

Installing and Managing HP ARPA File Transfer Protocol Network Manager's Guide

HP 3000 MPE/iX Computer Systems

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Preface

The HP ARPA File Transfer Protocol product provides the ARPA file transfer protocol (FTP) service to MPE/iX users.

The chapters in this manual are organized as follows:

- Chapter 1, “Overview,” is a brief overview of ARPA Services and what is provided on MPE/iX.
- Chapter 2, “Verify Installation and Update LAN Configuration,” describes how to verify FTP has been installed and the steps for updating the LAN for Ethernet support.
- Chapter 3, “Starting FTP,” describes how to start FTP and test a connection
- Chapter 4, “Managing FTP,” describes FTP users, the FTP commands available for both MPE/iX users and remote users, and an overview of FTP network architecture.
- Chapter 5, “Troubleshooting,” provides a troubleshooting tree to help the network manager resolve FTP problems.
- Appendix A, “Error Messages,” provides a list of possible errors with meaning, cause, and action.
- Appendix B, “Using the FTP Server,” provides information for remote users accessing the MPE/iX FTP server.
- Appendix C, “PING/iX Utility,” describes how to use the PING/iX tool to aid in troubleshooting connection problems.
- Glossary provides terms and definitions for ARPA services and networking.

Changes to This Manual

This manual has been updated to reflect the latest enhancements made to the FTP/iX product.

Related Documentation

The following manuals contain information related to the product described in this manual. You may need information from one or all of the manuals listed here.

FTP

- *Installing and Managing HP ARPA File Transfer Protocol Network Manager's Guide*
- *HP ARPA File Transfer Protocol User's Guide*

Telnet

- *Using the HP OpenView DTC Manager*

Link Products

- *NS 3000/iX Network Planning and Configuration Guide*
- *Using the OpenView DTC Manager*
- *(For NMMGR): Using the Node Management Services (NMS) Utilities*

General Networking

- *NS 3000/iX Operations and Maintenance Reference Manual*
- *NS 3000/iX NMMGR Screens Reference Manual*
- *NS 3000/iX Error Messages Reference Manual*

MPE/iX

- *MPE/iX Error Messages Manual Volume I, Volume II, and Volume III.*
- *MPE/iX Commands Reference Manual Volume I and Volume II.*

Network Services

- *Using NS 3000/iX Network Services*
- *NetIPC 3000/iX Programmer's Reference Manual*

Software Installation

- *HP 3000 MPE/iX System Software Maintenance Manual*

Hardware installation

- *HP 36923A LAN 3000/iX Link and Terminal LAN Link Hardware Reference Manual*
- *LAN Cable and Accessories Installation Manual*

1

Overview

This chapter briefly describes ARPA services and what is provided on MPE/iX.

ARPA Services

The ARPA services are a subset of the networking services originally developed by the University of California at Berkeley for the Advanced Research Projects Agency (ARPA). ARPA services have become a de facto standard for multivendor network communication. MPE/iX provides the Teletype Network Protocol (Telnet) and File Transfer Protocol (FTP) ARPA services which enable users to communicate with non-HP and HP systems using these services.

Telnet

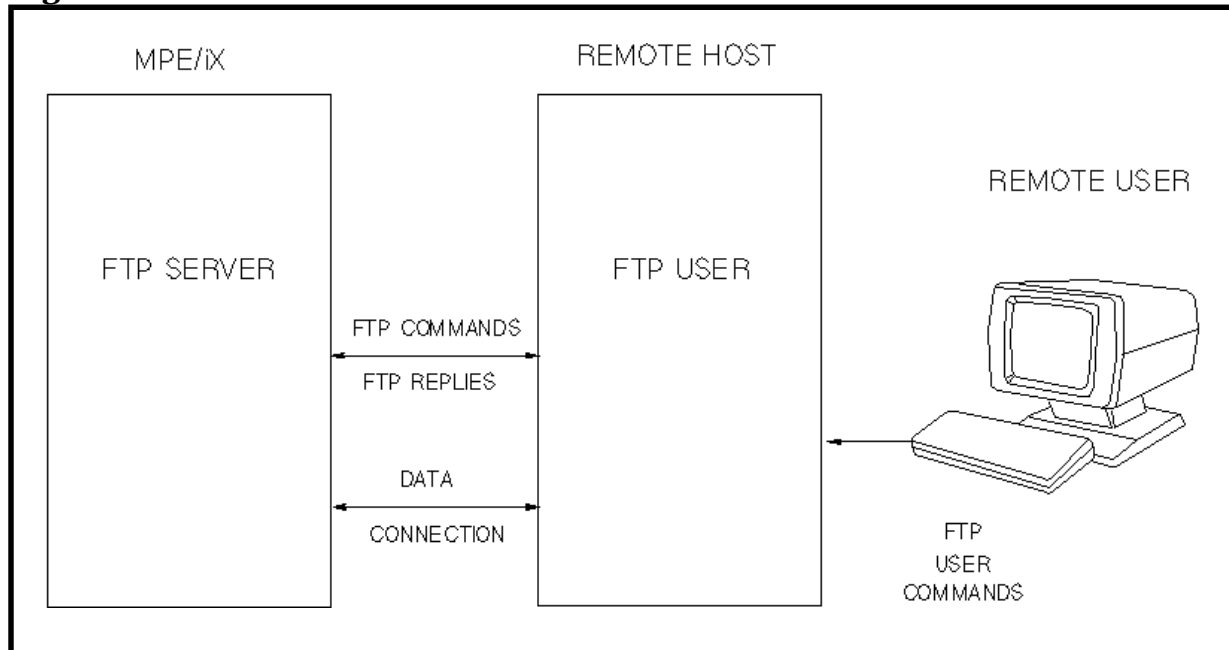
The Telnet protocol provides the ARPA standard virtual terminal connection between an HP 3000 and a remote host on the network.

FTP

FTP is an ARPA Service that allows users to transfer files among other networked systems. FTP is the file transfer program that uses the ARPA standard File Transfer Protocol (FTP). With FTP, you can also perform file management operations.

FTP is based on the client-server model as shown in Figure 1-1. An FTP user on a system (the client) accesses the remote host FTP server to perform FTP tasks.

Figure 1-1 FTP Client-Server Model



HP ARPA Telnet

The HP ARPA Telnet products can be used with systems supporting the ARPA Telnet service such as other HP systems, UNIX systems and many non-UNIX systems. For more information on the HP ARPA Telnet products (HP ARPA Telnet Access, HP ARPA Telnet Express and HP OpenView DTC Manager), see *Using HP OpenView DTC Manager*.

