTC and network traffic.

To select predefined sets of timer values, access the Tune DTC - Timer Selection Screen within NMMGR. This screen can be accessed by pressing the **[Tune DTC]** key at the DTC Configuration Screen for the DTC. (Refer to Figure 3-5 for an example of a DTC Configuration Screen for a DTC 72MX.)

The Tune DTC - Timer Selection Screen for host-based management is shown below, in Figure A-1. PC-based screen varies slightly.

```
NMMGR/3000 (X.02.00) #37  Tune DTC - Timer Selection                Data:
Command:

DTC name

 AFCP timer selection [1]                  Management timer selection [1]

  1. Set 1: Normal timer mode               1. Set 1: Normal timer mode
  2. Set 2: Short retransmission timer mode 2. Set 2: Busy LAN mode
  3. Set 3: Long retransmission timer mode
  4. Set 4: Variable timer mode
  5. Set 5: MPE XL Release 1.2 timer mode
  6. Set 6: MPE XL Release 2.1 timer mode


Press Help to see the timer details.

File:  NMCONFIG.PUB.SYS
                                  Validate Link/DTS  Save Data  Help  Prior Screen
```

Figure A-1. Tune DTC - Timer Selection Screen

1. The DTC name field is a display field and shows the name of the DTC you are currently configuring.
2. Select one of six predefined sets of values for AFCP timers. The default is selection 1.
3. Select one of two predefined sets of values for management timer. The default is selection 1. The management protocol timers determine different transmission algorithms.
4. After you have selected the desired timer values, press the **[Save Data]** key.
5. Press the **[Prior Screen]** key to return to the DTC Configuration Screen, or press **[Validate Link/DTS]** to validate your configuration if you have completed configuration for your DTCs.

Note

If you changed your network configuration, you need to validate the configuration before you exit NMMGR. You must also cross-validate with SYSGEN, and reboot your HP 3000 and DTC. Refer to Chapter 3 for information on these steps.

The timer selections apply to both nailed and non-nailed devices.

For host-based management, both host and DTC values will take effect after you reboot the system and download the DTC. For PC-based management, only the host values will take effect because the DTCs are managed by the OpenView DTC Manager on the PC. You must use the OpenView DTC Manager to configure the DTC timer values. In this case, you must ensure consistency of timer selections between the host and the DTC during configuration in NMMGR and OpenView DTC Manager.

Fields

`AFCP Timer Set 1` Normal timer mode. This selection is appropriate for most users operating in a normal LAN environment.

`AFCP Timer Set 2` Short retransmission timer mode. This is appropriate in a LAN environment where there is a high number (greater than 1%) of packets lost on the LAN. The values are adapted to provide shorter retransmission values and higher number of retries.

AFCP Timer Set 3	Long retransmission timer mode. This is appropriate in a LAN environment where the LAN is very reliable. The values are adapted to reduce LAN traffic and host driver overhead.
AFCP Timer Set 4	Variable retransmission timer mode. This is appropriate in exceptional cases where there is a very high percentage of lost packets on the LAN. The values are adapted to prevent saturation of the LAN.
AFCP Timer Set 5	MPE XL release 1.2 timer mode. This is appropriate for use with HP 3000 MPE XL FOS release 1.2.
AFCP Timer Set 6	MPE XL release 2.1 timer mode. This is appropriate for use with HP 3000 MPE XL FOS release 2.1.
Management Timer Set 1	Normal traffic mode. This is appropriate in a LAN environment with normal traffic.
Management Timer Set 2	Busy LAN mode. This is appropriate in a LAN environment with busy traffic.

Migrating from Previous Releases

This appendix describes the steps for migrating network configuration files to the current MPE/iX release (C.45.00) from previous MPE/iX or MPE V releases.

A utility called NMMGRVER.PUB.SYS is provided to automatically convert your old network configuration file to the current release format.

Note

Customers who do not have an existing network configuration file, NMCONFIG.PUB.SYS, do not need to run NMMGRVER. Instead, they need to create a network configuration file from scratch. To do so, copy the template file NMSAMP1.PUB.SYS into NMCONFIG and then modify this network configuration file in NMMGR. These steps are covered in Chapter 3, "Configuring Terminal and Printer Connections (for Host-Based Management)."

MPE/iX customers with an older version of NMCONFIG.PUB.SYS need to run NMMGRVER to convert their network configuration files to the current MPE/iX format. You need to migrate to the current version before adding a DTC 72MX to your network configuration.

MPE V customers with an older version of NMCONFIG.PUB.SYS also need to run NMMGRVER to convert their network configuration file to the current MPE/iX format. NMCONFIG.PUB.SYS files from MPE V do not have the DTS subsystem, so NMMGRVER will create a default DTS subsystem for the new configuration file - with one default configuration for a DTC 48 and one default configuration for a DTC 72MX. Modify this network configuration file in NMMGR to fit your actual DTS and DTC configuration. These steps are covered in Chapter 3, "Configuring Terminal and Printer Connections."

Running NMMGRVER

To run NMMGRVER, logon as MANAGER.SYS in the PUB group and run the utility by entering NMMGRVER after the MPE/iX prompt. NMMGRVER will prompt you for the configuration file name. Enter NMCONFIG, and enter Y to the confirmation prompt.

The steps to run NMMGRVER are shown here:

```
HELLO MANAGER.SYS,PUB

NMMGRVER

Fileset to be scanned? NMCONFIG

OK to convert NMCONFIG? Y

Backup file is NMBACKn; temporary file is Nxxxx.

* Converting MPE iX config file **

Conversion completed successfully
```

NMMGRVER generates a backup copy of your old configuration file under file name NMBACK*n*, (where *n* starts with A, then B, C, and so on, for multiple backup copies). It also creates a temporarly file N*xxxx*, that is purged upon completion of NMMGRVER conversion.

After converting the network configuration file with NMMGRVER, you then run NMMGR to modify the DTS subsystem to fit your actual hardware configuration. Follow the steps described in Chapter 3 for modifying your network configuration file.

Note

After converting your network configuration file with NMMGRVER, you must validate NMCONFIG.PUB.SYS inside NMMGR, cross-validate with SYSGEN, and reboot your HP 3000 system. Refer to Chapter 3 for details on these steps.

C

Describing Asynchronous Devices

This chapter discusses the following concepts:

- How the HP 3000 Series 900 initially recognizes devices and how it communicates with them from that time on.
- How devices are owned, who can own them, and the restrictions that apply when a device is owned.
- How the MPE/iX file system perceives devices and its response to some of their characteristics.
- How different device operation modes set the functionality of devices.
- How the connection type sets certain device characteristics.

This chapter also discusses processes that are internal to the Distributed Terminal Subsystem (DTS):

- How to control the flow of data.
- How to control terminals.
- How to control printers.

How MPE/iX Identifies Devices

Asynchronous devices (terminals, printers, plotters, etc.) are located and communicated with in two ways:

- Through the device's **logical device (ldev) number.**
- Through the **physical path** from the HP 3000 to the asynchronous device.

Logical Device Numbers

The ldev number is a value that the MPE/iX operating system uses to recognize attached devices. Terminals attached to Datacommunications and Terminal Controllers (DTCs), managed by an HP 3000 host, are configured with **nailed** ldev numbers. Terminals attached to DTCs, managed by an OpenView Windows Workstation, can be configured to have either **nailed** ldev numbers or **non-nailed** ldev numbers on the host systems to which they have access. Logical device numbers are associated with nailed devices during configuration.

A nailed device has a permanently assigned ldev number. A non-nailed device has an ldev number associated with it after a session is requested.

A terminal connected through a DTC to multiple HP 3000 computers can have a nailed connection on more than one host system. Alternatively, a terminal can have a nailed connection on one host system and a non-nailed connection on another, or it can be configured to have non-nailed connectionson all of the systems to which it has access.

Non-Nailed Devices

A non-nailed device is able to establish a connection to the HP 3000 computer but has no permanently assigned ldev number in the NMMGR configuration file. The user of a terminal connected as a non-nailed device can establish a session provided a connection is available and the host configuration specifies a device profile matching the characteristics of the device requesting the connection.

When the user logs onto the host, an ldev number is assigned from a pool of available ldev numbers. When the connection is ended (the user logs off), the ldev number is returned to the pool of ldev numbers and becomes available for use by a different device. It is

possible to configure non-nailed devices only when PC-based management is used.

Nailed Devices

A nailed device is permanently assigned an ldev number through the NMMGR configuration of the HP 3000 computer. Any time a connection exists between a computer and one of its nailed devices, the same ldev number will belong to that device. Only nailed devices can be accessed programmatically. All printers must be nailed, as must any device that will be accessed programmatically. Devices with permanently assigned ldev numbers keep the same ldev number unless that number is modified through NMMGR and the host is restarted. All devices are nailed when host-based network management is used.

Note

If two or more systems have access to the same nailed device, contention for that device might exist. Only one system can access a nailed device at any time. For example, if system A accesses the nailed device, system B will not be able to access the nailed device at the same time. The nailed device is being used by system A and is probably not broken, even though it can't be reached.

An ldev number can be assigned to any asynchronous device, including the following:

- The system console.
- Printers, Terminals, and Plotters.
- Other serial devices.

System Console

The system console is always connected through the access port on the HP 3000 Series 900 computer. The system console's ldev number is assigned during system initialization and remains constant unless it is modified through the SYSGEN utility and the host is restarted.

Printers

Printers are assigned ldev numbers during configuration making them nailed devices. Each printer keeps the same ldev number unless that number is modified through NMMGR and the host is restarted.

Terminals

Usually, many terminals are connected to a DTC. Some terminals can have permanent ldev numbers assigned during NMMGR configuration.

Other terminals might not have permanent ldev numbers assigned (non-nailed). Instead, these terminals will use an ldev number from a pool of available ldev numbers. Non-nailed devices can be configured if PC-based network management is used. Refer to "Nailed Devices" and "Non-Nailed Devices" earlier in this chapter for more information.

Terminal users should know the physical device address for their terminal. If a terminal is having problems, the physical device address is needed to troubleshoot the terminal. The physical device address consists of identifiers for the DTC, the interface card, and the port to which the device is connected. Refer to "Device Physical Path" later in this chapter for more information.

Plotters

Sometimes plotters are connected to a DTC. Plotters, like printers, always have assigned ldev numbers (always a nailed device).

Other Non-Supported Devices

Devices that conform to Hewlett-Packard's asynchronous protocol and are capable of being physically connected to the DTC can be controlled through Asynchronous Serial Communications (ASC). This includes test instruments, data collection devices, etc. To determine if a device can be non-nailed or if it must be nailed, refer to "Nailed Device" and "Non-Nailed Deviced" in this chapter. *Contact your Hewlett-Packard support representative for more information on non-supported devices. Take extreme care when connecting non-supported devices.*

Device Physical Path

Each asynchronous device (excluding the system console, PADs, and Telnet/iX devices) is connected to a port on an interface card within a DTC; this is the device's physical path. The address for the physical path, or the physical device address, consists of identifiers for the DTC, the interface card, and the port to which the device is connected. Note that the physical device address can be used to troubleshoot a device and its connection.

How Devices Are Owned and Why

Devices (terminals, printers, plotters, etc.) are subject to ownership. If a device is owned by a process, then use of the device by other processes is restricted. For instance, when a session owns a terminal, only the process which initiated the session or its child process, can access the terminal.

To determine which process owns a device, use the MPE/iX SHOWDEV command. Asynchronous devices will be listed as one of the following:

- Available. The device is not owned. Any process that wants to claim ownership of the device can do so. For terminals, this means that no one is logged on to the device or no other process has programmatically opened the terminal. For printers, it means that the device is not spooled, nor has it been opened by a user program.
- Unavailable. The device is owned. The owner—a job, a session, or the system—is also listed.
- Spooled. The device is owned by the spooler while data is being transferred between a spoolfile (on disk) and the device. Other processes can access the device through the spooler, but only the spooler process owns the device. Printers and plotters are the only asynchronous devices that are spooled.

How the File System Manages Information

The file system is the part of the MPE/iX operating system that manages information being stored or transferred. It handles various input/output operations, such as passing information to and from user processes. All input and output operations are done through files. Files can be kept in any storage medium and accessed by any input/output peripheral device.

Two basic types of files exist:

- Disk files. These are files residing on disk, immediately accessible to the system and potentially shareable by several sessions or jobs at the same time.
- Device files. These are files currently being input from or output to any peripheral device *except* a disk.

How Operation Modes Set Functionality

Five device operation modes can be used. Each has different capabilities and is intended for a specific purpose. The five are as follows:

- System console.
- Session-accepting devices.
- Programmatic devices.
- Spooled devices.
- Slaved devices.

System Console

On CIO systems, the system console is the only device that is not connected to the computer through a DTC. The computer is aware of its existence from system initialization. It is connected to a special interface card in the cabinet called the access port.

Although the system console is session-accepting, it has the following added functionality:

- Receipt of console messages. The system console is the message center for the computer. Messages can be informational, such as notifying an operator when users log on or off the host. Messages can also alert an operator to take an action, such as mounting a magnetic tape on the tape drive so that its data can be accessed by a user program.
- Execution of console commands requiring the console attention character. These commands are called **[CTRL]-A** commands. Using **[CTRL]-A**, an operator can interrupt an action on the system console to enter commands that will abort one or all users, answer console requests, or shutdown the computer.
- Execution of other console commands. These commands are used for system startup and shut down procedures.

Because the system console serves a specific purpose, the following functionality is not provided:

- System console operation at 19200 bps. Supported speeds are 300, 1200, 2400, 4800, and 9600 bps.
- User block mode applications. Only block mode applications that use VPLUS can run on the system console. NMMGR *is* supported on the system console.

  Block mode applications do not prevent the system console from printing received messages. Such messages can cause data on block mode screens to be overwritten or lost. Because of this, block mode applications should not be run on the console.

Some console functionality can be given to the logical console. The system console can "pass" console functionality (except **[CTRL]-A**) to any other user; a user with system manager capability can "grab" the console by issuing the `CONSOLE` command.

The logical console can receive messages sent to the system console, but it cannot execute console commands that require the console attention character (**[CTRL]-A**). When a logical console is used, the system console can still execute **[CTRL]-A** commands. Refer to "Session-Accepting Devices" later in this chapter for more information on the logical console.

Note

The logical console cannot be assigned to:

- Devices configured with switching enabled.
- Devices connected through a PAD.
- Devices connected through Telnet/iX.

HP-PB Console Support

HP Precision Bus (HP-PB) provides console support for HP 3000 Series 900 systems. It is supported by the SCSI/Console LAN Card. This card provides two serial ports for remote and session activity.

These two serial ports only support the 239X and 700/9X terminals and emulators with Terminal Type 10. They do not support the following:

- Set XOFF timer

- Set block mode alert character
- Set block mode trigger character
- Set Flow Control characters (XON/XOFF)
- Set read trigger character
- Set form feed character
- Enable or disable form feed
- Set termtype file
- FDEVICECONTROL intrinsics

In addition, the console port does not support:

- Set parity
- Set speed
- Binary mode

The first serial port provides a connection to the local console. The port is always fixed as LDEV 20. For backwards compatibility with the CIO console, speed and parity on the console **cannot** be changed. The speed is set at 9600 baud and the parity is set at none.