HP ARPA File Transfer Protocol

The HP ARPA File Transfer Protocol product (FTP) can be used with systems supporting the ARPA FTP service such as other HP systems, UNIX systems, and non-UNIX systems.

FTP is supported over LAN, Token Ring, FDDI, 100VG-AnyLAN, 100Base-T, X.25, and NS Point-to-Point networks.

FTP User (Client)

The MPE/iX FTP user can perform the following tasks:

- Connect to a remote host system
- Transfer or delete single or multiple files
- Rename single files on the remote system
- List or change remote directories
- Perform ASCII, binary, or bytestream file transfers
- Change file attributes (using `BUILD` parameters) for files transferred to the MPE/iX system

The supported FTP user commands are summarized in Chapter 4, “Managing FTP,” in this manual. Also see the *HP ARPA File Transfer Protocol User's Guide* for more information.

FTP Server

Remote users accessing the MPE/iX FTP server can perform the following tasks:

- Connect to the MPE/iX FTP services
- Transfer or delete single or multiple files
- Rename single files on the remote MPE/iX system
- List or change remote MPE/iX directories
- Perform ASCII, binary, or bytestream file transfers
- Change file attributes (using `BUILD` parameters) for files transferred to the MPE/iX system

A summary of the supported MPE/iX FTP server commands is included in Chapter 4, “Managing FTP.”

Appendix B, "Using the FTP Server," provides remote non-MPE/iX system users information for accessing the MPE/iX FTP server. This information is also provided in an online text file named `FTPDOC.ARPA.SYS` which can be transferred to remote users using FTP.

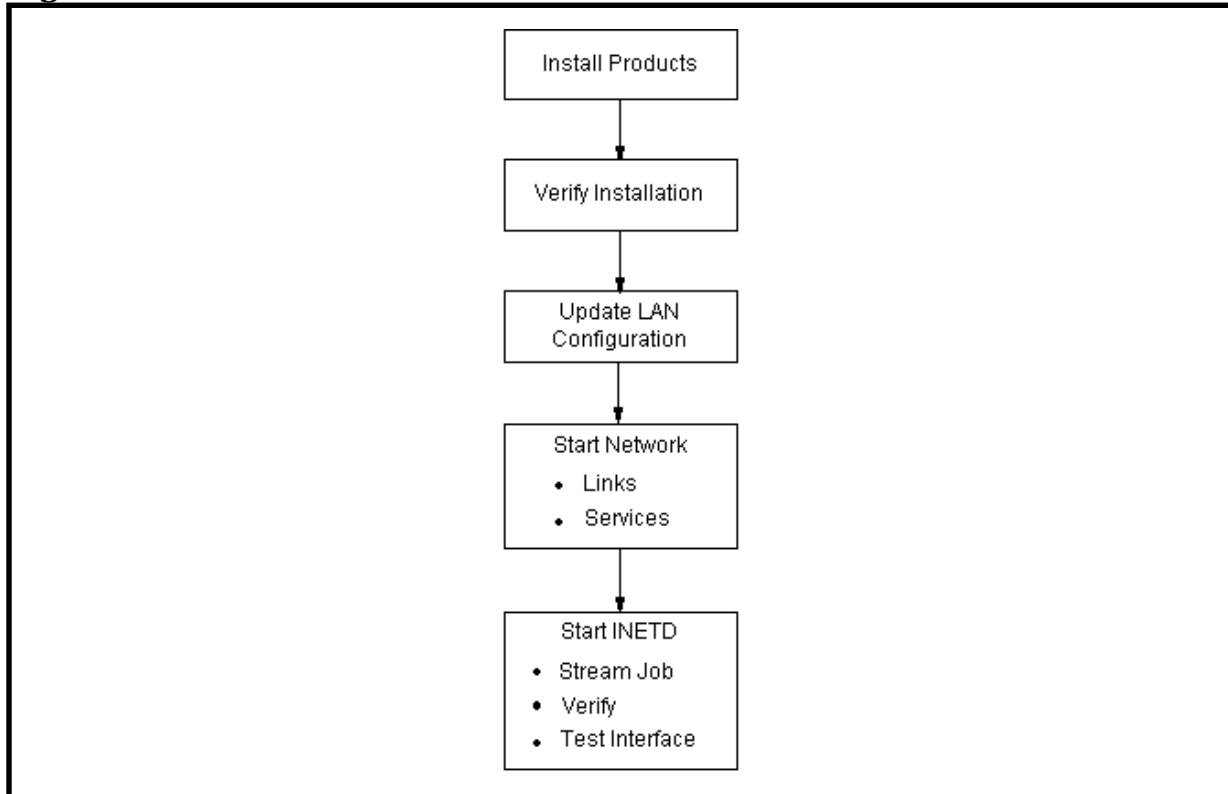
Who Should Use this Manual

This manual is intended for the HP 3000 network manager/administrator who is responsible for managing the networking products and resources on the HP 3000. It is expected that the network manager has a thorough knowledge of the HP 3000 system.

Planning for FTP

An overview of the tasks required for installing, configuring, and starting FTP are shown in Figure 1-2.

Figure 1-2 FTP Overview



Before Using FTP

To install and use FTP, you need the following:

- A supported version of the MPE/iX operating system.
- At least one network link that supports the TCP/IP protocols.

Verify Installation and Update LAN Configuration

This chapter describes how to verify the installation of FTP, and how to update the configuration of the local area network (LAN) link for Ethernet support.

If you are installing a new MPE/iX system and link or are updating to a new release of MPE/iX, refer to the *HP 3000 MPE/iX Installation, and Update Manual* or the *HP 3000 MPE/iX System Software Maintenance Manual*.

To configure a new network link, refer to the *NS 3000/iX Network Planning and Configuration Guide*, and then return to this manual. If you are providing Ethernet support, remember to update the LAN Configuration screen Enable Ethernet field to yes (Y).

Verifying Installation

At this point, you should have already installed the required hardware, link, and FTP software. Any other products you are installing should also have been done by this time.

To verify that FTP has been installed correctly:

- Run NMMAINT as follows:

```
:nmmaint,50  
NMS Maintenance Utility 32098-20014 B.00.10 (C) Hewlett-Packard Co. 1984
```

```
MON, APR 20, 1998, 10:50 PM  
Data comm products build version: N.61.08
```

Subsystem version ID's:

```
HP FTP/XL                HP36957 module versions:  
XL procedure:            HPFTP_COMMON              Version:      A0009001  
XL procedure:            HPFTP_UTIL                Version:      A0009001  
NM program file:         FTP.ARPA.SYS              Version:      A0009001  
NM program file:         FTPSRVR.ARPA.SYS          Version:      A0009001  
Catalog file:            FTPC000.ARPA.SYS          Version:      A0009001  
Catalog file:            FTPHELP.ARPA.SYS          Version:      A0009001
```

```
HP FTP/XL                HP36957 overall version = A.00.09  
:
```

- Verify the capabilities for the group ARPA.SYS account. The required group capabilities are: PM, PH, IA, and BA.
- Verify the security of the files in the group ARPA.SYS account. Issue a :LISTF @.arpa.sys,3.

Verify that the security fields are set as follows:

File Name in ARPA.SYS	SECURITY Field
FTP	READ : ANY EXECUTE : ANY
FTPXL	READ : ANY EXECUTE : ANY
FTPSRV	READ : ANY EXECUTE : ANY
FTPC000	READ : ANY
FTPDOC	READ : ANY
FTPHELP	READ : ANY

Adding Ethernet Support

To update the LAN configuration for Ethernet support, you need to do the following:

- Update the `NMCONFIG.PUB.SYS` file using `NMMGR`.
- If you are updating your system from a previous MPE/iX release, you must run `NMMGRVER` to update your `NMCONFIG` configuration file.
- If needed, update the network directory with remote system names.
- Restart the network in order to activate the new configuration file.

Convert NMCONFIG to New Release

If you are updating your MPE/iX system from a previous release, you must update your NMCONFIG file. Run the utility `NMMGRVER.PUB.SYS` to convert the NMCONFIG file to the new release. NMMGRVER prompts you for the files to convert, and creates a backup file. For instructions on running NMMGRVER, refer to the *NS 3000/iX Operations and Maintenance Manual*.

Enabling Ethernet Support

Before updating the configuration file, obtain the configured name of the LAN NI, and the local node name. In addition, make sure you have a loopback NI of type `LOOP` configured.

From within the `NMMGR` program, you can check what the configured NIs are. After you have opened the `NMCONFIG.PUB.SYS` file, enter the direct path `@NETXPORT.NI`. The Network Interface Configuration screen is displayed. Under the heading Configured Network Interfaces, verify that an NI of type `LAN` and an NI of type `LOOP` have been configured.

Before updating the configuration file, shut down the transport (and the Network Services if installed). Issue an `NSCONTROL STOP` followed by an `NSCONTROL ABORT` for the Network Services, and `NETCONTROL STOP` for the transport.

Run NMMGR

NA or NM user capability is required to update the `NMCONFIG.PUB.SYS` configuration file.

At the MPE/iX prompt, type:

```
:NMMGR
```

Open the Configuration File

The first screen displayed is the Open Configuration/Directory File screen.

The configuration file name `NMCONFIG.PUB.SYS` is displayed. Press the **[Open Config]** key to proceed with updating the configuration.

Go to NS

At the next screen, Main, make sure that the name of the local node is showing and press the **[NS]** key to go to the Network Services branch.

Go to Guided

From the next screen, the NS Configuration screen, press the **[Guided Config]** key to proceed with guided configuration.

Select the LAN NI to Modify

On the next screen, the Network Transport Configuration screen, enter the name of the LAN network interface (NI) in the field labeled NI name, and press the **[Config Network]** key to proceed with guided configuration.

Update the LAN NI Configuration

The LAN Configuration screen is displayed. Use the **[Tab]** key to reach the Enable Ethernet? field and enter **Y** for yes.

Press the **[Save Data]** key to save the Ethernet change.

Press the **[Validate Netxport]** key to validate the transport configuration before exiting from NMMGR.

Additional Updates

Before exiting NMMGR, check the section, “Changing ARP Parameters” to verify that the default ARP parameters are correct for your installation. In addition, review the paragraphs under “Network Traffic” and update the IP Protocol Configuration if necessary for your installation.

If you want to provide NS node name for remote systems that do not support probe, see the subsection, “Updating the Network Directory.” To configure ARPA domain names, see the subsection titled “Configuring ARPA Domain Name Files” in this chapter.

Exit from NMMGR

To exit the NMMGR program, hold down the **[Shift]** key and press the **[Tab]** key which returns you to the command prompt. At the command prompt, enter: `EXIT`, then press the **[Enter]** key.

Restarting the Network

After updating the LAN to support Ethernet, you need to restart the network in order to activate the changed configuration file as described later in this chapter under the heading, “Restarting the Network.”

Changing ARP Parameters

When you use guided configuration to update the LAN NI for Ethernet support, default parameters are set for the address resolution protocol (ARP) configuration.

To verify what these are, or to change them, do the following:

1. Obtain the configured LAN NI name (issue a `NETCONTROL STATUS` command).
2. Run `NMMGR.PUB.SYS`.
3. At the Open Configuration/Directory File screen, ensure that the configuration file `NMCONFIG.PUB.SYS` appears as the configuration file name. You want to open the file by pressing the **[Open Config]** key
4. The HP Configuration screen is displayed. At the Command prompt, enter the direct path name as follows and then press the **[Enter]** key:

```
@NETXPORT.NI.niname.PROTOCOL.ARP
```

where *niname* is the configured LAN NI name. The Address Resolution Protocol (ARP) Configuration screen is displayed. The ARP parameters are:

- **Retransmission Maximum:** The maximum number of times an ARP request will be sent if no reply arrives.
Range:1 to 10
Default:2
 - **Retransmission Timeout:** The time (in seconds) between retransmissions of ARP requests if no reply has arrived.
Range:1 to 10
Default:1
5. If you change any parameters, press the **[Save Data]** key. Next,
 - a. Hold down the **[Shift]** key and press the **[Tab]** key which returns you to the command prompt.
 - b. At the command prompt, enter: `validate`, then press the **[Enter]** key.
 - c. The Validate screen is displayed. Press the **[Validate Netxport]** key to validate the updated configuration.
 6. To exit the NMMGR program, hold down the **[Shift]** key and press the **[Tab]** key which returns you to the command prompt. At the command prompt, enter: `EXIT`, then press the **[Enter]** key.

7. If you changed any of the parameters, you need to restart the network in order to activate the changed configuration file as described later in this chapter under the heading, “Restarting the Network.”