The second serial port is capable of connecting to the console port path and connecting directly to the system. Although the second port can connect directly to the system and be used as a user port, it should be reserved for remote support access. It is configured as LDEV 21 by default. Baud line rate is set at 9600 and parity is set at none.

Note

The second serial port can be set as a remote console or a session port but never both. When the user port is configured as a modem port for remote support, the session is aborted after a powerfail, since modem connections do not recover after a powerfail.

Session-Accepting Devices

Session-accepting devices are opened with the HELLO command, and then a session is initiated. The session remains active until the user logs off by typing the BYE command, or initiates a different session by typing the HELLO command.

Session-accepting devices are terminals or PCs running in terminal emulation mode. During a session, the terminal is used for interactive (conversational) communication with the computer.

The terminal user can do any of the following:

- Enter MPE/iX commands.
- Run programs.
- Enter data.
- Receive output from the computer.
- Place the terminal under partial control of a program running on the computer.
- Communicate with other terminal users and with the system operator.
- Transfer data and control information between the computer and a slaved device connected to the terminal.
- Change the line speed of the terminal.
- Terminate the session.

Also, session-accepting devices that are not connected through a PAD or Telnet/iX and are not configured for switching can temporarily obtain partial system console functionality by using the CONSOLE command. A terminal that is the logical console can receive console messages, execute commands that do not require **[CTRL]-A**, and return console control to the system console (through the CONSOLE command).

Programmatic Devices

Programmatic devices run under the control of a program on the computer. The program accesses the device through the file system by treating the device as a file (device file). The file system passes information from the controlling program to the software which communicates directly with the device.

A programmatic device is captive of the program because access to the device is through the program only. For instance, MPE/iX commands cannot be executed from a terminal under the control

of a program unless the controlling program initiates the command. A programmatic device can be used for input, output, or both, depending on the device and how the controlling program opened it.

Spooled Devices

MPE/iX is equipped with a spooling facility to assist in the management of nonshareable devices. When a spooler process controls a nonshareable device, the device appears to be shared among several users, when in fact, it can process only one file at a time. This is done by temporarily storing data on disk instead of sending it directly to the device. The disk essentially becomes a staging area, while the spooler manages the selection of output spool files destined for the spooled device.

A user program writing data to a spooled output device actually writes records to a disk file instead of to the device itself. When the output device is available, the spooler process selects a file and begins to send the data in the file to the device.

Slaved Devices

If two devices share the same port in the DTC (one device is connected to the port and the other device is connected by an additional cable to the first device), only one device is recognized by the DTS software. The device that is recognized is referred to as the **master device**, while the other device is called a **slave device.** The master might or might not be the device that is physically connected to the port.

Note

The existence of slaves is not known to the DTS software or the MPE/iX operating system. Therefore, slaved devices are not supported.

A wide variety of devices can be connected as slaves, such as terminals, printers, card readers, flexible-disk drives, cartridge tape units, and plotters. Slaves can be connected in the following ways:

- As pass-through slaves (also called eavesdrop).
- As remote slaves (also called end-of-the-line).

How Connections Set Characteristics

Asynchronous devices can be connected to the DTC in the following ways:

- Directly connected to the DTC.
- Remotely connected through a modem, a mux, a switch, a PBX, a PAD, or Telnet/iX.

Direct Connections

A direct connection is one in which a device's data communications cable is plugged into a port without being connected to any other communications equipment. Two standards are available for direct connections to HP 3000 Series 900 systems, RS-232-C and RS-422.

RS-232-C direct connections need only consist of the wire the device uses to send data, the one it uses to receive data, and a ground wire. If RS-232-C cables are used, each device can be up to 50 feet (15m) away from the DTC.

Cables for RS-422 use two wires for each send and receive, plus a ground wire. These cables are less susceptible to noise and can be used at longer distances from the DTC than devices using RS-232-C cables. If RS-422 cables are used, each device can be up to 4000 feet (1200m) away from the DTC.

The system console is normally located next to the computer. The cable that attaches the system console to the access port uses the RS-232-C specification.

The speeds supported for direct connections are 300, 1200, 4800, 9600, and 19200 bps. (Direct connected devices on DTC 16iX and DTC 72MX also support 38400 bps.) Note that the system console does not support 19200 or 38400 bps.

Modem Connections

Modem connections are more complex because more equipment is used. The RS-232-C standard is used for modem connections, with more of the circuits defined by the standard implemented to support the requirements of the modem connection. A device's RS-232-C data communications cable is connected to a modem (or the device has an integral modem); the modem sends data through telephone lines to another modem. The second modem is connected through a RS-232-C cable to a port on the DTC. Both of the RS-232-C cables must adhere to a 50 foot (15m) length restriction. However, no restrictions are placed on the distance between modems.

Only full-duplex asynchronous modems are supported for use with HP 3000 Series 900 computers. Twenty-five pin RS-232-C cables must be used on each end of a modem connection because, in addition to send, receive, and ground signals, control signals are also required to control the modems.

Both terminals and serial printers are supported over modems. However, because data is traveling for long distances through telephone lines of varying quality, parity must be used to detect transmission errors. This means that only printers that support printer-type 21 should be used over modems, since parity cannot be used with other printer type files.

Theoretically, remote devices are supported at the same speeds as devices connected directly. However, most full duplex asynchronous modems support only a limited set of speeds. Common modem speeds are 300, 1200, and 2400 bps. Note that the device, the modems, and the data communications configuration must be set to the same transmission speed for the connection to work.

How to Access Multisessions

Multisession is the ability to have a device on a DTC simultaneously associated with multiple sessions, jobs, or processes on one or more hosts.

Each port can support up to 5 connections and connections can only be active one at a time; the other connections are in a "hold" state. The connection establishment method (Session or Programmatic, i.e. FOPEN) for multiple connections associated with a particular port is determined by the first established connection. If this is a session then the other multisession connections to that port must be session. Similarly, if the first connection is established through the use of a programmatic process, the other multisession connections must be established through the use of a programmatic process.

Multisession is only available in a PC-based network environment (i.e. when the DTCs are managed by an OpenView Windows Workstation on the LAN).

Multisession is supported on switched ports only and some restrictions apply to nailed devices. See the list below:

- **Switched Ports**: Multisession is supported only for switched ports.
- **Non Switched Ports**: The DTC User Interface is not accessible to non switched ports. For Multisession to establish another connection it needs the DTC User Interface.
- **Nailed LDEV**: If a switched port is configured as a nailed LDEV on a system, then multiple sessions from that port to that system are not possible because the port can have only the one connection associated with the assigned LDEV on the host system. Although multiple sessions to that particular host are not possible, it is possible to establish multiple sessions from that switched port to other systems.
- **Non Nailed LDEV**: If a switched port is configured as a non nailed LDEV on a system, then multiple sessions from that port to that system are supported in addition to multiple sessions to multiple systems.

How to Use Duplex Printing

Duplex printing is the ability to print on both the front and back sides of the printer paper. The Laserjet 3D and the Laserjet 3SI are the two PCL (Printer Control Language) laser printers that support duplex printing. These two printers also support simplex (one-sided) printing.

To use duplex printing on these printers, duplex printing must be configured and enabled. Configuration consists of modifying an existing printer type file so that Duplex Printer Mode is enabled. This is done using the Workstation Configurator (TTUTIL.PUB.SYS). This printer type file is then assigned to the printer in NMMGR. This allows the Terminal I/O driver to send the Front-of-Page (FOP) escape sequence to the printer when appropriate.

In the Workstation Configurator, the field before the question Does the printer support duplex printing (Y, N), type Y to indicate that a printer may be used as a duplex printer. To save this modification, press [ENTER] and then the SAVE DATA function key.

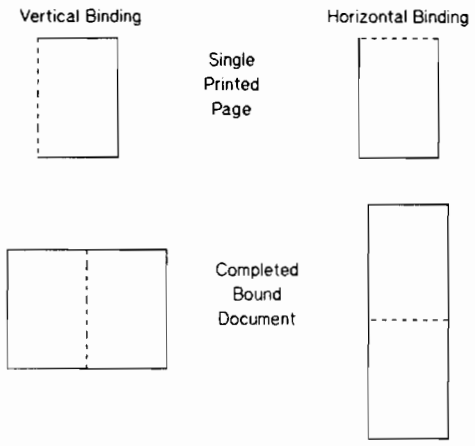
Once configuration is complete the printer must be enabled for duplex printing. Duplex printing can be enabled and disabled by sending escape sequences to the printer. This can be done in three ways:

- Escape sequences can be embedded in the data file being printed.
- The printer type file can be modified to include the escape sequence as part of the initialization string.
- The printer type file can be modified to include the escape sequence as a Vertical Forms Control (VFC) string.

There are three escape sequences for duplex printing:

[ESC]&l1S -	Enable vertical binding duplex mode
[ESC]&l2S -	Enable horizontal binding duplex mode
[ESC]&l0S -	Disable duplex mode (enable simplex mode)

The two duplex modes provide for the binding of the final document. Vertical binding allows for binding a document along the physical length of the page and horizontal binding allows for binding a document along the physical width of the page. This is pictured below where the dotted line (- - -) represents binding.



In addition to the escape sequences mentioned above, the [RESET] escape sequence ([ESC]) will also disable duplex mode and return the printer to simplex mode. Therefore, the duplex mode escape sequences should be entered after the [RESET] escape sequence in an initialization string.

Since the duplex mode escape sequences can be embedded within a data file, it is possible for a printer configuration not to be in agreement with how the printer is enabled.

To avoid this situation, close attention to detail during configuration and use of escape sequences is required. When configuring simplex printers, always indicate in the Printer Control screen of the printer file that duplex printing is supported. Also, do not send duplex mode escape sequences to simplex printers. When configuring duplex printers for duplex printing, it is mandatory to indicate in the Printer Control screen that duplex printing is supported. Duplex printing will not be effective until the escape sequences are received by the printer. Similarly, duplex printing will remain in effect until the Disable duplex mode escape sequence is received or the [RESET] escape sequence is received.

For detailed information on TTUTIL.PUB.SYS, refer to *Customizing Terminal Type Files and Printer Type Files with Workstation Configurator* (P/N: 5959-2870).

For detailed information on the use of the escape sequences refer to the technical reference manual provided with the printer.

How to Control the Flow of Data

Flow control is how the transfer of data between the computer and the asynchronous device is regulated. Flow control protects the computer and the device from data overruns. A **data overrun** occurs when the sender of data transmits the data faster than the receiver can accept it. Because the receiver cannot accept all of the data being sent, it is said to be *overrun* with data. Therefore, some data may be lost.

When asynchronous devices communicate with a HP 3000 Series 900 computer, one main method of flow control is used: the **XON/XOFF protocol**. This protocol controls the flow of data between devices and the Datacommunications and Terminal Controller (DTC). Its purpose is to protect devices from data overruns.

An additional mechanism is used for controlling the flow of data from a device to the computer: the **read trigger character**. The read trigger character tells a device when it is allowed to send data. Its purpose is to protect the DTC from data overruns.

Flow control is also called **pacing methods**. For instance, terminal settings for the XON/XOFF protocol are called transmit pacing (`XmitPace`) and receive pacing (`RecvPace`).

Because flow control guards against data overruns, it is a means of data protection. Other methods of data protection used with asynchronous devices are parity and printer status requests. Refer to "How to Control Printers" later in this chapter for more information on parity and printer status requests.

The XON/XOFF Protocol

The XON/XOFF protocol is controlled by the recipient of the data being transferred. The recipient sends an XOFF character to the sender of the data if it is unable to continue to receive data. The sender then suspends the transmission of data. When the receiver can accept data again, it sends the XON character to the sender, and the transmission of data is resumed.

Assuming that receive pacing is enabled at a terminal (this is *not* the terminal's default setting), the terminal will send an XOFF character if any one of the following occur:

- The terminal is placed in local mode. (Remote mode is necessary to communicate to the computer; refer to the

manual that came with the terminal for an explanation of local and remote modes.)

- The terminal's buffer (a temporary data storage area) fills up because data is being received faster than the terminal is able to display it.
- The terminal user presses **[CTRL]-S**. (Pressing **[Stop]** on HP239x terminals also sends the XOFF character to the computer. Note that this key is a toggle switch; the second time it is pressed, it sends an XON character to the computer, the third time, an XOFF character, etc.)

After a terminal sends an XOFF character, the DTC waits indefinitely for an XON character.

A printer will send an XOFF character if any one of the following occur:

- The printer is placed off-line.
- The printer runs out of paper.
- The paper in the printer jams.
- The printer's buffer fills up because data is being received faster than the printer is able to process it.

When printers (using printer type files 21, 22, or 26) send an XOFF character to the computer, an internal timer (called the XOFF timer) starts. If the timer expires before the printer sends an XON character, a message is sent to the system console. The message informs the operator that intervention is needed to get the printer to function again. After a printer using printer type file 18 sends an XOFF character to the computer, the computer waits indefinitely for the XON character, but no message is sent to the system console.

Use of the XON/XOFF protocol assumes the following:

- Full-duplex communication lines are used.
- The attached devices are capable of using the XON/XOFF protocol.
- The attached devices are capable of transmitting and receiving simultaneously.

These requirements are met if supported devices and cables are used. If non-HP devices are used, ensure that these requirements are filled.

Note

The two handshake characters, XON (the ASCII DC1 character) and XOFF (the ASCII DC3 character), are defined as **special characters** and are reserved for the purpose of protocol. These characters cannot be used as data except in binary mode.

The Read Trigger Character

The read trigger character tells an asynchronous device when it can send data to the computer. It prevents a device from sending data before the computer is ready to receive it. Data sent before the read trigger character is received is not accepted unless typeahead is enabled. If typeahead is enabled, data can be entered at any time and the read trigger character is not necessarily sent to the terminal. After the computer sends the read trigger character, the input of data can proceed.

The ASC software generates the read trigger character at the beginning of each read when the computer is ready to accept data. The read trigger character is the ASCII DC1 character (the same as XON). If the device is operating in character mode, the device can begin transmitting without further exchange of protocol characters.

However, if the data is sent through block mode, the device informs the DTC by sending an ASCII DC2 character in response to the read trigger character. The DTC, informed that a lot of data will be coming, sends another read trigger character when it is ready to accept the block of data. This second read trigger character is called a block read trigger character.

How to Control Terminals

DTS helps control the operation of terminals. It automatically handles the input and output of data to the terminal as explained earlier in this chapter under "How to Control the Flow of Data." Alternative methods for controlling terminals are as follows:

- Echoing characters to the terminal screen as they are typed at the keyboard.
- Allowing special characters to be processed as intended. For example, **[Enter]** signals the end of input data and the backspace character causes an unwanted character to be deleted from input data. Other examples of special characters include system break (**[Break]**) and subsystem break (usually **[CTRL]-Y**).
- Modifying the transmission speed through the SPEED or SET commands.

It is possible to programmatically change the method that the DTS uses to control a terminal. A program can change the following attributes:

- Parity error checking.
- The method of input for a read from character mode to block mode.
- The set of special characters recognized by the DTC.
- The maximum byte count or a maximum time to enter data.