Network Traffic

Enabling Ethernet on an MPE/iX system increases the number of broadcast packets the system receives. If your installation has had network traffic problems in the past, or you expect this increase in traffic to affect your network performance, there are two things you can do:

- First, if the node is not a gateway, verify that the store and forward feature has been disabled.
- Second, as part of an overall network plan, examine the MPE/iX subnet feature as a means for managing network traffic.

Store and Forward

Traffic problems may occur if you use the default configuration for store and forward buffers. If the node you are updating is not a gateway node, you can decrease network traffic by disabling store and forward.

Creating Subnets

Subnetting is used to divide one large network into smaller subnetworks (subnets). Subnets are configured using the IP subnet mask as described under “Update the IP Protocol Configuration.”

Update the IP Protocol Configuration

To enter an IP subnet mask for each node in the subnetwork and/or to disable store and forward, do the following:

1. Run `NMMGR . PUB . SYS`.
2. At the Open Configuration/Directory File screen, ensure that the configuration file `NMCONFIG . PUB . SYS` appears as the configuration file name. You want to open the file by pressing the **[Open Config]** key.
3. The Main screen is displayed. At the Command prompt, enter the direct path name as follows and then press the **[Enter]** key:

```
@NETXPORT . NI . niname . PROTOCOL . IP
```

where *niname* is the configured LAN NI that supports Ethernet.

4. From the IP Protocol Configuration screen, enter the IP subnet mask you have selected for this subnetwork in the IP Mask field. The subnet mask is specified in the same format as the IP address without the preceding letter (A, B, or C). The 32-bit mask is grouped in octets expressed as decimal integers and is delimited by a period (.) or a space. (See the paragraph “Example: Subnet Mask” later in this chapter.)

5. For a non-gateway node, you should disable store and forward buffers.
Enter zero (0) in the Store & Forward Buffers field.
6. After you have finished updating the IP Protocol Configuration, press the **[Save Data]** key. Next,
 - a. Hold down the **[Shift]** key and press the **[Tab]** key which returns you to the command prompt.
 - b. At the command prompt, enter: `validate`, then press the **[Enter]** key.
 - c. The Validate screen is displayed. Press the **[Validate Netxport]** key to validate the updated configuration.
7. To exit the NMMGR program, hold down the **[Shift]** key which returns you to the command prompt. At the command prompt, enter: `EXIT`, then press the **[Enter]** key.
8. If you changed any of the parameters, you need to restart the network in order to activate the changed configuration file as described later in this chapter under the heading, "Restarting the Network."

Example: Subnet Mask

This example shows a network using class C IP addresses which has been subnetted with the first three bits of the node address (in bold) identifying the subnetwork. The IP address for two of the nodes in the subnetwork are (in decimal and in binary):

```
192.006.012 041 1100 0000 0000 0110 0000 1100 0010 1001
192.006.012 055 1100 0000 0000 0110 0000 1100 0010 0111
```

a subnet mask for these two nodes is:

```
255.255.255 224 1111 1111 1111 1111 1111 1111 1110 0000
```

NOTE

The network address and the three bits identifying the subnet bits are set to ones.

For this example, the decimal equivalent (255.255.255 224) is entered in the IP Subnet Mask field.

Updating the Network Directory

For your installation, you may decide to provide users with NS node names for remote systems that do not support probe. MPE/iX FTP users can enter an NS node name instead of the IP address to connect to remote systems which have been identified in the network directory. If you are using ARPA domain names, refer to the subsection in this chapter called “Configuring ARPA Domain Names.”

The steps for updating the network directory are:

1. Run `NMMGR . PUB . SYS`.
2. From the Open Configuration/Directory File screen, verify that the network directory file name displayed is `NSDIR . NET . SYS`, then press the **[Open Directory]** key.
3. The Network Directory Main screen is displayed. Press the **[Update Dir]** key to continue.
4. The Network Directory Select Node Name screen is displayed. Enter a new node name at the node name field, and select **Y** or **N** for Global. The node name must be in the form:
`nodename.domain.organization`.

Press the **[Add]** key to proceed.

Each field in the node name must be 16 or fewer characters starting with an alphabetic character.

5. The Network Directory Data screen is displayed. Enter the IP address for the remote node you are adding to the network directory, and select the correct type. Select type 1 (IP) for a node that supports Ethernet using ARP.

For remote nodes that use Ethernet but do not support ARP, enter the IP address and type 5 (LAN/ETHERNET). You must also enter the LAN station address in the field, Additional Address (six hexadecimal bytes, separated by dashes (`XX-XX-XX-XX-XX-XX`)).

Under the heading Transport services, the field, Checksum for TCP required (**Y**) or optional (**N**) must be set to yes (**Y**) for multivendor communication. This will activate checksumming only for the connection specified. Note that setting checksum to yes in the network directory overrides a value of no set in the Transmission Protocol Configuration (TCP) Screen (path `@NETXPORT . GPROT . TCP`). HP recommends setting a no TCP checksum in the TCP screen because a value of yes turns on checksum for all connections (creating unnecessary overhead).

6. Press the **[Save Data]** key to save the new node name configuration.

7. To exit the NMMGR program, hold the **[Shift]** key and press the **[Tab]** key which returns you to the command prompt. At the command prompt, enter: `EXIT`, then press the **[Enter]** key.
8. To activate the new network directory, you must restart the network as described in the section, “Restarting the Network” later in this chapter.

Configuring ARPA Domain Name Files

If you are planning to use the domain name resolver for name to IP address resolution, you will need to configure a set of ASCII files on each node that contain needed information. To configure these files, you use any standard editor to modify existing sample files according to the instructions in this chapter.

The following subsections detail:

- **How to modify the `RSLVSAMP.NET.SYS` file and save it as `RESLVCNF.NET.SYS` for use as the domain name resolver.**
- **How to modify the `HOSTSAMP.NET.SYS` file and save it as `HOSTS.NET.SYS` for use as the domain name host file.**
- **Other files you can configure to make additional information available to the network.**

To Create or Modify the Resolver File

The resolver file (`RESLVCNF.NET.SYS`) is an initialization file for the domain name resolver. It contains information needed by the network to determine how to resolve a domain name to an IP address. This file is read by the resolver routines the first time they are invoked by a process.

To create the resolver file, perform the following steps:

1. Copy the sample file, `RSLVSAMP.NET.SYS`, to `RESLVCNF.NET.SYS`.
2. Modify `RESLVCNF.NET.SYS` using any ASCII editor so that it contains information about the name servers, domain, and search order for your network. The keywords included in the file are described under “Keywords.”

To modify an already existing `RESLVCNF.NET.SYS` file, simply use your editor to update and save the existing file.

Keywords

Each entry in the resolver file consists of a keyword followed by a value separated by white space. The keyword and its associated value must appear on a single line and the keyword must start the line. Figure 2-1 shows an example of a resolver file. Comment lines start with a pound sign (#).

`domain` Enter the local domain name. Most queries for names within this domain can use short names relative to the local domain name. If the host name does not contain a domain part, the root domain is assumed. If more than one instance of the domain keyword is present, the last instance will override.

The domain name is composed of labels, with each label separated by a period. Each label must start with a letter or digit, and have as interior characters only letters, digits, hyphens (-), or underbars (_). A domain name may have any number of labels, but its total length, including periods, is limited to 255 characters.

`label [.label] [...]`

Domain names are not case sensitive.

`search` The search entry is optional and indicates the order in which domains should be searched for host name lookup. You should add a search entry if users on this system commonly try to connect to nodes in other domains. The search list is limited to six domains with a total of 256 characters. If more than one instance of the search keyword is present, the last instance will override.

Resolver queries will be attempted using each component of the search path in turn until a match is found. Note that this process may be slow and will generate a lot of network traffic if the servers for the listed domains are not local. Note also that queries will time out if no server is available for one of the domains.

`nameserver` Enter the IP address of a name server the resolver should query. The address must be in dot format, with leading zeros omitted and a period between each grouping. See example addresses in Figure 2-1.

NOTE

It is very important that you omit the leading zeros in the network addresses that you enter in the domain name resolver files. If you enter leading zeros here, the domain name resolver will interpret the numbers as octal numbers.

You can list up to three name servers, but you must use a separate keyword entry for each. If there are multiple servers, the resolver will query them in the order listed. If no nameserver entries are present, the default is to use the `HOSTS.NET.SYS` file. If you have no server, do not add any nameserver entries; the resolver will immediately revert to the `HOSTS.NET.SYS` file. Errors in the resolver file will be silently ignored by the resolver routines.

Figure 2-1 **Sample Resolver Configuration File**

```
#resolv.conf file
#
domain locl.inet.com
search locl.inet.com inet.com
nameserver 192.255.25.33
nameserver 192.255.354.74
nameserver 192.15.360.75
```

Note that the IP addresses and domain names used above are for purposes of the example only.

To Create or Modify the Hosts File

The host name data base file, `HOSTS.NET.SYS`, associates internet addresses with official host names and aliases. This allows a user to refer to a host by a symbolic name instead of an internet address.

When using the name server, this file serves only as a backup when the server is not running. In this circumstance, it is a common practice that `HOSTS.NET.SYS` contains a few addresses of machines on the local network.

To create the hosts file, perform the following steps:

1. Copy the sample file, `HOSTSAMP.NET.SYS`, to `HOSTS.NET.SYS`.
2. Modify `HOSTS.NET.SYS` using any ASCII editor so that it contains information about the nodes on your network.

To modify an already existing `HOSTS.NET.SYS` file, simply use your editor to update and save the existing file.

Enter a single line for each host, including the following information:

```
[internet address] [local host name] [aliases]
```

A line cannot start with a space. Items are separated by any number of blanks and/or tab characters. A pound sign (#) indicates the beginning of a comment.

Network addresses are specified in dot format, with leading zeros omitted and a period between each grouping. (See example addresses in Figure 2-2.)

Host names can contain any printable character other than a white space, newline, or comment character.

NOTE

It is very important that you omit the leading zeros in the network addresses. If you enter the leading zeros here, the domain name resolver will interpret the numbers as octal numbers.

Figure 2-2 Sample Hosts Configuration File

```
# This file contains information regarding the known hosts.
#
# The form for each entry is:
# host IP address local host name host aliases
#
# Note: the entries cannot be preceded by a blank space.
# 172.0.0.1 localhost loopback me myself local
192.41.112.100      bashful.locl.inet.com      bashful
192.41.112.114      happy.locl.inet.com        happy
192.41.112.413      queezy.locl.inet.com      queezy
192.41.112.136      sneezy.locl.inet.com      sneezy
192.41.104.4        mpmdnda.locl.inet.com     mpmdnda moose
192.41.104.5        mpmdwa.locl.inet.com     mpmdwa wabbit
192.41.104.132      mpmtchq.locl.inet.com    mpmtchq foo
192.41.130.16       mpmdiv.locl.inet.com     mpmdiv zephyr
192.41.130.82 a      abacus.locl.inet.com      abacus spots
192.41.132.161      camelot.locl.inet.com     camelot
192.41.132.166      bigblue.locl.inet.com     bigblue
```

Note that the IP addresses and host names used in this figure are for purposes of example only.

Additional Domain Name Configuration Files

In addition to the resolver file and the host name data base, there are other files available to allow you to configure additional information about your network. Each of these files is provided in sample format in the `NET.SYS` account. Each sample file contains an explanation of the format for the data and a sample entry. The available files and their functions are described here.

Network Name Database

The network name database, `NETWORKS.NET.SYS`, associates IP addresses with official network names and aliases. This allows the user to refer to a network by a symbolic name instead of an internet address. To configure the network name database, modify the sample file `NETSAMP.NET.SYS`.

Protocol Name Database

The protocol name database, `PROTOCOL.NET.SYS`, associates protocol numbers with official protocol name and aliases. This allows the user to refer to a protocol by a symbolic name instead of a number. The protocol number mappings are defined in *RFC 1010 Assigned Numbers*. To configure the protocol name database, modify the sample file `PROTSAMP.NET.SYS`.

Service Name Database

The service name database, `SERVICES.NET.SYS`, associates official service names and aliases with the port number and protocol the services use. Reserved port numbers 0 through 255 are assigned by *RFC 1010*. To configure the service name database, modify the sample file `SERVSAMP.NET.SYS`.

Restarting the Network

In order to activate the changed configuration file, you need to restart the network.