Each of the methods for controlling terminals is explained in the following pages. Refer to the *Asynchronous Serial Communications Programmer's Reference Manual* for more information on programmatic device control.

Echo

When characters are typed on a keyboard, the terminal user expects each character to appear on the screen as it is typed. This is referred to as echo. Any of the following settings determine whether echo occurs:

- Local echo enabled.
- The modem echo is enabled.
- DTC echo is enabled.
- Typeahead echo is enabled.

Only one of these settings should be enabled at any time. Each of these settings are described below. Hewlett-Packard recommends setting DTC echo. (*DTC echo is automatically enabled for devices configured as terminals.*)

Local Echo

When terminals are installed, local echo is turned off. If local echo is turned on, the terminal will echo each character to the screen as it is typed. Local echo is used with half-duplex communications lines and some statistical multiplexers. *Note that block mode applications usually turn local echo on because input characters are sent to the DTC in a block of data, instead of one character at a time.*

Modem Echo

Modems are able to echo characters as they are typed. *This feature should not be used.* This feature is usually disabled in the modem's default configuration setting.

DTC Echo

DTC echo is enabled for both terminal type file 10 and terminal type file 18. The DTC will echo to the terminal screen each character as it is typed. DTC echo provides a simple form of data protection since data that appears after it is typed has been successfully transmitted to the DTC and back to the terminal screen again. *Disable DTC echo for block mode reads*; Local echo takes over the function of DTC echo because data is transferred to the DTC in a block of characters, instead of one character at a time.

Typeahead Echo

Typeahead allows the terminal user to continuously enter data without having to wait for the system to process the data and return the MPE prompt (:). Typeahead echo mode determines whether input characters will be echoed to the terminal screen once or twice.

Disabling Echo

Sometimes characters should not be echoed to the screen, for instance, when entering a password. In this case, the computer disables echo. However, if characters should not be echoed to the screen at other times, the SET ECHO=OFF command can be used. Echo can also be disabled by a program through the use of the FCONTROL or FDEVICECONTROL intrinsic. *Note that programs controlling block mode reads* must disable DTC echo.

Special Characters

Special characters are ASCII characters that have certain functions assigned to them; they signal the DTC to take a particular action. The results of using special characters are called special control functions. These include the characters described below, as well as the characters used for protocols. The characters described below are defaults and are modifiable by applications.

Backspace

When a backspace character is entered, the DTC deletes the previous character from the input data and echoes the backspace character to the terminal (provided echo is enabled). When the echoed backspace character is received, the cursor on the screen moves back one character and is positioned at the character that was deleted. Use **[Backspace]** or **[CTRL]-H** to backspace.

Line Delete

To delete a line of data while in character mode, press **[CTRL]-X**. After **[CTRL]-X** is pressed, three exclamation points (!!!), along with a carriage return and line-feed, are displayed, signaling that all read data was deleted.

End-of-Record Character

When a terminal operates in character mode, a special character is set to enable the user to end a read. This is called the **End-of-Record (EOR) character**. It is also called a record terminator or line terminator. Two types of EOR characters exist: standard EOR character and additional EOR character.

Standard EOR Character

When users finish typing a line and press **[Return]** (the standard EOR character), data is transmitted. The carriage return character terminates the read but it is not included in the data of the read or counted in the number of actual characters read. When the EOR character is detected, a carriage return is echoed to the screen and the ASC software generates a line feed. This places the cursor at the beginning of the next line. The EOR character can be replaced with another character during transparent editing; this is done through the FCONTROL 41 intrinsic.

Additional EOR Character

Also referred to as an alternate EOR character, this character is included in the data and the actual character count (byte count) of the data. The read does not end normally, but terminates in an error stating that the additional EOR character was encountered. The program that initiated the read must recover from the error by deleting the additional EOR character from the input data, subtracting one from the byte count, and sending a carriage return and line feed to place the cursor in its proper place.

AEOR characters can be defined through the FCONTROL 25 or FDEVICECONTROL 192, 40 intrinsics. Note that when a read terminates, the program must call the FCHECK intrinsic to see why the read terminated. If FCHECK returns an error code of 31, it means the read ended with the additional EOR character.

Up to 16 AEOR's are available but only through the use of FDEVICECONTROL 192, 66.

System Console Attention Character

When **[CTRL]-A** is entered on the system console, it signals a **[CTRL]-A** console command. The computer sends the system console a carriage return and line feed along with an equals sign prompt (=), signaling that it is ready for the command. **[CTRL]-A** commands are allowed only on the system console. For more information on the system console and its special commands, refer to *MPE/iX Managing Peripherals* (32650-90031).

Note

[CTRL]-A is not accepted as a special character from a terminal that is connected to a DTC.

System Break

Using default operating conditions, the ASC software responds to a system break signal from the terminal and alerts the computer. The system break function interrupts the execution of programs, subsystems, and most MPE/iX commands. Once the program or subsystem is interrupted, it can be aborted by entering the ABORT command or the program or subsystem can be restarted by entering the RESUME command.

To transmit a system break signal, press **[Break]**. System break can be disabled programmatically. Refer to the *MPE/iX Intrinsics Reference Manual* (32650-90031) for more information on system break.

Some application programs, such as block mode programs, change the settings of terminals and the characteristics of their device files. These programs should return the devices to normal operating mode before they complete.

If a program does not disable break (through the FCONTROL or FDEVICECONTROL intrinsic), the user can still use [Break]. If [Break] is pressed, the program might not be able to recover but the MPE/iX operating system will by assuming that the terminal is in normal operating mode.

A VPLUS block mode application can be reset by pressing **[CTRL], [Shift]**, and **[Reset]** simultaneously. Other block mode applications are harder to reset. Sometimes, it is necessary to turn the terminal off and on. Other times, the port must be reset. Refer to *Troubleshooting Terminal, Printer, and Serial Device Connections* for information on resetting ports if host-based management is being used. Refer to *Using OpenView DTC Manager* for more information on resetting ports if PC-based management is being used.

Subsystem Break

Subsystem break stops a program-local or subsystem-local command and enables the user to enter a different command. The default subsystem break character in standard editing mode is **[CTRL]-Y**.

Subsystem break is not enabled by default. It must be enabled programmatically through the FCONTROL 17 intrinsic. A subsystem break character can also be defined when entering transparent editing through the FCONTROL 41 intrinsic.

Transmission Speed

Asynchronous data transmission speeds on MPE/iX computers range from 300 bps to 19200 bps. The following speeds are supported:

> 300, 1200, 2400, 4800, 9600, and 19200 bps. 38400 bps is also supported for direct connected devices on DTC 16iX and DTC 72MX.

The speed chosen must be supported by the terminal. A terminal can be changed to any supported speed if it is directly connected to the DTC. The speed of a terminal connected to a modem should be set to the speed of the modem and the telephone line being used.

Parity

Parity verifies that each character of data is transmitted between a device and the system without error. It detects data transmission errors, but does not correct them.

Parity can be used only with 7-bit character sets, such as USASCII, because the eighth bit is used as a parity bit. Character sets that use all eight data bits cannot use parity. Examples include the terminal's alternate character set and character sets used for European languages.

Two types of true parity exist: odd and even. Odd parity counts the number of ones in the seven data bits for each character. Every character has an odd number of bits set to one. If there is an odd number of ones, the eighth bit (parity bit) is set to zero; if there is an even number of ones, the eighth bit is set to one. When the character is transmitted, the receiver verifies that the number of bits set to one is an odd number.

If one of the bits is transmitted incorrectly, the number of bits is even and an error is detected. If two bits are transmitted incorrectly, the character might contain an odd number of ones and the error won't be detected. Since most data transmission errors involve only one bit of the character, most transmission errors are detected.

Even parity works the same way as odd parity, except the total number of bits set to one in each character is set to an even number.

Hewlett-Packard asynchronous devices and the ASC software use two other parity settings as well. These are called ones and zeros.

With ones parity, the parity bit of each character is set to one; with zeros parity, the parity bit is set to zero. If the eighth bit is involved in a transmission error, it is detected because the bit is not what was expected.

It is possible to not use parity at all. This is called none parity or 8-bit pass-through. Neither the sender nor receiver of data sets the eighth bit or checks it for parity. (A terminal using a 7-bit character set and no parity places a zero in the eighth position so that characters being transmitted are always eight bits long.)

Parity can be enabled through the FCONTROL intrinsic or the FDEVICECONTROL intrinsic. When enabled, the ASC software generates parity on outgoing data and checks for parity errors on incoming data. After the parity is checked, the parity bit is set to zero because the program using the data has no need for parity information. Parity checking is handled the same way in block mode as in character mode.

Parity settings for terminals must match the type of parity used by the ASC software. *The default parity setting for HP terminals is to generate zeros parity*, but not to check parity on data from the computer. HP terminals will work correctly with the ASC software without having to modify any configuration values.

If enabling parity, verify that the program which uses the FCONTROL or the FDEVICECONTROL intrinsic either requests that the user change the terminal's parity setting to the new setting of the ASC software or pass the proper escape sequences to change the terminal's settings. When a parity error is detected, the read is completed in error. The ASC software reports the error to the program reading the data.

Input Modes

Data can be input in character mode or block mode. Characteristics and limitations for each are determined by the ASC software and the attached terminal.

Character Mode

Characters are transmitted to the DTC as they are typed. The DTC expects to receive them this way. If DTC echo is enabled, characters are echoed back to the screen as they are received.

Character mode is how terminals are opened, whether by a session or a program. Character mode reads are terminated with the carriage return character (**[Return]** or **[CTRL]-M**).

Block Mode

When a terminal operates in block mode, characters are held in the terminal's memory (buffer) as they are typed. Characters are not transmitted to the DTC until a specific action is taken. Pressing **[Enter]** at the end of a block of data will normally send it to the DTC.

An application program can use an alternate method to end a block mode read. Refer to "Terminating Reads" later in this chapter for more information on ways to end a block mode read.

Block mode is enabled programmatically by executing a block mode application at the terminal. The program needs to change the terminal's configuration settings. It should do this automatically by sending escape sequences to the terminal.

Blocks of characters can be input to the DTC a line at a time (called line block mode) or a page at a time (called page block mode), depending on the type of block mode used. Because characters are displayed on the screen as they are entered, local editing and cursor control features can be used to alter a line or page before it is transmitted to the DTC.

Data is transmitted one character (literally one byte) at a time, with each character bound by start bits and stop bits. Block mode sends data in one transmission "burst," although the characters are transmitted one by one in a long stream.

Data Editing Modes

Data input from a terminal is usually intended as data for the computer: commands, input to a program, etc. Some characters are not interpreted as data, but as special characters. When these characters are encountered, the DTC or the ASC software is signaled to perform a specific function. The functions vary from deleting a character to interrupting a program or subsystem.

The data editing mode defines which characters are recognized as special characters by the system. The types of data editing modes are as follows:

- Standard editing.
- Transparent editing.
- Binary editing.

Special character sets are defined for each editing mode. All special characters apply in standard editing mode, fewer apply in transparent editing mode, and no special characters are recognized in binary editing mode. Refer to the *Asynchronous Serial Communications Programmer's Reference Manual* for more information on data editing modes.

Terminating Reads

Reads can be programmatically terminated in one of several ways:

- An EOR or AEOR character is sent from the terminal.
- The input byte count is reached.
- The read limit timer expires.
- The block mode read timer expires.
- The system break character (if it is enabled) is sent from the terminal.
- The subsystem break character is sent from the terminal.
- The **[CTRL]-A** character is sent from the system console.
- The DTC encounters a parity error (only when parity checking is enabled).

Note that when using binary editing mode, a read cannot be terminated by any character. Binary reads can be terminated only if either:

- The input byte count is reached.
- The read limit timer expires.

How to Control Printers

Controlling printers is similar to controlling terminals, except for two differences:

- Printers have no need for control mechanisms (such as echo, read trigger, special characters, or modes of input) related to user input. Note: printers which support status checking require a read trigger.
- Printers need additional control mechanisms to define how output will appear on the printed page, as well as special ways to prevent data loss.

Each of the methods for controlling printers is explained in the pages that follow. Refer to the *Asynchronous Serial Communications Programmer's Reference Manual* for more information on programmatic device control.

Transmission Speed

Asynchronous data transmission speeds on MPE/iX computers range from 300 bps to 19200 bps. The following speeds are supported:

300, 1200, 2400, 4800, 9600, and 19200 bps. 38400 bps is also supported for direct connect devices on DTC 16iX and DTC 72MX.

If host-based, transmission speed is configured through NMMGR. The speed chosen must be supported by the printer. A printer can be changed to any supported speed if it is directly connected to the DTC. The speed of a printer connected to a modem is set by the speed of the modem and the telephone line being used.

Parity

Parity verifies that each character of data is transmitted between the system and the printer without error. It detects data transmission errors, but does not correct them. Printers using printer type file 21 use parity. Printer type file 21 generates odd parity. When a printer using printer type file 21 encounters a parity error, it remembers the error until the ASC software verifies the printer's status. When the error is returned to the ASC software, a message is printed on the system console.

Printers using printer type files 18 or 22 cannot use parity. Additionally, the FCONTROL and the FDEVICECONTROL intrinsic

cannot be used to change the parity settings for printers. For more information on parity, refer to "How to Control Terminals" earlier in this chapter.

Status Request

Printers using printer type files 21, 22, or 26 have a data protection mechanism that prevents the DTC from sending data to a printer when it is unable to print it. This mechanism is called **status request** or **status checking**. Printers respond to the request and return information on their status. A status request is sent after each file has printed.

Some printers are unable to return status information to the ASC software or to the user program controlling it. These printers should use printer type file 18, which does not send status checks to printers. Since the ASC software has no way of knowing when something is wrong, data can be lost.

Vertical Format Control

Many printers use Vertical Format Control (VFC) to direct the placement of output. VFC instructs a printer to skip to predetermined lines or to a specific point on a page with typically one or two commands, instead of counting and outputting a number of blank lines and spaces. This capability is often referred to as "Skip to Channel *x*," where *x* is one of the predetermined points.

Printer Initialization

When a printer is shared, each user can manipulate the printer in a different way. One user can change the printer's characteristics (such as margins, tabs, or print density) and affect another who does not want those characteristics.

To prevent one user from affecting other users, the printer must be initialized to a known state before printing the next job. When a printer configured as printer type file 21, 22, or 26 is opened, the ASC software writes an initialization character string to the printer.

Printers using printer type file 18 cannot use the initialization string. This means that if a user changes the printer's characteristics, the characteristics are not reset by the ASC software. The user's program must reset the printer when it is finished with it.

D

Error Messages

This chapter contains validation and Datacommunication Configurator (DCC) error messages. Validation errors indicate problems with the network management configuration file. They are detected during network management configuration file validation. DCC errors indicate problems with the link or the DTS manager. They are detected when the host is rebooted.

Validation Error Messages

A numerical list of validation error messages and actions for each follows.