1. If you have the Network Services (NS 3000/iX) installed, stop them by first issuing `NSCONTROL STOP` followed by `NSCONTROL ABORT`.
2. Next, to stop the transport, issue a `NETCONTROL STOP`.
3. Once the network has been stopped, issue the following `NETCONTROL` commands:
 - `NETCONTROL NI=Loop_niname ; START` to restart the loopback NI (where *Loop_niname* is the name of the configured NI of type LOOP) and,
 - `NETCONTROL NI=niname ; START` for each configured NI to restart the links.
4. If you have the Network Services installed, restart them with `NSCONTROL START`.

3**Starting FTP**

Once you have configured the LAN or updated the configuration for Ethernet support, the next step is starting INETD.

Starting INETD

Since FTPSRVR runs under INETD, INETD has to be started now.

Refer to the *Configuring and Managing MPE/iX Internet Services Manual*, for specifics into the setup of the INETD (the Internet Super Daemon) configuration files referenced here.

Here are the entries needed for FTPSRVR to run under INETD. These entries can be added by streaming `FTPCNFJ.ARPA.SYS` or by manually editing each file.

Services File

The `SERVICES.NET.SYS` file must have the following line:

```
ftp      21/tcp
```

It might be commented out (with # symbol). In that case, uncomment it. Otherwise enter the line using an MPE editor.

Protocol File

The `PROTOCOL.NET.SYS` file must have the following line:

```
tcp      6      TCP      # transmission control protocol
```

It might be commented out (with # symbol). In that case, uncomment it. Otherwise enter that line using an MPE editor.

Configuration File

Add the FTP services to `INETDCNF.NET.SYS`. This is done by adding the following line:

```
ftp stream tcp nowait  MANAGER.SYS /SYS/ARPA/FTPSRVR ftpsrvr
```

It might be commented out (with # symbol). In that case, uncomment it. Otherwise enter that line using an MPE editor.

Starting INETD

Stream the job `JINETD.NET.SYS`:

```
:stream JINETD.NET.SYS
```

NOTE

Do not stream `JFTPSTRT.ARPA.SYS`; it is no longer needed. Check startup jobs, UDCs and Command files for any place where `JFTPSTRT` is streamed and delete or comment out those entries.

Optional Configuration

The optional configuration changes for FTPSRVR support anonymous logon.

To support anonymous FTP, certain system administrative tasks have to be done. These are essential for system security.

1. **FTPGUEST account and user, named USER under the FTPGUEST account should be created:**

```
:NEWACCT FTPGUEST,USER
```

If this account and user already exist, proceed to step 2.

2. **Assign passwords to FTPGUEST account and USER:**

```
:ALTACCT FTPGUEST;PASS=ANYPASS
```

```
:ALTUSER USER.FTPGUEST;PASS=ANYPASS
```

3. **The capability list for the account FTPGUEST should be AL, AM, GL, IA, ND, SF:**

```
:ALTACCT FTPGUEST;CAP=AL,AM,GL,IA,ND,SF
```

4. **The capability list for the group PUB under FTPGUEST should be IA:**

```
:ALTUSER PUB.FTPGUEST;CAP=IA
```

5. **The capability list for the user USER under FTPGUEST should be IA, SF, ND:**

```
:ALTGROUP USER.FTPGUEST;CAP=IA,SF,ND
```

NOTE

The configuration of an anonymous logon is not required and can be implemented or not, on a system by system basis, by simply not building the "FTPGUEST" account on systems where an anonymous logon is not required.

Providing Access to the FTP Server Only

For security reasons, you can prevent MPE/iX users from running the FTP user program by locking the file named `FTP.ARPA.SYS` with the MPE/iX command `ALTSEC`.

Providing Access to the MPE/iX FTP User Only

To prevent remote users from accessing the MPE/iX FTP server:

- don't run INETD (if only FTPSRVR is running under INETD)
- otherwise, comment out the line

```
ftp stream tcp nowait MANAGER.SYS /SYS/ARPA/FTPSRVR ftpsrvr
```

by placing the # symbol in the first column in the file
INETDCNF.NET.SYS and restart INETD as
:INETD.NET; info="-c"

To restrict only a particular host/network from accessing the MPE/iX FTP server, add a line in INETDSEC file, in the form of:

```
<service name> <allow/deny> <host/network addresses, host/network names>
```

For example, to disallow the host 192.23.4.3 from accessing the FTP server, add the following line:

```
ftp deny 192.23.4.3
```

For more information regarding INETDSEC.NET.SYS, refer to the *Configuring and Managing MPE/iX Internet Services* manual, section "inetd Security File".

Changing Logging

The INETD's log file will log any error which results in the FTPSRVR getting aborted.

Testing the FTP User Interface and Server

Once you have FTP installed and running, you can test FTP in loopback mode and to a remote system.

Test in Loopback Mode

You can test FTP in loopback mode by establishing an FTP session on your local node as in the following sample session. In loopback, you are accessing and seeing responses from the MPE/iX FTP server.

Run FTP

Enter the following at the MPE/iX prompt:

```
FTP.ARPA.SYS
```

Connect and Log On in Loopback

Connect to your local node by entering the local node name. For example:

```
ftp> OPEN localnode
```

Enter a user account on your system, then the passwords when prompted:

```
ftp> Name (username) USERNAME.MYACCT
```

```
331 Password required for USERNAME.MYACCT [userpass] [,acctpass] [,grouppass]  
Password: (enter password)
```

```
230 USER LOGGED ON
```

View Local Files

List the files in the current group:

```
ftp> DIR
```

```
200 PORT command ok.
```

```
150 File LISTF opened; data connection will be opened
```

```
ACCOUNT = MYACCT
```

```
GROUP = MYGROUP
```

FILENAME	CODE	-----LOGICAL RECORD-----	SIZE	TYP	EOF	LIMIT
NSCREEN1			256B	FA	800	10000
NSCREEN2			80B	FA	500	14000
NSPROGX PROG			1934W	VB	4551	9480
PROGRAMX			256W	FB	700	1350

```
226 Transfer complete
```

```
nnn bytes received in n.nn seconds (n.nn Kbytes/sec)
```

```
ftp>
```

Starting FTP
Testing the FTP User Interface and Server

Transfer a File

Choose a file to transfer from you account, back to the same account with a different target name:

```
ftp> GET NSCREEN2 TESTFILE
```

Check to see that the file transfer was successful by issuing an FTP **LS** command:

```
ftp> LS
200 PORT command ok.
NSCREEN1
NSCREEN2
NSPROGX
TESTFILE
226 Transfer complete
nnn bytes sent in n.nn seconds: (n.nn Kbytes/sec)
ftp>
```

Exit From FTP

End the session by entering the FTP command **QUIT**: ftp> QUIT.