1	MESSAGE	**Path:** *NMMGRpath* **A read error encountered while reading the data record (bad file).** **(DTSERR=1)**
	CAUSE	Either a hardware problem occurred or the data record is too long.
	ACTION	Try to print the network management configuration file. Rebuild the file from a copy of the sample file NMSAMP1.PUB.SYS. If the problem persists, contact your Hewlett-Packard support representative.
2	MESSAGE	**Path:** *NMMGRpath* **A write error encountered while updating the data record (bad file).** **(DTSERR=2)**
	CAUSE	Either a hardware problem occurred or the data record file is too small.
	ACTION	If the data record file has been compressed, it is impossible to validate the file. Go to the UTILITY screen and use the compression utility to make the file larger. Try to validate the file. If it still fails, build the file from a copy of the sample file NMSAMP1.PUB.SYS. If the problem persists when verifying the new file, contact your Hewlett-Packard support representative.
3	MESSAGE	**Path:** *NMMGRpath* **The data record is empty (use Update Data function key).** **(DTSERR=3)**
	CAUSE	The data record was not created for the *NMMGRpath*.
	ACTION	Go back to the screen specified by the *NMMGRpath* and update the screen.
4	MESSAGE	**Path:** *NMMGRpath* **The same physical path is being used at LINK.***linkname*. **(DTSERR=4)**
	CAUSE	The physical path specified for this link is being used.
	ACTION	Go to the link screen specified by the *NMMGRpath* or go to the link screen specified by the *linkname*, and modify the physical path.

5	MESSAGE	**Path:** *NMMGRpath* **The same station address is being used at LINK.***linkname*. **(DTSERR=5)**
	CAUSE	The IEEE 802.3 station address is already used. Each station address must be unique.
	ACTION	Go back to the screen specified by the *NMMGRpath* or go to the screen specified by the *linkname* and modify the station address.
6	MESSAGE	**Path:** *NMMGRpath* **LINK.***linkname* **is not defined.** **(DTSERR=6)**
	CAUSE	The link name specified on the DTS Configuration screen is not defined; therefore, the link data record was not created.
	ACTION	Verify the link name on the DTS Configuration screen. If the link data record does not exist, update the DTS Configuration screen.
7	MESSAGE	**Path:** *NMMGRpath* **DTS.PROFILE.***profilename* **is not defined.** **(DTSERR=7)**
	CAUSE	The *profilename* on the screen specified by the *NMMGRpath* is not defined; therefore, the profile data record does not exist.
	ACTION	Check that the profile name exists on the DTS Profile Selection screen and if it does, check that the data record for this profile was created.
8	MESSAGE	**Path:** *NMMGRpath* **The same station address or node name is being used at DTS.DTC.SELECT.***DTCname*. **(DTSERR=8)**
	CAUSE	The station address or node name used on the screen specified by the *NMMGRpath* is also used on the screen specified by the DTS.DTC.SELECT.*DTCname* screen.
	ACTION	Go to the screen specified by the *NMMGRpath* or to the screen specified by the *DTCname* and modify the station address or node name.

9	MESSAGE	**Path:** *NMMGRpath* **The same LDEV #*nnn* is being used at** **DTS.DTC.SELECT.*DTCname*.CARD012.** **(DTSERR=9)**
	CAUSE	The logical device (ldev) number is being used on the screen specified by the *NMMGRpath* and on the DTS.DTC.SELECT.*DTCname*.CARD012 screen.
	ACTION	Go to one of the two screens and change the ldev number. The ldev number must be unique for each port.
10	MESSAGE	**Path:** *NMMGRpath* **The same LDEV #*nnn* is being used at** **DTS.DTC.SELECT.*DTCname*.CARD345.** **(DTSERR=10)**
	CAUSE	The same logical device (ldev) number is being used on the screen specified by the *NMMGRpath* and on the DTS.DTC.SELECT.*DTCname*.CARD345 screen.
	ACTION	Go to one of the two screens and change the ldev number. The ldev number must be unique for each port.
12	MESSAGE	**Path:** *NMMGRpath* **LDEV #*nnn* is too big (must be <=2175).** **(DTSERR=12)**
	CAUSE	The logical device (ldev) number is bigger than the allowed maximum ldev number.
	ACTION	Go to the screen specified by the *NMMGRpath* and modify the ldev number.
13	MESSAGE	**Path:** *NMMGRpath* **Too many LDEVs are being used (must be <=1700).** **(DTSERR=13)**
	CAUSE	Too many logical device (ldev) numbers are being used.
	ACTION	Review the screens that use ldevs and delete some ldev numbers. The validation procedure allows a total of 1700 ldevs.

15	MESSAGE	**Path:** *NMMGRpath* **Defined LINK.** *linkname* **is not being used.** **(DTSWARN=15)**
	CAUSE	The defined *linkname* is not used by DTS or the network interface.
	ACTION	This is a warning only. No action is required.
16	MESSAGE	**Path:** *NMMGRpath* **Too many links are being used (max. number allowed = 8).** **(DTSERR=16)**
	CAUSE	The link specified in the *NMMGRpath* cannot be processed. Too many links are already defined.
	ACTION	Go back to the DTS Configuration screen and delete the link specified in the *NMMGRpath.* Delete all unused links so that eight or less links are being used.
17	MESSAGE	**Path:** *NMMGRpath* **Too many paths are being used (max. number allowed = 8).** **(DTSERR=17)**
	CAUSE	The link specified in the *NMMGRpath* cannot be processed. Too many physical paths are already defined.
	ACTION	Go back to the DTS Configuration screen and delete the link specified in the *NMMGRpath.* Delete all unused links so that eight or less links are being used.
18	MESSAGE	**Path:** *NMMGRpath* **Too many DTCs are being used (max. number allowed = 120).** **(DTSERR=18)**
	CAUSE	The DTC specified in the *NMMGRpath* cannot be processed. Too many DTCs are already configured.
	ACTION	Go back to the DTC Configuration screen and delete the DTC specified in the *NMMGRpath.*

19	MESSAGE	**Path: *NMMGRpath*** **Too many nodes are being used (max. number allowed = 129). (DTSERR=19)**
	CAUSE	The DTC specified in the *NMMGRpath* cannot be processed. Too many nodes are being used.
	ACTION	Go to the DTC Configuration screen and delete the DTC specified in the *NMMGRpath*.
20	MESSAGE	**Path: *NMMGRpath*** **Too many classes are being used (max. number allowed = 450). (DTSERR=20)**
	CAUSE	The total number of classes exceeds the maximum allowed number.
	ACTION	Delete class names so that no more than 450 different class names are associated with asynchronous devices.
21	MESSAGE	**Path: *NMMGRpath*** **Too many profiles are being used (max. number allowed = 256). (DTSERR=21)**
	CAUSE	The total number of defined profiles exceeds the maximum allowed.
	ACTION	Delete profiles so that no more than 256 are specified.
22	MESSAGE	**No link is defined.** **(DTSWARN=22)**
	CAUSE	A link is not configured.
	ACTION	Without a configured link, the network management configuration file is useless. Return to the configuration screens and add a link, making sure that all necessary data records are created.
23	MESSAGE	**No DTC is defined.** **(DTSWARN=23)**
	CAUSE	A DTC is not configured.
	ACTION	An action is not required if neither terminals, printers, nor both are needed. If terminals and printers are required, return to the configuration screens and add a DTC, making sure that all necessary data records are created.

24	MESSAGE	**Path:** *NMMGRpath* **LINK.***linkname* **is shared with network interface.** **(DTSWARN=24)**
	CAUSE	The same link is shared between the DTS and the NS subsystem. A separate link must exist for each of the two subsystems.
	ACTION	Decide which of the two subsystems should use the existing link and configure an additional link for the remaining subsystem.
25	MESSAGE	**Path:** *NMMGRpath* **Modem type not supported.** **(DTSERR=25)**
	CAUSE	The modem type specified on the DTS Terminal Profile screen is not 0, 1, or 2.
	ACTION	Modify the modem type specified on the DTS Terminal Profile screen to specify the appropriate modem type.
27	MESSAGE	**Path:** *NMMGRpath* **Must supply a physical path.** **(DTSERR=27)**
	CAUSE	A physical path was not specified in the Physical Path of LANIC field.
	ACTION	Go the DTS Configuration screen and enter the appropriate physical path.
28	MESSAGE	**Path:** *NMMGRpath* **Duplicate profile class name** *classname* **used.** **(DTSWARN=28)**
	CAUSE	The same class name is used in several terminal profiles or the same class name is used in several printer profiles.
	ACTION	An action is not required. Informational message only.

29	MESSAGE	**Path:** *NMMGRpath* **Class name duplicated between printer and terminal profiles.** **(DTSERR=29)**
	CAUSE	The same class name is used for both a terminal profile and a printer profile.
	ACTION	Remove the duplicate class name from the terminal profile or the printer profile.
30	MESSAGE	**Path:** *NMMGRpath* **Profile** *profilename* **specified for non-nailed terminals is of printer-type.** **(DTSERR=30)**
	CAUSE	A printer profile is specified where only a terminal profile is allowed.
	ACTION	Change the printer profile to be a terminal profile.
31	MESSAGE	**Path:** *NMMGRpath* **Profile** *profilename* **specified for non-nailed PAD terminals is of Printer-type.** **(DTSERR=31)**
	CAUSE	A printer profile is specified where only a terminal profile is allowed.
	ACTION	Change the printer profile to be a terminal profile.
32	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at DTS.DTCPC.SELECT.***DTCname***.CARD012.PAD0.** **(DTSERR=32)**
	CAUSE	A PAD name is used more than once.
	ACTION	Remove all of the duplicate references to the PAD name.

33	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD012.PAD1.** **(DTSERR=33)**
	CAUSE	A PAD name is used more than once.
	ACTION	Remove all of the duplicate references to the PAD name.
34	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD012.PAD2.** **(DTSERR=34)**
	CAUSE	A PAD name is used more than once.
	ACTION	Remove all of the duplicate references to the PAD name.
35	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD345.PAD3.** **(DTSERR=35)**
	CAUSE	A PAD name is used more than once.
	ACTION	Remove all of the duplicate references to the PAD name.
36	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD345.PAD4.** **(DTSERR=36)**
	CAUSE	A PAD name is used more than once.
	ACTION	Remove all of the duplicate references to the PAD name.
37	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD345.PAD5.** **(DTSERR=37)**
	CAUSE	A PAD name is used more than once.
	ACTION	Remove all of the duplicate references to the PAD name.

38	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD** **012.PAD0. (DTSERR=38)**
	CAUSE	The same logical device (ldev) number is used more than once.
	ACTION	Remove the duplicate ldev number.
39	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD012.PAD1.** **(DTSERR=39)**
	CAUSE	The same logical device (ldev) number is used more than once.
	ACTION	Remove the duplicate ldev number.
40	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD012.PAD2.** **(DTSERR=40)**
	CAUSE	The same logical device (ldev) number is used more than once.
	ACTION	Remove the duplicate ldev number.
41	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD345.PAD3.** **(DTSERR=41)**
	CAUSE	The same logical device number (ldev) is used more than once.
	ACTION	Remove the duplicate ldev number.
42	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD345.PAD4.** **(DTSERR=42)**
	CAUSE	The same logical device (ldev) number is used more than once.
	ACTION	Remove the duplicate ldev number.

43	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD345.PAD5.** **(DTSERR=43)**
	CAUSE	The same logical device (ldev) number is used more than once.
	ACTION	Remove duplicate ldev number.
44	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD012.** **(DTSERR=44)**
	CAUSE	The logical device (ldev) number is used more than once in the CARD012 configuration.
	ACTION	Remove any duplicate references to the ldev number.
45	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTCPC.SELECT.***DTCname***.CARD345.** **(DTSERR=45)**
	CAUSE	The logical device (ldev) number is used more than once in the CARD345 configuration.
	ACTION	Remove any duplicate references to the ldev number.
46	MESSAGE	**Path:** *NMMGRpath* **The same node name is being used at** *linkname***.** **(DTSERR=46)**
	CAUSE	The same node name is used more than once.
	ACTION	Remove the duplicate reference to the node name.
47	MESSAGE	**Path:** *NMMGRpath* **Blank node name.** **(DTSERR=47)**
	CAUSE	A host node name is not specified on the screen specified in the path.
	ACTION	Enter a host node name on the screen specified in the path.

48	MESSAGE	**Path:** *NMMGRpath* **The profile for LDEV** *#nnn*, *profilename*, **is not defined.** **(DTSERR=48)**
	CAUSE	An incorrect profile name was used for the logical device (ldev).
	ACTION	Verify the profile name for the logical device in the DTS Profile Selection screen.
49	MESSAGE	**Path:** *NMMGRpath* **Too many logical devices are configured using device class name** *devicename* **(max allowed num = 255).** **(DTSERR=49)**
	CAUSE	Too many logical devices are configured under the specified device class name. The maximum allowed is 255.
	ACTION	Reduce the number of logical devices configured under the specified device class name.
50	MESSAGE	**Path:** *NMMGRpath* **Profile** *profilename* **specified for non-nailed PAD terminals is of PRINTER or PADPRINT type.** **(DTSERR=50)**
	CAUSE	A printer or PAD printer profile is specified where only a terminal or pad terminal profile is allowed.
	ACTION	Change the printer profile to be a terminal profile.
51	MESSAGE	**Path:** *NMMGRpath* **The profile for LDEV** *#nnn*, *profilename*, **is of PADTERM or PADPRINT type.** **(DTSERR=51)**
	CAUSE	A PAD terminal or PAD printer profile is specified where only a terminal or printer profile is allowed.
	ACTION	Change the PAD terminal or PAD printer profile to be a terminal or printer profile.

52	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD012.PAD0.** **(DTSERR=52)**
	CAUSE	The same PAD device name is used more than once in the configuration.
	ACTION	Remove any duplicate references to the PAD device name.
53	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD012.PAD1.** **(DTSERR=53)**
	CAUSE	The same PAD device name is used more than once in the configuration.
	ACTION	Remove any duplicate references to the PAD device name.
54	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD012.PAD2.** **(DTSERR=54)**
	CAUSE	The same PAD device name is used more than once in the configuration.
	ACTION	Remove any duplicate references to the PAD device name.
55	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD345.PAD3.** **(DTSERR=55)**
	CAUSE	The same PAD device name is used more than once in the configuration.
	ACTION	Remove any duplicate references to the PAD device name.
56	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD345.PAD4.** **(DTSERR=56)**
	CAUSE	The same PAD device name is used more than once in the configuration.
	ACTION	Remove any duplicate references to the PAD device name.

57	MESSAGE	**Path:** *NMMGRpath* **PAD device name for LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD345.PAD5.** **(DTSERR=57)**
	CAUSE	The same PAD device name is used more than once in the configuration.
	ACTION	Remove any duplicate references to the PAD device name.
58	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD012.PAD0.** **(DTSERR=58)**
	CAUSE	The logical device (ldev) number is used more than once in the configuration.
	ACTION	Remove any duplicate references to the ldev number.
59	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD012.PAD1.** **(DTSERR=59)**
	CAUSE	The logical device (ldev) number is used more than once in the configuration.
	ACTION	Remove any duplicate references to the ldev number.
60	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD012.PAD2.** **(DTSERR=60)**
	CAUSE	The logical device (ldev) number is used more than once in the configuration.
	ACTION	Remove any duplicate references to the ldev number.

61	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD345.PAD3.** **(DTSERR=61)**
	CAUSE	The logical device (ldev) number is used more than once in the configuration.
	ACTION	Remove any duplicate references to the ldev number.
62	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD345.PAD4.** **(DTSERR=62)**
	CAUSE	The logical device (ldev) number is used more than once in the configuration.
	ACTION	Remove any duplicate references to the ldev number.
63	MESSAGE	**Path:** *NMMGRpath* **The same LDEV** *#nnn* **is being used at** **DTS.DTC.SELECT.***DTCname***.CARD345.PAD5.** **(DTSERR=63)**
	CAUSE	The logical device (ldev) number is used more than once in the configuration.
	ACTION	Remove any duplicate references to the ldev number.
64	MESSAGE	**Path:** *NMMGRpath* **Modem behaviour DCE high for LDEV** *#nnn*, **defined in Profile** *profilename*, **is not supported on DTC 16 and DTC 48.** **(DTSERR=64)**
	CAUSE	DCE high modem behaviour is not supported for devices on a DTC 16 or DTC 48. DCE high is being specified for LDEV *#nnn*, which is on a DTC 16 or DTC 48.
	ACTION	Modify the modem behaviour to one that is supported for the DTC, or make sure you have specified the right DTC type (not a DTC 16 or DTC 48) for the device with LDEV *#nnn*.

65	MESSAGE	**Path:** *NMMGRpath* **Hardware handshaking for LDEV #*nnn*, defined in Profile *profilename*, is not supported on DTC 16 and DTC 48. (DTSERR=65)**
	CAUSE	Hardware handshaking is not supported for devices on a DTC 16 or DTC 48. Hardware handshaking is being specified for LDEV *#nnn*, which is on a DTC 16 or DTC 48.
	ACTION	Make sure you have specified the right DTC type (not a DTC 16 or DTC 48), or if you are configuring ports on a DTC 16 or DTC 48, do not use a profile that specifies hardware handshaking.
66	MESSAGE	**Path:** *NMMGRpath* **Modem behaviour is not supported. (DTSERR=66)**
	CAUSE	An invalid modem behaviour has been specified. Valid modem behaviour values are: 0, 1, 2, or 3. The configuration file may be corrupt.
	ACTION	Modify the modem behaviour specified on the Terminal Profile or Printer Profile screens to a valid value.
67	MESSAGE	**Path:** *NMMGRpath* **Invalid AFCP timer selection. (DTSERR=67)**
	CAUSE	You have specified an invalid AFCP timer selection.
	ACTION	Go to the Tune DTC - Timer Selection Screen and choose a value from 1 to 6 for an AFCP timer selection.
68	MESSAGE	**Path:** *NMMGRpath* **Invalid Management timer selection. (DTSERR=68)**
	CAUSE	You have specified an invalid management timer selection.
	ACTION	Go to the Tune DTC - Timer Selection Screen and choose a value of 1 or 2 for a management timer selection.

69	MESSAGE	**Path:** *NMMGRpath* **Baud rate 38400 for LDEV** *#nnn*, **defined in Profile** *profilename*, **is not supported on DTC 16 and DTC 48. (DTSERR=69)**
	CAUSE	You have used a profile that specified a baud rate of 38400 for a device that is connected to a DTC 16 or DTC 48.
	ACTION	Make sure you specified the right DTC type (not a DTC 16 or DTC 48), or do not use this profile for the port with LDEV *#nnn*.
	MESSAGE	**After successful validation, run SYSGEN to cross-validate the DTS configuration with the system configuration.**
	CAUSE	This is just a warning message.
	ACTION	Make sure that after a successful validation, you run SYSGEN to cross-validate the DTS configuration with the system configuration.
	MESSAGE	**In order for any TIO changes to take effect, you must reboot the system.**
	CAUSE	This is just a warning message.
	ACTION	After you make changes to your DTS TIO configuration, you must reboot your HP 3000 system in order for the changes to take effect.

DCC Error Messages

As system start-up nears completion, the Datacomm Configurator (DCC) creates the LINK and DTS managers. If the procedure is successful, the following message will be displayed on the console:

```
DCC STARTUP - OK!
```

If the procedure is not successful, the message above is replaced by one or more error messages.

When looking up an error message, note that the following strings of characters are used to represent information that is inserted when the message is generated:

- P-L - is replaced by a DCC procedure number and DCC location number; used for detailed diagnostics by Hewlett-Packard support representative.
- *SSSSSSSS* - is replaced by an eight-digit hexadecimal value; also used for detailed diagnostics.
- *MMM* and *LLL* - are replaced by decimal values; used for detailed diagnostics.
- *PATH* - is replaced by an NMCONF path or LLIO physical path.

1	MESSAGE	**DCC ERROR P-L, (LLIO status *SSSSSSSS*). (DCCERR=1)**
	CAUSE	A problem exists with the low-level I/O services.
	ACTION	Contact your Hewlett-Packard support representative.
2	MESSAGE	**DCC ERROR P-L, (reply status *SSSSSSSS*, msg descriptors *MMM*). (DCCERR=2)**
	CAUSE	A problem exists with interprocess communication.
	ACTION	Contact your Hewlett-Packard support representative.
3	MESSAGE	**DCC ERROR P-L, Configuration file open error *SSSSSSSS*. (DCCERR=3)**
	CAUSE	The configuration file does not exist or it is locked.
	ACTION	Check to see if NMCONFIG.PUB.SYS exists. If it exists, verify that it is the proper file type and that it is not locked.
4	MESSAGE	**DCC ERROR P-L, (NMCONF record error *SSSSSSSS*). NM Path: *NMMGRpath* (DCCERR=4)**
	CAUSE	The DCC surrogate cannot read a record in NMCONFIG.PUB.SYS, or data in the file was not validated or the data is corrupt.
	ACTION	Validate the NMCONFIG.PUB.SYS file and reboot. If necessary, replace the file, validate the file, and reboot the system.
5	MESSAGE	**DCC ERROR P-L, configuration record data was invalid. NM Path: *NMMGRpath* (DCCERR=5)**
	CAUSE	Data in the NMCONFIG.PUB.SYS file was not validated or the data is corrupt.
	ACTION	Validate the NMCONFIG.PUB.SYS file and reboot the system.

6	MESSAGE	**DCC ERROR P-L, (HLIO status *SSSSSSSS*, ldev *LLL*). (DCCERR=6)**
	CAUSE	A problem exists with the high-level I/O services.
	ACTION	Contact your Hewlett-Packard support representative.
7	MESSAGE	**DCC ERROR P-L, (Buffer manager status *SSSSSSSS*). (DCCERR=7)**
	CAUSE	A problem exists with the datacomm buffers.
	ACTION	Contact your Hewlett-Packard support representative.
8	MESSAGE	**DCC ERROR P-L, (External procedure not found). (DCCERR=8)**
	CAUSE	A problem exists with DCC execution.
	ACTION	Contact your Hewlett-Packard support representative.
9	MESSAGE	**DCC ERROR P-L, (Memory management status *SSSSSSSS*). (DCCERR=9)**
	CAUSE	A problem with the system occurred; the DCC cannot obtain memory.
	ACTION	Contact your Hewlett-Packard support representative.
10	MESSAGE	**DCC ERROR P-L, (Ports status *SSSSSSSS*). (DCCERR=10)**
	CAUSE	A problem with the DCC or the port's subsystem occurred.
	ACTION	Contact your Hewlett-Packard support representative.
11	MESSAGE	**DCC ERROR P-L, time out on reply msg, descriptors *MMM*. (DCCERR=11)**
	CAUSE	The DCC did not receive a reply message within the allotted time.
	ACTION	Contact your Hewlett-Packard support representative.

12	MESSAGE	**DCC ERROR P-L, too many DTCs configured. (DCCERR=12)**
	CAUSE	The NMCONFIG.PUB.SYS file contains more than the supported number of DTCs.
	ACTION	Remove excess DTCs from the NMCONFIG.PUB.SYS file and reboot.
13	MESSAGE	**DCC ERROR P-L, link name specified for the DTS does not exist. (DCCERR=13)**
	CAUSE	The link name configured in NMMGR on the DTS Configuration screen does not exist.
	ACTION	Go the DTS Configuration screen and enter the link name.
14	MESSAGE	**DCC ERROR P-L, link name specified for the DTS is not available. (DCCERR=14)**
	CAUSE	A problem occurred with the link hardware; the LANIC might be in the wrong slot or it might not be connected to the LAN.
	ACTION	Check the hardware configuration and connections.
15	MESSAGE	**DCC ERROR P-L, too many links configured. (DCCERR=15)**
	CAUSE	More that eight links are configured.
	ACTION	Delete all unused links so that eight or less links are used.
16	MESSAGE	**DCC ERROR P-L, message received on wrong subque. (DCCERR=16)**
	CAUSE	A problem exists with the interprocess communication.
	ACTION	Contact your Hewlett-Packard support representative.

17	MESSAGE	**DCC ERROR P-L, unrecognized message received. (DCCERR=17)**
	CAUSE	A problem exists with the interprocess communication.
	ACTION	Contact your Hewlett-Packard support representative.
18	MESSAGE	**DCC ERROR P-L, internal DCC logic error. (DCCERR=18)**
	CAUSE	A problem internal to the DCC exists.
	ACTION	Contact your Hewlett-Packard support representative.
19	MESSAGE	**DCC ERROR P-L, Link error status. (DCCERR=19)**
	CAUSE	A problem occurred while configuring the link manager.
	ACTION	Contact your Hewlett-Packard support representative.
20	MESSAGE	**DCC WARNING P-L, Add LDEV to class failure (HLIO status** *SSSSSSSS*, **ldev** *LLL*). **(DCCERR=20)**
	CAUSE	A class contains more than 255 devices, or a conflict in class names exists.
	ACTION	Run SYSGEN to verify the conflict.
21	MESSAGE	**DCC ERROR P-L, Configuration file close error** *SSSSSSSS*. **(DCCERR=21)**
	CAUSE	A problem occurred while closing the NMCONFIG.PUB.SYS file or the NMCONFIX.PUB.SYS file.
	ACTION	Check that the files exist, and that adequate disc space is available for them. If the files exist and the disc space is large enough, check for file system or hardware problems.

22	MESSAGE	**NLIO status** *SSSSSSSS*, **ldev** *LLL*) **(DCCERR=22)**
	CAUSE	A problem exists in the NLIO services.
	ACTION	Contact your Hewlett-Packard support representative.
23	MESSAGE	**DCC ERROR P-L, Blank NODENAME. (DCCERR=23)**
	CAUSE	A host node name was not configured.
	ACTION	Configure a host node name.
24	MESSAGE	**DCC ERROR P-L, Configuration file not validated. (DCCERR=24)**
	CAUSE	Either modifications were made to the network management configuration file and the file was not validated, or the file was validated but the errors listed to the console were not corrected.
	ACTION	Either validate the network management configuration file, or correct the errors listed to the console when the file was first validated and then revalidate the file.
25	MESSAGE	**DCC ERROR P-L, X.25 Level 1&2 not configured in NMMGR, status** *SSSSSSSS*. **(DCCERR=25)**
	CAUSE	Level 1&2 of the X.25 network management structure have not been configured in NMMGR.
	ACTION	Supply the required information in the X.25 Level 1&2 screen in NMMGR.
26	MESSAGE	**DCC ERROR P-L, X.25 Level 3 not configured in NMMGR, status** *SSSSSSSS* **(DCCERR=26)**
	CAUSE	Level 3 of the X.25 network management structure have not been configured in NMMGR.
	ACTION	Supply the required information in the X.25 Level 3 screen in NMMGR.

27	MESSAGE	**DCC ERROR P-L, Invalid card number specified, status** *SSSSSSSS*, **card number =** *cardnumber*. **(DCCERR=27)**
	CAUSE	You have specified an invalid card number for the DTC type.
	ACTION	For DTC 72MX, the valid range for card number is 0 to 3. For DTC 48, the valid range for card number is 0 to 5. For DTC 16, you may use card 0 and 1 for connector cards and card 2 for X.25 card.
28	MESSAGE	**DCC ERROR P-L, Invalid DTC type specified, status** *SSSSSSSS*. **(DCCERR=28).**
	CAUSE	The NMCONFIG.PUB.SYS file may be corrupt.
	ACTION	Uae a backup configuration file, verify and update your configuration, validate, cross-validate with SYSGEN, and reboot your system. Keep the corrupt configuration file and report this condition to your HP representative.
100	MESSAGE	**WARNING: I/O config from last START NORECOVERY will be used. (DCCWARN=100)**
	CAUSE	A routine message; this indicates that a start recovery is being attempted.
	ACTION	No action is required.
101	MESSAGE	**DCC WARNING P-L, (Startup) cannot open NMCONFIG, status** *SSSSSSSS*. **(DCCWARN=101)**
	CAUSE	Cannot open the NMCONFIG.PUB.SYS file.
	ACTION	Check that the file exists and that it is not locked. If the file exists and is not locked, check for file system or hardware problems.
102	MESSAGE	**DCC WARNING P-L, (Startup) cannot purge NMCONFIX, status** *SSSSSSSS*. **(DCCWARN=102)**
	CAUSE	The NMCONFIX.PUB.SYS file cannot be purged.
	ACTION	Check that the file exists. If the file exists, check for file system or hardware problems.

103	MESSAGE	**DCC WARNING P-L, (Startup) cannot open NMCONFIX, status** *SSSSSSSS*. **(DCCWARN=103)**
	CAUSE	The NMCONFIX.PUB.SYS file exists but it cannot be opened.
	ACTION	Check that the file is not locked. If the file is not locked, check for file system or hardware problems.
104	MESSAGE	**DCC WARNING P-L, (Startup) cannot create NMCONFIX, status** *SSSSSSSS*. **(DCCWARN=104)**
	CAUSE	A disc space problem, a file system problem, or a hardware problem exists.
	ACTION	Verify that enough disc space is available. If enough disc space is available, verify that no the file system problems exist. Then, verify that no hardware problems exist.
105	MESSAGE	**DCC WARNING P-L , (Startup) cannot copy record from NMCONFIX, status** *SSSSSSSS*. **(DCCWARN=105)**
	CAUSE	The NMCONFIX.PUB.SYS does not exist, or a file system or hardware problem exists.
	ACTION	Check that the NMCONFIX.PUB.SYS file exists. If it does not, restore it. If the file exists, check for file system or hardware problems.
106	MESSAGE	**DCC WARNING P-L, (Startup) cannot copy record to NMCONFIG, status** *SSSSSSSS*. **(DCCWARN=106)**
	CAUSE	The NMCONFIG.PUB.SYS file does not exist, or a file system or hardware problem exists.
	ACTION	If the file does not exist, create it. If the file exists, check for file system or hardware problems.

107	MESSAGE	**DCC WARNING P-L, (Startup) cannot close NMCONFIG, status** *SSSSSSSS*. **(DCCWARN=107)**
	CAUSE	The NMCONFIG.PUB.SYS file does not exist, or a disc space, a file system, or hardware problem exists.
	ACTION	Check that the NMCONFIG.PUB.SYS file exists. If it does not exist, restore it. If the file exists, check for a disc space problem, a file system problem, or a hardware problem.
108	MESSAGE	**DCC WARNING P-L, (Startup) cannot close NMCONFIX, status** *SSSSSSSS*. **(DCCWARN=108)**
	CAUSE	The NMCONFIX.PUB.SYS file does not exist, or a disc space, file system, or hardware problem exists.
	ACTION	Check that the NMCONFIX.PUB.SYS exists. If it does not exist, restore it. If the file exists, check for a file system problem or a hardware problem.