Test to a Remote System

You can follow the same steps to test FTP from MPE/iX to a remote system by using the remote system IP address (or its mode name) in the **OPEN** command. Responses and displays from the remote system FTP server are implementation dependent.

This chapter provides you with information for managing FTP:

- Describes what FTP users need to access remote systems or the MPE/iX FTP server with FTP,
- Summarizes the HP ARPA File Transfer Protocol features (user and server commands), and
- Describes MPE/iX FTP architecture.

FTP Users

On MPE/iX, there are two groups of FTP users: MPE/iX FTP users accessing remote systems with FTP user commands, and remote system FTP users accessing the FTP server on MPE/iX.

MPE/iX FTP Users

MPE/iX FTP users need the ARPA domain names, IP addresses, or NS node names and logon accounts for remote systems they can access with FTP user commands.

To allow users to use alias names, you can identify remote systems in the network directory as NS node names. Standard ARPA domain names are supported. Another method for providing alias names is suggesting users create MPE/iX CI variables containing the IP addresses for frequently accessed systems or using UDCs or command files (see “Using FTP” in the *HP ARPA File Transfer Protocol User's Guide* for examples.)

Remote FTP Users

Remote FTP users accessing the FTP server will need the:

- Node name or IP address of the MPE/iX system,
- User logon account and passwords,
- MPE/iX file system information.

For users unfamiliar with the MPE/iX file system, see Appendix B, "Using the FTP Server." This information is also provided in an online text file: `FTPDOC.ARPA.SYS` which can be transferred to remote users using FTP.

FTP User Commands on MPE/iX

The following quick reference provides the syntax and usage of the FTP user commands, listed in alphabetic order.

To stop a file transfer or directory listing in progress, you can [CTRL-Y].

You are prompted to exit FTP, cancel the transfer, or continue. From the FTP prompt you can exit by entering **QUIT** or pressing the [Break] key.

:mpecommand From within an FTP session you can execute an MPE/iX command or program by entering a colon (:) followed by the command or program name. After the command is executed, or the program is exited, you are returned to your FTP session.

? A synonym for the **HELP** command.

APPEND *localfile*

[*remotefile*]

[;*buildparms*]

Store data from *localfile* on the local system into *remotefile* on the remote system. If *remotefile* is not specified, *localfile* will be used as the *remotefile* name as well. If the remote file exists, the data will be appended to it; otherwise, the file will be created.

NOTE

If the remote file does not exist, this command behaves the same as **PUT**, and any specified build parameters (*buildparms*) will be used. But if the file already exists, any *buildparms* will be ignored.

ASCII

Sets the FTP file transfer type to **ASCII**. This is the default when you first enter the FTP program.

BINARY

Sets the FTP file transfer type to binary.

BYE

A synonym for the **QUIT** command.

BYTESTREAM

(**BYTE**)

Sets the FTP file transfer type to binary.

CASE

When using the **MPUT** command, turns on or off the feature to force resulting filenames to lower case. When case is off, resulting file names are all upper case. The default is off.

CD

remotedirectory

Changes the working directory on the remote host to the directory specified.

CLOSE

Closes the remote connection but remains in the FTP program.

DEBUG Turns on or off the terminal screen display of the commands and parameters that are sent to the remote host. The default is off.

DELETE
remotefilename Deletes the remote file specified. A directory path may be included with *remotefilename*.

DIR
[*remotedirectory*
[*localfile*]] Writes the requested *remotedirectory* listing to the terminal, or to a local file if specified. If *remotedirectory* is not specified, the current remote working directory contents are listed.

DISCONNECT A synonym for the **CLOSE** command.

EXIT A synonym for the **QUIT** command.

EXITONERROR Turns on or off the feature to exit an FTP session when an error is detected. The last error and message are saved in system variables (enter **SHOWVAR FTP@** to display). Useful for batch jobs using FTP commands. The default is off.

FORM
[**NONPRINT**] Sets the FTP file transfer form to the specified format. The only supported form is **NONPRINT**. Entering **FORM** without a parameter displays the supported format.

GET *remotefile*
[*localfile*]
[;*buildparms*]
[;*move*] Transfers the remote file specified to a local file. Build parameters may be used to change how the file is stored on MPE/iX. If a local file name is not specified, the file is saved with the same name as the remote file name (assuming a legal file name).

The **move** option requests that the specified source file be physically moved from the source location to the specified target location.

This is available for **MGET**, **PUT** and **MPUT** as well.

NOTE The removal of the original source file may be guarded by file system security.

HASH Toggles the state of the hash function within the ftp client. When the hash function is enabled, the “#” (hash) symbol will print to stdlist for every 1024 characters transferred during data transfer requests.

HELP [<i>ftpcommand</i>]	Displays a list of the valid FTP user commands. If an FTP user command is specified with HELP , a brief description of the command is displayed. You can also use the HELP command for information on specific FTP messages and errors, and the supported build parameters (<i>buildparms</i>).
LCD <i>localdirectory</i>	Changes the working directory on the local machine to the directory specified.
LS [<i>remotedirectory</i> [<i>localfile</i>]]	Displays the contents of a remote directory, one file per line. If a <i>localfile</i> name is specified, the listing will be saved to the file specified. If <i>remotedirectory</i> is not specified, the current remote working directory contents are listed.
MDELETE <i>remotefiles</i>	Delete multiple files on the remote system.
MGET <i>remotefiles</i> [<i>;buildparms</i>] [<i>;move</i>]	Retrieve multiple files from the remote system. Build parameters can be specified and apply to all files in the transfer. The resulting local files will have the same name as the remote files. Note that MPE/iX file names are exclusively upper case.
MKDIR <i>remotedirectory</i>	Creates a directory on the remote machine.
MODE [<i>STREAM</i>]	Sets the FTP file transfer mode to the specified mode. The only supported mode is <i>STREAM</i> . Entering <i>MODE</i> without a parameter displays the supported format.
MODTIME <i>remotefile</i>	Returns the last modification time and date of the remote file.
MPUT <i>localfiles</i> [<i>;buildparms</i>] [<i>;move</i>]	Transfer multiple files using wildcard characters in the <i>localfiles</i> parameter. Optionally, build parameters can be specified if the remote system is an MPE/iX system. The build parameters affect each file in the transfer. Non-MPE/iX FTP servers will not interpret the build parameters as

intended. The resulting file names are in upper case letters unless you use the **CASE** command to force the resulting file names to all lower case letters.