Glossary

A

access port A special interface card in the system cabinet through which the MPE/iX system console is connected.

ADCP Avesta Device Control Protocol. An HP proprietary protocol which provides device control features. ADCP is optimized for communications between a DTC and MPE/iX systems.

address A numerical identifier defined and used by a particular protocol and associated software to distinguish one node from another.

address key *See* **X.25 address key.**

address resolution In NS networks, the mapping of node names to IP addresses and the mapping of IP addresses to subnet addresses.

address resolution protocol (ARP) A protocol used to convert an IP address to a low level hardware address. ARP can be used only over a single physical network and is limited to networks that support hardware broadcast.

adjacent A node on a point-to-point network that is connected to another node by a single link with no intervening nodes.

ADP Active Distribution Panel. *See* **MDP.**

AFCP Avesta Flow Control Protocol. An HP proprietary protocol which provides data flow control features. AFCP is optimized for communications between nodes, including DTCs, in an MPE/iX environment.

ARP *See* **address resolution protocol.**

ARPA Advanced Research Projects Agency. It is the former name of the Defense Advanced Research Project Agency (DARPA). The Internet suite of protocols was developed under ARPA guidance.

ARPA Telnet Access An HP product which is a board that can be installed in a DTC 48 and DTC 72MX. The Telnet Access board performs protocol translation. Calls to the IP address of an MPE/iX system are detected by the Telnet Access board and are retransmitted on the LAN using AFCP, allowing connections from terminals on ARPA systems to HP 3000s.

ARPA Telnet Express An HP product which is a standalone hardware platform dedicated to performing protocol translation. Calls to the IP address of an MPE/iX system are detected by the Telnet Express and are retransmitted on the LAN using AFCP, allowing connections from terminals on ARPA systems to HP 3000s.

ASCII American National Standard Code for Information Interchange. A character set using 7-bit code used for information interchange among data processing and data communications systems. The American implementation of International Alphabet No. 5.

asynchronous A device's mode of operation in which a sequence of operations are executed irrespective of time coincidence with any event. Devices that are directly accessible by people (for example, terminal keyboards) operate in this manner.

asynchronous processor board The new 24-port mux board for the DTC 72MX. Allows up to 24 direct and modem connections per board. A DTC 72MX can have up to 3 asynchronous processor boards (for a total of 72 connections).

Attachment Unit Interface AUI. The cable that runs between each node (host, DTC, or other device) and the Medium Attachment Unit (MAU) that connects it to the LAN in a ThickLAN configuration.

autodial A dial link in which the remote node's telephone number is automatically dialed by a modem or other device with this capability.

B

backbone LAN A thick LAN cable conforming to the IEEE 802.3 Type 10 BASE 5 Standard.

back-to-back configuration A DTC configuration whereby MPE users connected to one DTC can communicate with a non-MPE/iX system connected to another DTC via the LAN. *See also* **Local Switching**.

banner A welcome message displayed on your screen. On the local OpenView workstation a banner appears when a remote connection is established with the OpenView DTC Manager. A banner also can appear when you log on to MPE.

baud The measure of the speed at which information travels between devices, most commonly used in reference to terminal speed settings. Baud represents signal events per second. When one bit represents each signal change, baud is the same as "bits per second."

binary mode A data-transfer scheme in which no special character processing is performed. All characters are considered to be data and are passed through with no control actions being taken.

bit Binary digit. A unit of information that designates one of two possible states, which are represented by either 1 or 0.

block mode A terminal processing mode in which groups, or "blocks," of data are transmitted all at once.

BNC T-Connector A connector used to connect a computer or a component such as a DTC to the LAN in a ThinLAN configuration.

boundary *See* **network boundary.**

bps Bits per second. The number of bits passing a point per second.

bridge A device that is used to connect LAN segments.

broadcast Communication method of sending a message to all devices on a link simultaneously.

buffer A logical grouping of a system's memory resources used by NS3000/iX.

byte A sequence of eight consecutive bits operated on as a unit.

C

call In X.25, a call is an attempt to set up communication between two DTEs using a virtual circuit. Also known as a virtual call.

call collision A conflict that occurs at a DTE/DCE interface when there is a simultaneous attempt by the DTE and DCE to set up a call using the same logical channel identifier.

called address When a node sends out a call request packet, the packet contains the address of the destination node. The address of the destination node is the called address.

calling address When a node receives an incoming call packet, the packet contains the address of the sending node. The address of the sending node is the calling address.

carrier A continuous wave that is modulated by an information-bearing signal.

catenet *See* **internetwork.**

CCITT Consultative Committee for International Telephony and Telegraphy. An international organization of communication carriers, especially government telephone monopolies, responsible for developing telecommunication standards by making recommendations. The emphasis is on "recommendations"; no carrier is required to adhere to a CCITT recommendation, although most do so in their own interests.

CIB The channel input/output bus in the backplane of an HP 3000.

circuit-switching network A type of data communications network wherein a physical and exclusive link is maintained between two communicating devices for the call duration. An all-digital, circuit-switching network is often referred to as an X.21 network.

closed user group An X.25 user facility that allows communication to and from a pre-specified group of users and no one else.

compatibility mode A processing mode on HP 3000 Series 900 computers that allows applications written for MPE V/E-based systems to be ported and run without changes or recompilation.

computer network A group of computer systems connected in such a way that they can exchange information and share resources.

configuration 1) The way in which computer equipment is physically interconnected and set up to operate as a system. 2) The layout of the computer system, including the MPE table, memory, and buffer sizes, that tells which peripheral devices are (or can be) connected to the computer and how they can be accessed. 3) The process of defining the characteristics of a network in software.

For MPE/iX-based computers, the operating systems are configured through use of the SYSGEN utility.

Next, the Distributed Terminal Subsystem (DTS) link is configured by using NMMGR (running on the host) and can, in addition, be configured using the OpenView DTC Manager software (running on the OpenView Windows Workstation) depending on the type of network management you use.

A system that is to run network services (NS3000/iX) is configured through use of NMMGR.

Access to X.25 is configured in two parts. The X.25 MPE/iX System Access software is configured on the host through use of NMMGR. The DTC/X.25 Network Access software residing on the DTC is configured at the OpenView Windows Workstation through use of the OpenView DTC Manager.

configuration file The configuration file contains the information that the network needs in order to operate. This file also contains information necessary for link-level and NetIPC logging. The only file name that the system recognizes is NMCONFIG.PUB.SYS.

control-X echo Three exclamation marks (!!!) output to the terminal screen when the cancel character (normally **[CTRL]-X**) is entered.

control-Y trap A user-written procedure to which control is passed when the subsystem break character (normally**[CTRL]-Y**) is entered during execution of a program with subsystem break enabled.

cross-validate The process of assuring that information contained in two locations is consistent where it is imperative that it be consistent. For example, an automatic cross-validation occurs when you enter SYSGEN to assure that information contained in NMCONFIG.PUB.SYS agrees with system configuration data.

CSMA/CD Carrier Sense Multiple Access with Collision Detect, transmission access method used by the IEEE 802.3 LAN standard.

CSN *See* **circuit-switching network.**

CTB The cache transfer bus in the backplane of an HP 3000.

CUG *See* **closed user group.**

D

data Basic elements of information that can be processed or produced by a computer.

Datacommunications and Terminal Controller *See* **DTC.**

datagram A self-contained packet that is independent of other packets. It does not require an acknowledgement and it carries information which is sufficient to route it from one DTE to another DTE without relying on earlier exchange between the DTEs.

data overrun Transmitted data that is sent faster than the receiving equipment can receive it. The resultant overflow data is lost. *See also* **flow control.**

Datapac The national public PSN of Canada.

Datex-P The national public PSN of West Germany.

D bit Delivery confirmation bit. Used in the X.25 protocol, the setting of the D bit in DATA packets indicates whether delivery acknowledgement of the packet is required from the local DCE or from the remote DTE. It therefore allows the choice between local and end-to-end acknowledgement.

DCE Data circuit-terminating equipment. The interfacing equipment required in order to interface to data terminal equipment (DTE) and its transmission circuit. Synonyms: data

communications equipment, dataset. A modem is an example of a DCE.

DDX The national public PSN of Japan.

DDFA DTC Device File Access Utilities. A set of HP-UX utilities which is used by systems and user written applications to programmatically access devices attached to DTC ports.

DDP Direct Distribution Panel; a distribution panel that serves as the electrical and physical interface between a DTC 72MX mux board (asynchronous processor board) and up to eight asynchronous devices for direct connections. See **MDP** for modem connections.

dedicated printer A printer that can be used only by one host on the LAN—the one specified in the Destination Node Name in that printer's configuration screen.

demodulation The process by which the information-bearing signal is retrieved from a modulated carrier wave. The inverse of modulation.

destination node name In DTS configuration, it is either 1) the name of a host that a user can be connected to by default (if switching is not enabled for that user, or if automatic modem connection is enabled), or 2) the name of the only host that can access a dedicated printer.

device class A collection of devices that have some user-defined relation. Device classes are assigned through use of the NMMGR configuration program.

device-dependent characteristic A file specification for which modifications are restricted because of the type of device on which the file is opened. For example, data directed to terminals must have a blocking factor of one.

device driver A software module that controls a specific type of input/output device.

devicefile A file being input to or output from any peripheral device except a disc. MPE/iX allows operations to be performed on the device itself as if it were a file.

device independence A characteristic of the operating system that allows users to selectively redirect input/output from a program, session, or job without regard to the nature of the device.

device name *See* **PAD name.**

Dial ID protocol A proprietary Hewlett-Packard protocol that provides security checking and address exchange for dial links.

dial link A connection made through public telephone lines.

direct-connect device An asynchronous device that is connected directly to a DTC through an RS-232-C or RS-422 cable, with no intervening communications equipment. Also referred to as a "local connection."

direct connection A leased line, private line, or other non-switched link in a network.

direct dial A dial link through which only one remote node can be reached.

direct-path branching The process of directly accessing any screen in NMMGR by entering a path name in the `Command:` field. The path name must be preceded by an at sign (@).

download The process of loading operating code and configuration files into the DTC's memory. The DTC is downloaded by the MPE/iX host for LANs using host-based network management, and by the PC for DTCs managed by the OpenView DTC Manager.

driver Software that controls input/output devices including NS3000/iX links.

DTC Datacommunications and Terminal Controller. The DTC is a hardware device, configured as a node on a LAN, that enables asynchronous devices to access HP 3000 Series 900 computers. Terminals can either be directly connected to the DTC, or they can be remotely connected through a Packet Assembler Disassembler (PAD). The DTC can be configured with DTC/X.25 Network Access cards and DTC/X.25 Network Access software. A DTC/X.25 iX Network Link consists of two software modules: the X.25 iX System Access software (running on the host) and the DTC/X.25 Network Access software (running on the DTC).

DTC 16 HP 2340A product. A DTC that provides 2 slots for asynchronous connections with each slot allowing up to 8 direct connections or 6 modem connections, plus an optional X.25 link supporting up to 32 virtual circuits at speeds of up to 19.2 Kbps.

DTC 16iX HP J2062A product. A DTC terminal server for HP 3000 systems. It allows up to 16 asynchronous (direct and modem) LAN connections to HP 3000 systems. Currently, DTC 16iX is only supported on host-based management.

DTC 16TN HP J2060A product. A DTC terminal server for Telnet systems. It allows up to 16 asynchronous connections to computer systems running ARPA, such as HP 9000s and third party systems.

DTC 48 HP 2345A product. A DTC that provides 6 slots for asynchronous connections, X.25 links, or Telnet Access. Each slot allows up to 8 direct connections or 6 modem connections. A DTC 48 may have up to 3 slots used for X.25 links, each supporting up to 256 virtual circuits at speeds of up to 64 Kpbs or one Telnet Access card with 40 Telnet connections to HP 3000 Series 900 connections.

DTC 72MX HP J2070A product. A DTC that provides 3 slots allowing up to 72 asynchronous connections. Each slot accommodates up to 24 direct or modem connections. A DTC 72MX may have up to 3 slots used for X.25 links, each supporting up to 256 virtual circuits at speeds of up to 64 Kpbs. It may also use one slot for Telnet Access card with 40 Telnet connections to HP 3000 Series 900 computers.

DTC identifier An identifier used only within NMMGR to define the branch of the configuration file containing information about a particular DTC. The identifier must begin with a letter and can be up to eight characters long.

DTC Manager *See* **OpenView DTC Manager.**

DTC node name A unique name used to identify a DTC on a LAN. The node name format is *nodename.domain.organization*, with each of the three parts having up to 16 characters. The name begins with either a letter or a digit.

DTC station address (802.3 address) A 12-digit hexadecimal number used to identify the DTC as a node belonging to the network configuration. Also called the LAN address or node address.

DTC switching A facility enabling terminal users to select any host system that they want to connect to. DTC switching is available only when the OpenView DTC Manager is used for network management.

DTC/X.25 Network Access The software that resides on the Datacommunications and Terminal Controller (DTC). To configure access to an X.25 network, you must configure two software components: the X.25 iX System Access (residing on the HP 3000 host and configured through use of NMMGR software), and DTC/X.25 Network Access (configured on the OpenView Windows Workstation through use of the OpenView DTC Manager software for PC-based management, and through NMMGR for host-based management).

DTC/X25 Network Access card The hardware card and channel adapter that provides X.25 Network Access. It resides in the Datacommunications and Terminal Controller (DTC).

DTC/X.25 iX Network Link Software and hardware that provides MPE/iX access to private and public X.25 networks. The X.25 iX System Access software resides on an HP 3000 host and is configured through use of NMMGR. The DTC/X.25 Network Access software resides on the Datacommunications and Terminal Controller and is configured at the OpenView Windows Workstation for PC-based management and through NMMGR for host-based management.

DTE Data Terminal Equipment. Equipment that converts user information into data-transmission signals or reconverts received data signals into user information. Data terminal equipment operates in conjunction with data circuit-terminating equipment.

DTS Distributed Terminal Subsystem. This consists of all of the Datacommunications and Terminal Controllers (DTCs) on a LAN, their LANIC cards (attached to the host), the LAN cable, and the host and DTC software that controls all related DTS hardware.

duplex A transmission method that allows two-way communication. If both ends of the transmission link can transmit simultaneously, it is called full duplex. If only one end can transmit at a time, it is half-duplex transmission.

E

entry priority In a point-to-point network, it is a ranking that identifies the most desirable route for data to travel from a given local node to a remote node.

environment A session that is established on a remote node.

escape from data transfer character A character that allows a user who is connected to a host system through the DTC, to break that connection and return to the DTC switching user interface. The default is **[CTRL]-K**. This character is used only on networks managed by the OpenView Windows Workstation.

escape sequence A sequence of characters beginning with the escape character and followed by one or more other characters, used to convey control directives to printers, plotters, or terminals.

Ethernet A Local Area Network system that uses baseband transmission at 10 Mbps over coaxial cable and unshielded twisted pair. Ethernet is a trademark of Xerox Corporation.

event log One of three circular files stored on the OpenView windows workstation. It contains lists of events that are reported by the DTCs for which it is responsible.

extended packet sequence numbering One of the optional Network Subscribed Facilities that provides packet sequence numbering using modulo 128. If not subscribed, modulo 8 is used.

F

facility An optional service offered by a packet switching network's administration and requested by the user either at the time of subscription for network access or at the time a call is made. Also known as user facility.

facility set A facility set defines the various X.25 connection parameters and X.25 facilities that can be negotiated for each virtual circuit on a per-call basis.

fast select An optional packet-switching network facility by which user data can be transmitted as part of the control packets that establish and clear a virtual connection.

FCS Frame Check Sequence. A sequence of bits generated by X.25 at Level 2 that forms part of the frame and guarantees the

integrity of its frame's contents. The FCS is also used by the IEEE802.3 protocol to check the validity of frames.

file equation An assignment statement used to associate a file with a specific device or type of device during execution of a program.

file number A unique number associated with a file when the file is opened. The file number is returned in the FOPEN or HPFOPEN call used to open the file. It can be used to access that file until the file is closed.

file specification The name and location of a file. The full specification for a file includes the file name, group, and account.

file system The part of the operating system that handles access to input/output devices (including those connected through the DTC), data blocking, buffering, data transfers, and deblocking.

flow control A means of regulating the rate at which data transfer takes place between devices to protect against data overruns.

flow control negotiation One of the network subscribed facilities selected at subscription time. This facility allows the Flow Control parameter to be negotiated at call set-up time, as opposed to having a predefined value.

formal file designator A name that can be used programmatically or in a file equation to refer to a file.

FOS Fundamental Operating System. The programs, utilities, and subsystems supplied on the Master Installation Tape that form the basic core of the MPE/iX operating system.

full gateway A full gateway is a node that belongs to more than one network and has one IP address for each network. It uses store and forward to transfer packets between each network that it belongs to.

G

gateway A node that connects two dissimilar network architectures. A gateway can be either a single node (full gateway) or two gateway halves.

gateway half A node that works in conjunction with another node on another network to form an internetwork. The only protocol used by gateway halves is the NS Point-to-Point 3000/iX Link. *See also* **full gateway.**

gateway-half link A link between the two nodes of a gateway-half pair. Each of the two nodes of a gateway-half pair has a configured link (hardware interface card) that is used for the gateway half network interface. The NS Point-to-Point 3000/iX Link is the only link that can be used as a gateway-half link.

gateway-half pair A set of two nodes that are joined by a gateway-half link. Each node in the pair must have a gateway-half network interface configured, using the link.

Guided Configuration A method of configuring a node in which a subset of the complete NMMGR interface is presented, and defaults of configurable values are used automatically.

H

handshaking A communications protocol between devices or between a device and the CPU. Provides a method of determining that each end of a communications link is ready to transmit or receive data, and that transmission has occurred without error.

hardware handshake Uses modem signals CTS and RTS to pace the data transfer from the DTC to the attached device. (For DTC 72MX only.)

hop count *See* **internet hop count and intranet hop count**

host-based network management A method of managing asynchronous communications for HP 3000 Series 900 computers. All of the control software is configured on a single MPE/iX host and is downloaded to the DTCs that are managed by that host. With host-based management, a permanent relationship exists between each DTC and the host. Terminal users can access only the single MPE/iX system that owns the DTC their terminal is connected to.

host computer The primary or controlling computer on a network. The computer on which the network control software resides. For HP purposes, it can also be used to distinguish the MPE/iX system (host) from the DTC.

HP block mode A block mode transmission method employed by HP computers where the system controls the block mode handshake. When HP block mode is used, the user program need not concern itself with data transfer protocol.

HP PPN Hewlett-Packard Private Packet Network. Hewlett-Packard's own packet-switching X.25 network, which gives users full control over the administration and security of their data communication.

HP TS8 A terminal server that can support up to eight asynchronous serial connections. When used in back-to-back configuration, users can access HP 3000 MPE/V systems on it through a DTC.

I

idle device timeout A timeout defined by the Configure:CPU command. When the timer lapses, a device connected to the DTC user interface that is still inactive will be disconnected.

IEEE 802.3 A standard for a broadcast local area network published by the Institute for Electrical and Electronics Engineers (IEEE). This standard is used for both the ThinLAN and ThickLAN implementations of the LAN.

IEEE 802.3 multicast address A hexadecimal number that identifies a set of nodes. This address is used for multicast delivery.

IEEE 802.3 nodal address A unique hexadecimal number that identifies a node on an IEEE 802.3 LAN.

initialization string A sequence of control characters used to initialize a terminal, printer, or plotter when a connection is established from a host on the network.

INP Intelligent Network Processor. The card residing in the back of an MPE V-based node that provides a point-to-point or X.25 interface.

interactive communications Processing that allows users to enter commands and data at the terminal and receive an immediate response. Interactive processing occurs in session mode on MPE/iX systems.

internet communication Communication that occurs between networks.

internet hop count The number of full gateways plus the number of gateway-half links that a packet must pass through in moving from source node to destination.

Internet Protocol A protocol used to provide routing between different local networks in an internetwork, as well as among nodes in the same local network. The Internet Protocol corresponds to Layer 3, the Network Layer, of the OSI model. *See also* **IP address**.

internet routing Internet routing involves all the processes required to route a packet from a node on one network to a destination node on another network.

internetwork Two or more networks joined by gateways.

intranet communication Communication that occurs between nodes in a single network.

intranet hop count The number of intermediate nodes that lie between a source and destination node on the same point-to-point network.

intranet routing Intranet routing involves all the processes required to route a packet from one node in a network to another node in the same network.

intrinsic A system routine accessible by user programs. It provides an interface to operating system resources and functions. Intrinsics perform common tasks such as file access and device control.

IP *See* **Internet Protocol**.

IP address Internet Protocol address. An address used by the Internet Protocol to perform internet routing. A complete IP address consists of a network portion and a node portion. The network portion of the IP address identifies a network, and the node portion identifies a node within the network.

IP router A node in an IP network that connects two or more networks and provides address mapping between them. The router selects messages from incoming buffers and places them into the appropriate outgoing message queues.

ISO International Organization of Standards. An international federation of national standards organizations involved in developing international standards, including communication standards.

L

LAN Local Area Network. A collection of data communication systems sharing a common cable whereby each system can communicate directly with another.

LAN address *See* **DTC station address.**

LANIC *See* **Local Area Network Interface Controller.**

LANIC physical path The physical location (slot number) of the LANIC within the SPU.

LANIC Self-Test A ROM-based program on a LANIC card that tests and reports the status of the LANIC hardware.

LAP Link Access Protocol. The data link protocol specified by older versions (prior to 1980) of X.25 at Level 2 but still permitted and therefore usable. All new implementations of X.25 must use LAP-B, and all old implementations must migrate to LAP-B at a future date.

LAP-B Link Access Protocol - Balanced. The data link protocol specified by the 1980 version of X.25 at Level 2 that determines the frame exchange procedures. LAP-B must also be used over direct-connect NS Point-to-Point 3000/iX Links.

LCI Logical Channel Identifier. Local value on a network node which identifies the channel used to establish a virtual circuit (SVC or PVC) through an X.25 network.

ldev *See* **logical device number.**

leased line A data-grade telephone line leased directly to a subscriber and allocated specifically for the subscriber's needs.

line speed The speed at which data is transferred over a specific physical link (usually measured in bits or kilobits per second).

link name A name that represents a hardware interface card. The link name can contain as many as eight characters. All

characters except the first can be alphanumeric; the first character must be alphabetic.

Local Area Network Interface Controller (LANIC) A hardware card that fits into the backplane of the HP 3000 Series 900 computer and provides a physical layer interface for IEEE 802.3 local area networks.

local connection *See* **direct connection.**

local node The computer that you are configuring or that you are logged on to.

local switching A feature of the DTC which permits back-to-back configuration (for connections to an HP 3000 MPE/V host), using two ports of the same DTC.

logging The process of recording the usage of network resources. Events can be logged to both the OpenView workstation and to the MPE/iX host.

logging class A number defining the severity of any given event logged. An operator uses the logging classes to specify which events are to be logged. Class 1 (catastrophic event) is always logged.

logical device number (ldev) A value by which MPE/iX recognizes a specific device. All DTC devices that are configured as nailed devices through the NMMGR configuration have ldev numbers permanently assigned. The DTC devices can then be accessed programmatically through use of their ldev number. Non-nailed devices have ldev numbers that are assigned from a pool of available ldev numbers for the life of their connection to a system. Each nailed port configured in NMMGR must have a unique ldev number.

log off The termination of a job or session.

log on The process of initiating a job or session.

logon device *See* **session-accepting device.**

loopback The routing of messages from a node back to itself.

LUG Local User Group. A list defined for a particular DTC and card that specifies which *remote* nodes this DTC can send data to and also which *remote* nodes this DTC can receive data from. *See also* **Closed User Group.**

M

map, network A drawing that shows the topology of the network. For networks managed by the OpenView DTC Manager a network map must be created through use of the OVDraw capability provided with the management software. A network map is also a hardcopy drawing used when planning a network. It shows network topology, node and network names, addresses, network boundaries (for an internetwork map), and link types.

mapping A set of characteristics that describe a route taken by messages to reach a destination node. This set of characteristics is configured with NMMGR at every node on a point-to-point network. One mapping is configured at each node for every other node on the network to which messages will be sent.

MAU Medium Attachment Unit. A device attached to a ThickLAN coaxial cable that provides the physical and electrical connection from the AUI cable to the coaxial cable.

M bit More data bit. Setting this bit in a DATA packet indicates that at least one more DATA packet is required to complete a message of contiguous data.

MDP Modem Distribution Panel; a distribution panel that serves as the electrical and physical interface between a DTC 72MX mux board (asynchronous processor board) and up to eight asynchronous devices for direct or modem connections. Also called **ADP**.

MIT Master Installation Tape. A magnetic tape containing the Fundamental Operating System for an HP 3000 Series 900 computer.

modem modulator/demodulator. A device that modulates and demodulates signals. Primarily used for modulating digital signals onto carriers for transmission and for performing the inverse function at the receiving end. Modems are essential for transmitting and receiving digital signals over telephone lines.

modulo Value used as the counting cycle for determining the send sequence number (N(S)) of frames sent across an X.25 network.

modulation The process in which certain characteristics of a carrier signal are altered in accordance with the changes of an information-bearing signal.

MPE/iX MultiProgramming Executive iX The operating system of the HP 3000 Series 900 computers. The NS3000/iX network services operate in conjunction with the MPE/iX operating system.

multiplexer MUX. A device that allows multiple communication links to use a single channel.

N

nailed device A device with a permanently assigned ldev. The assignment is established through the system configuration of the MPE/iX host system. Nailed devices can be accessed programmatically through their ldev number. Nailed devices can also be assigned to more than one host.

native mode The run-time environment of MPE/iX. In Native Mode, source code has been compiled into the native instruction set of the HP 3000 Series 900 computer.

neighbor gateway A gateway that is in the same network as a given node.

NetIPC Network Interprocess Communication. Software that enables programs to access network transport protocols.

network A group of computers connected so that they can exchange information and share resources.

network address This can be either 1) the network portion of an IP address as opposed to the node portion, or 2) when referring to X.25 networks, it is a node's X.25 address.

network boundary The logical division between networks in an internetwork.

network directory A file containing information required for one node to communicate with other nodes in 1) an internetwork, 2) an X.25 network, or 3) a network that contains non-HP nodes. The active network directory on a node must be named NSDIR.NET.SYS.

network interface NI. The collective software that enables data communication between a system and a network. A node possesses one or more network interfaces for each of the networks to which it belongs. Network interface types are LAN802.3, router (point-to-point), X.25, loopback, and gateway half. The maximum number of supported NIs is 12, one of which is reserved for loopback.

network management The collective tasks required to design, install, configure, maintain, and if necessary, change a network.

network map A drawing that shows the topology of the network. For networks managed by the OpenView DTC Manager, a network map must be created using the OVDraw capability provided with the management software.

Network Services NS. Software application products that can be used to access data, initiate processes, and exchange information among nodes in the network. The HP 3000/iX Network Services include RPM, VT, RFA, RDBA, and NFT.

network subscribed facilities A set of parameters that the user chooses when he subscribes to the X.25 network; they include Flow Control Negotiation, Use of D-bit, Throughput Class Negotiation and Extended Packet Sequence Numbering.

NFT Network File Transfer. The network service that transfers disc files between nodes on a network.

NI *See* **network interface.**

NLP Name Lookup Protocol. A protocol used when setting up links between DTCs, as happens when DTCs are used in a back-to-back configuration.

NMCONFIG.PUB.SYS The file that contains all of the network configuration data for the HP 3000 Series 900 computer on which it resides. It includes information about the DTCs that can access the system as well as information about any Network Service (NS) products running on the system. This is the only file name allowed at run-time.

NMDUMP A utility used to format log and trace files.

NMMAINT A utility that lists the software module version numbers for all HP AdvanceNet products, including NS3000/iX. It detects missing or invalid software modules.

NMMGR Node Management Services Configuration Manager. A software subsystem that enables you to configure DTC connectivity and network access parameters for an HP 3000 Series 900 computer.

NMMGRVER A conversion program called NMMGRVER.PUB.SYS. It converts configuration files created with NMMGR from an earlier version to the latest format.

NMSAMP1.PUB.SYS A sample configuration file supplied with FOS that can be used as a template for DTS configuration.

node A computer that is part of a network. The DTC is also considered to be a node and has its own address.

node address The node portion of an IP address. The IP address consists of a node portion and a network portion.

Node Management Services Configuration Manager *See* **NMMGR**.

node name A character string that uniquely identifies each system in a network or internetwork. Each node name in a network or internetwork must be unique; however, a single node can be identified by more than one node name.

node names list A list defined on the OpenView windows workstation and subsequently downloaded to all DTCs for which it is the "owner." The list specifies all of the HP 3000 Series 900 hosts on the LAN that are accessible from the DTCs.

non-adjacent Describes a node on an NS Point-to-Point 3000/iX network that is separated from a given node by intervening or intermediate node.

non-nailed device A session-accepting device that is not permanently associated with an ldev number at configuration time. When the user at such a device logs on to an MPE/iX system, an ldev is assigned from a pool of ldevs set aside for this purpose at configuration time. The association between a non-nailed device and this assigned ldev exists only for the duration of the session. One advantage of the use of non-nailed device connections is that

configuration is simplified, since it is not required that each non-nailed device be individually configured.

NS3000/iX A Hewlett-Packard data communication product that provides networking capabilities for MPE/iX based HP 3000 minicomputers. NS3000/iX consists of a link and network services.

NS3000/iX Link Software and hardware that provides the connection between nodes on a network. Some of the NS3000/iX links available are the ThinLAN 3000/iX Link and its ThickLAN option, the DTC/X.25 iX Network Link, the NS Point-to-Point 3000/iX Link, and the StarLAN 10 3000/iX link.

NS3000/iX Network Services Software applications that can be used to access data, initiate processes, and exchange information among nodes in a network. The services are RPM, VT, RFA, RDBA, and NFT.

NSDIR.NET.SYS Name of the active network directory file. *See also* **network directory.**

O

octet An eight-bit byte operated upon as an entity.

OpenView HP OpenView Windows is HP's network management environment. It provides the basic services for accessing and managing networks used by the DTC Manager, and other applications, such as Switch/PAD Manager, Hub Manager, etc.

OpenView Admin An OpenView Windows program that enables you to configure how your OpenView Windows applications will function. For example, it enables you to set a default map for the OpenView DTC Manager.

OpenView Draw An OpenView windows program that is used to draw the network map and to label the components on it.

OpenView DTC Manager An OpenView Windows application that enables you to configure, control, monitor, and troubleshoot the operation of the Distributed Terminal Subsystems on the LAN.

OpenView Run An OpenView windows program that covers most of the control features used by the DTC Manager, including monitoring and diagnostic functions.

OpenView Windows The set of three programs: OV Admin, OV Draw and OV Run, running on the OpenView workstation under MS Windows, that acts as the platform for all OpenView applications, such as DTC Manager.

OpenView Windows Workstation The personal computer that provides software downloads to enable operation of the Datacommunications and Terminal Controller (DTC). The configuration software that runs on this workstation is called the OpenView DTC Manager software.

OSI model Open Systems Interconnection model. A model of network architecture devised by the International Standards Organization (ISO). The OSI model defines seven layers of a network architecture with each layer performing specified functions.

P

packet A block of data whose maximum length is fixed. The unit of information exchanged by X.25 at Level 3. The types of packets are DATA packets and various control packets. A packet type is identified by the encoding of its header.

Packet Exchange Protocol PXP. A transport layer protocol used in NS3000/iX links to initially establish communication between nodes when NetIPC socket registry is used.

packet-switched network name The name of a data communication network adhering to the CCITT X.25 recommendation. This can be a PDN or a private network such as the HP PPN.

PAD (packet assembler/disassembler) A device that converts asynchronous character streams into packets that can be transmitted over a packet switching network (PSN).

PAD name A name of up to eight characters that is associated with a configured PAD device. The PAD name is known to both the DTC (defined by the DTC Manager) and the MPE/iX systems (defined by NMMGR) that the device can access.

PAD profile A terminal or printer profile that specifies the configuration characteristics for PAD-connected devices.

PAD support A software module which can be downloaded to an X.25 board in a DTC. The software is used to manage connections with remote PAD devices.

partner gateway half When gateway halves are used, two gateway halves are required in order to provide communication between two networks. Each is the partner of the other.

path name When configuring with NMMGR, you can type a string in the COMMAND: field on a screen to branch to another screen. Each screen has a unique path name that corresponds to its location in the hierarchy of configuration screens presented by NMMGR.

PDN Public data network. A data communication network whose services are available to any user willing to pay for them. Most PDNs use packet switching techniques.

point-to-point A link that connects either two nodes in a NS Point-to-Point 3000/iX network or two gateway halves.

port An outlet through which a device can be connected to a computer, consisting of a physical connection point and controlling hardware, controlling software, and configurable port characteristics. Ports can be thought of as data paths through which a device communicates with the computer.

Precision Architecture The hardware design structure for the HP 3000 Series 900 computer family.

printer name A character string of up to 16 characters specified in the DTC Manager configuration (for networks using OpenView Network Management) to define a printer by name. Can be shared by several printers (port pool).

printer profile A set of configuration characteristics that can be associated with one or more printers through the NMMGR configuration. Printer profile specifications include the printer type, line speed, device class assignment, and other values relevant to printers connected through a DTC.

printer type A collection of characteristics that cause a printer connected to an MPE/iX system to act and react in a specified manner. You can configure a printer to use one of the system-supplied printer types, or you can create custom printer types using Workstation Configurator.

privileged mode A capability assigned to accounts, groups, or users allowing unrestricted memory access, access to privileged CPU instructions, and the ability to call privileged procedures.

probe protocol An HP protocol used by NS3000/iX IEEE 802.3 networks to obtain information about other nodes on the network.

probe proxy server A node on an IEEE 802.3 network that possesses a network directory. A probe proxy server can provide a node with information about other nodes on the same or other networks of an internetwork.

profile A method of grouping device connection specifications and characteristics so that the set of characteristics can be easily associated with groups of like devices. *See also* printer profile, terminal profile.

program captive device *See* **programmatic device.**

Programmable Serial Interface PSI. A hardware card that fits into the backplane of the HP 3000 Series 900 computer. It provides a physical layer interface for NS Point-to-Point 3000/iX Links.

programmatic device A device operating under control of a program running on a computer. Programmatic devices can be used for input, output, or both, depending on the device and how it is opened by the controlling program.

protocol A set of rules that enables two or more data processing entities to exchange information. In networks, protocols are the rules that govern each layer of network architecture. They define which functions are to be performed and how messages are to be exchanged.

PSN Packet-Switching Network. Any data communication network in which data is disassembled into packets at a source interface and reassembled into a data stream at a destination interface. A public PSN offers the service to any paying customer.

PSS Packet-Switching System. The national public PSN of the United Kingdom.

PVC Permanent Virtual Circuit. A permanent logical association between two physically separate DTEs that does not require call set-up or clearing procedures.

PXP *See* **Packet Exchange Protocol.**

Q

Q bit Qualified bit. When set in DATA packets the Q bit signifies that the packet's user data is a control signal for the remote device, not a message for its user.

QuickVal A software program that tests whether Network Services are operating correctly between nodes.

R

RDBA Remote Data Base Access. A network service that allows users to access data bases on remote nodes.

reachable network A network that can be accessed (with additional internet hops possibly required) by a particular gateway.

remote connect device An asynchronous device that is indirectly connected to a DTC through a modem and telephone hook-up or through a PAD.

remote node Any network node that is physically separate from the node you are currently using or referring to.

retransmission count (N2) The maximum number of times a frame will be retransmitted following the expiration of the Retransmission Timer, T1.

retransmission timer (T1) The length of time that a transmitter will wait for an acknowledgment from a destination address before attempting to retransmit a frame. When choosing this value, factors like the line speed and maximum frame size should be taken into account.

RFA Remote File Access. A network service that allows users to access file and devices on remote nodes.

routing The path that packets or fragments of a message take through a network to reach a destination node.

RMP Remote Maintenance Protocol. HP proprietary protocol used in DTC management.

RPM Remote Process Management. A network service that allows a process to programmatically initiate and terminate other processes throughout a network from any node on the network.

RS-232-C The Electronic Industries Association (EIA) Level 1 protocol specification that defines electrical circuit functions for 25 connector pins. HP provides two implementations of this standard: a 3-pin version for direct connections up to a distance of 15 meters (50 feet), and a version which makes use of additional circuits and can be used for either modem or direct connections.

RS-422 The Electronic Industries Association (EIA) Level 1 protocol specification implemented by HP in a 5-pin version which can be used for direct device connection up to a distance of 1500 meters (4000 feet).

S

security string An alphanumeric character string that functions as a password for dial links. The security string is used by the Dial IP protocol.

serial device Any device that is attached to and communicates with a computer by means of a serial transmission interface. Terminals, printers, and plotters are among the devices that communicate serially with MPE/iX computers.

serial transmission A method of transferring data in which characters are transmitted one bit at a time and received one bit at a time in the order of transmission. This transmission scheme is employed by devices connected to the MPE/iX systems via the DTC.

session-accepting device A terminal or personal computer running in terminal-emulation mode that is able to establish an interactive (conversational) session with an HP 3000 computer. Also referred to as a logon device.

shared dial A dial link that provides connection to more than one remote system, although to only one at a time.

shared-line access The feature that allows two or more HP 3000 Series 900 hosts to use the same DTC/X.25 Network Access card on a DTC to access an X.25 network.

SIC Serial Interface Card. A card installed in the front of the DTC that acts as an interface between a corresponding Connector Card (CC) and the DTC's processor.

slaved device A device that shares the same DTC port as another device and is connected, to the other device, referred to as its master, by a cable. The actions of the slaved device are controlled by the master device.

SNMP Simple Network Management Protocol. An industry standard, for managing networked computers in a multi-vendor environment.

SNP Synchronous Network Processor card; an alternative name for an X.25 board.

spooled device A printer that is accessed through the MPE/iX spooling facility. The spooling facility allows a nonsharable device to be shared among several users by temporarily storing output data on disc and managing the selection of output spool files destined for the spooled device.

start bit A data bit used to signal the start of a character being transmitted in an asynchronous communication mode.

station address A link-level address used by the IEEE 802.3 protocol that is assigned to every node on an IEEE 802.3 network.

stop bit A data bit used to signal the end of a character being transmitted in an asynchronous communication mode.

store-and-forward A technique in which messages are passed from one node to another in a network to reach their destination. Point-to-point networks use the store-and-forward technique to transmit messages.

subnet Another name for a network, especially if the network is part of an internetwork. The word subnet is also a synonym for intranet.

SVC Switched Virtual Circuit. The path through an X.25 network that is established at call set-up time.

switching *See* **DTC switching.**

Switching User Interface The user interface available when DTC switching is enabled that allows terminal users to choose the MPE/iX computer with which they want to establish a communication link.

synchronous A mode of operation or transmission in which a continuous data stream is generated without intervals between characters. The data stream is synchronized by clock signals at the receiver and transmitter. As a result, fast transmission speeds (above 9600 bps) are attainable.

SYSGEN The software program that allows you to configure the operating system on HP 3000 Series 900 computers.

system configuration The method for telling MPE/iX which peripheral I/O devices are attached to the DTC and which parameters are required for system operation.

T

TCP *See* **Transmission Control Protocol.**

Telenet A proprietary public data network in the USA.

Telnet Access Card (TAC) A card that resides in the DTC 48 and provides protocol conversion between Telnet and AFCP.

TermDSM Terminal Online Diagnostic System Manager. A utility that provides diagnostic services for DTC connections by means of a series of commands accessible through the SYSDIAG utility. TermDSM is used only when DTCs are managed by an MPE/iX host system.

terminal name A character string of up to 16 characters specified in the OpenView DTC Manager configuration (for networks using OpenView Network Management) to define a terminal by name. It can be shared by several terminals (pool port).

terminal profile A set of configuration characteristics that can be associated with one or more terminals through the NMMGR configuration. Terminal profile specifications include the terminal type, line speed, device class assignment, and other values relevant to terminals connected through a DTC.

terminal type A collection of characteristics that cause a terminal connected to an MPE/iX system to act and react in a

specified manner. You can configure a terminal to use one of the system-supplied terminal types, or you can create custom terminal types using the Workstation Configurator.

ThinLAN 3000/iX A LAN that conforms to the IEEE 802.3 Type 10 BASE 2 standard LAN.

throughput class A value assigned to a given virtual circuit that defines how many network resources should be assigned to a given call. It is determined by the access line speed, packet and window sizes, and the local network's internal mechanisms.

throughput class negotiation One of the Network Subscribed Facilities defined at subscription time. This allows the user to negotiate the Throughput Class at call set-up time.

timer (T3) The length of time that a link can remain in an idle state. After the expiration of the timer, the link is considered to be in a non-active, non-operational state and is automatically reset. The value should be chosen carefully. In particular, it must be sufficiently greater than the Retransmission Timer (T1) so that no doubt exists about the link's state.

topology The physical arrangement of nodes in a network. Some common topologies are bus, star, and ring.

Transmission Control Protocol TCP. A network protocol that establishes and maintains connections between nodes. TCP regulates the flow of data, breaks messages into smaller fragments if necessary (and reassembles the fragments at the destination), detects errors, and retransmits messages if errors have been detected.

Transpac The national public PSN of France.

transparent mode A data-transfer scheme in which only a limited number of special characters retain their meaning and are acted on by the system. All other characters are considered to be data and are passed through with no control actions being taken.

transport, network Software that corresponds to layers 3 and 4 of the OSI network architecture model. It sends data out over the communications link, receives incoming data, and routes incoming or outgoing data to the appropriate destination node.

TS8 *See* **HP TS8.**

TTUTIL Also known as the Workstation Configurator. A program, TTUTIL.PUB.SYS, on the HP 3000 that is used to create and modify terminal and printer type files.

Tymnet A proprietary public data network in the USA.

typeahead A facility that allows terminal users to enter data before a read is actually posted to the terminal.

U

unacknowledged frame number (K) The number of frames that can be transmitted without receiving an acknowledgement from the destination address. When this number (K) frame is reached, the same K frames are retransmitted.

unedited mode *See* **transparent mode.**

V

V.24 The CCITT recommendation that defines the function of the interchange circuits between a DTE and a DCE.

validation The process of ascertaining whether the network transport configuration file has been correctly configured. This is accomplished by using the NMMGR Validate Configuration File screen.

VAN Value-Added Network. A data communication network that uses and pays for facilities belonging to another carrier. The value-added package is then sold to a user.

VC *See* **virtual circuit.**

virtual circuit A logical association between two physically separate DTEs.

Virtual Terminal A network service that allows a user to establish interactive sessions on a node.

VPLUS Software used to generate screens such as those displayed by NMMGR.

V-Series (V.##) CCITT A set of CCITT recommendations related to data communication over a voice-grade telephone network.

VT *See* **Virtual Terminal.**

W

WAN Wide Area Network. A data communications network of unlimited size, used for connecting localities, cities, and countries.

Workstation Configurator A utility available on MPE/iX systems, TTUTIL.PUB.SYS, that allows users to create customized terminal and printer types by entering data through a series of VPLUS screens.

X

X.3 The protocol that defines which user facilities should be internationally available from a packet assembler/disassembler (PAD) when this is offered by a public data network.

X.21 The protocol that defines the physical interface between a DTE and a DCE of a public data network where the access to the network is made over synchronous digital lines.

X.25 The protocol that defines the interface between a DTE and a DCE for packet-mode operation on a Public Data Network (PDN).

X.25 address The X.25 address provided by the network administration if you are connected to a public data network (PDN).

X.25 address key An X.25 address key is a label that maps a node's IP address to its X.25 address and its associated X.25 parameters. You have a combined maximum of 1024 X.25 address keys in the SVC and PVC path tables.

X.25 LUG address X.25 address of a node belonging to a LUG.

X.25 iX System Access The software that works in conjunction with the DTC/X.25 Network Access software to provide MPE/iX access to X.25. The software resides on an HP 3000 host and is configured through use of NMMGR. To configure access to an X.25 network, you must configure two software components: the X.25 iX System Access and the DTC/X.25 Network Access (residing on the Datacommunications and Terminal Controller and configured at the OpenView Windows Workstation). Together, these two components provide a network connection on HP 3000 systems to private and public X.25 packet-switched networks (PSNs).

X.29 The protocol that defines the interface for data exchange between a packet-mode DTE and a remote Packet Assembly/Disassembly (PAD) facility over a packet-switching network.

XON/XOFF protocol The flow control used by MPE/iX systems to protect against data overruns. XON/XOFF protocol is controlled by the data recipient who sends an XOFF character (ASCII DC3) to the sender if it is unable to continue to receive data. The sender suspends transmission until it receives an XON character (ASCII DC1).

X.Series (X.##) CCITT recommendations A set of recommendations for data communication networks governing their services, facilities, and terminal equipment operation and interfaces.

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E