OPEN	
<i>remotehostname</i>	Opens a connection to the remote host specified. Must be either an ARPA domain name, IP address, or an NS node name.
PROMPT	Toggle interactive prompting. Interactive prompting is used during multiple file transfers to allow the user to selectively retrieve or restore files, and during multiple file deletes to selectively delete. If prompting is turned off, the default for MGET and MPUT is to transfer all files, and the default for MDELETE is to delete all files.
PUT <i>localfile</i> [<i>remotefile</i>] [; <i>move</i>]	Transfers a local file to a file on the remote system. If the remote file name is not specified, the file is saved with the local file name (assuming a legal file name). Optionally, build parameters can be specified if the remote system is an MPE/iX system.
PWD	Displays the name of the remote working directory on the terminal.
QUIT	Closes the connection to the remote system and exits from FTP.
QUOTE <i>string</i>	Sends server commands to the remote host. Used for troubleshooting.
RECV <i>remotefile</i> [<i>localfile</i>] [; <i>buildparms</i>]	A synonym for the GET command.
REMOTEHELP [<i>servercommand</i>]	Displays the remote host FTP server commands supported. If a server command is specified with the REMOTEHELP command, a brief description of the command is displayed. (Implementation dependent).
RENAME <i>remotefile</i> <i>newname</i>	Renames a remote file.
REPLACE	Toggles the internal replace flag and the value of the environment variable FTP_REPLACE to either TRUE (on) or FALSE (off). This flag specifies the file placement policy during subsequent file transfers.
	on sets the internal replace flag and the value of the FTP_REPLACE CI environment variable to TRUE (this is

		the default state). In this case, all file transfers will unconditionally replace the target file.
	<code>off</code>	sets the internal replace flag and the value of the environment variable to FALSE. In this state, all file transfers will be conditional predicated on user response to replace the target file if it previously existed.
RESET		Clear reply queue. This command resynchronises command/reply sequencing with the remote FTP server. Resynchronisation may be necessary following a violation of the FTP protocol by the remote server.
RMDIR	<i>remotedirectory</i>	Deletes a directory from the remote machine.
RUNIQUE		Toggle receive-unique mode. In receive-unique mode, all files stored on the local machine will be guaranteed to be created with a unique file name.
SEND	<i>localfile</i> [<i>remotefile</i>]	A synonym for the PUT command.
SITE	<i>string</i>	Asks remote server to perform a site-specific command. Type REMOTEHELP SITE for a list of commands supported by the remote server.
SIZE	<i>remotefile</i>	Returns the size in bytes of the remote file.
STATUS		Display the status of the connection, the data type, whether each of verbose, debug, exit-on-error, prompting, lowercase, store-unique, receive-unique, tracing is on or off, plus the connection timeout value.
STRUCT	[FILE]	Sets the FTP file transfer structure to the specified structure. The only supported structure is FILE. Entering STRUCT without a parameter displays the supported structure type.
SUNIQUE		Toggle store-unique mode. In store-unique mode, all files stored on the remote machine will be guaranteed to be created with a unique file name.
SYSTEM		Displays the remote system type.
TIMEOUT	[<i>num-secs</i>]	The connection timeout value indicates how long to wait for a message from the remote FTP server before giving up. The allowable range is 0 to 3000. A value from 1 to 3000 indicates a timeout value in seconds. A

	value of 0 means no timeout (that is, wait forever). If <i>num-secs</i> is not specified, the current timeout value will be displayed. Otherwise, this command sets the connection timeout to <i>num-secs</i> seconds.
TRACE	If command is specified, toggle tracing.
TYPE [<i>transfertype</i>]	Sets the FTP file transfer type to the specified type. If a transfer type is not included, the current file transfer type is displayed. The supported transfer types are ASCII and BINARY. The default is ASCII.
USER <i>username</i>	Used to enter a logon name in order to establish a session on the remote host. A connection to the remote host must already have been established using OPEN.
VERBOSE	Turns on or off the display of responses from the remote host. The default is on.

MPE/iX FTP Server Commands

The quick reference provides a list of the FTP user commands a remote FTP user accessing MPE/iX can use. The corresponding MPE/iX FTP server commands are in parentheses.

User command

**(SERVER
command)** DESCRIPTION

ASCII

(TYPE A) Sets the FTP file transfer type to ASCII. This is the default when you first enter FTP.

BINARY

(TYPE I) Sets the FTP file transfer type to binary.

BYTESTREAM

(TYPE L) Sets the FTP file transfer type to bytestream.

CD *remotedirectory*

(CWD | XCWD) Changes the working directory on the remote host to the directory specified.

CLOSE **(QUIT)** Closes the remote connection but remains in the FTP program.

DELETE

remotefilename

(DELE) Deletes the remote file specified. A directory path may be included with the *remotefilename*.

DIR

[*remotedirectory*]

[*localfile*]

(LIST) Writes the requested remote directory listing to the terminal, or to a local file if specified. If *remotedirectory* is not included, the current remote working directory contents are listed.

FORM [NONPRINT]

(FORM) Sets the FTP file transfer form to the specified format. The only supported form is NONPRINT.

GET *remotefile*

[*localfile*]

(RETR) Transfers the remote file specified to a local file. If a local file name is not specified, the file is saved with the same name as the remote file name (assuming a legal file name).

LS

[*remotedirectory*]

[*localfile*] **(NLST)** Displays the contents of a remote directory, one file per line. If a *localfile* name is specified, the listing will be saved to the file specified. If *remotedirectory* is not included, the current remote working directory contents are listed.

MDELETE

remotefiles

(NLST,DELE) The remote system expands the wildcard characters in *remotefiles* and deletes the set of files on the remote MPE/iX host.

MGET *remotefiles*

(NLST,RETR) The remote system expands the wildcard characters in *remotefiles* and retrieves the set of files from the remote host.

MKDIR

remotedirectory

(MKD | XMKD) Creates a directory on the remote machine.

MODE [STREAM]

(MODE) Sets the FTP file transfer mode to the specified mode. The only supported mode is STREAM.

MODTIME

remotefile

(MDTM) Returns the last modification time and date of the remote file.

MPUT *localfiles*

(NLST,STOR) The local system expands the wildcard characters in *localfiles* and transfers the set of files from the local host to the remote MPE/iX system.

OPEN

remotehostname Opens a connection to the remote host specified.

PUT *localfile*

[*remotefile*]

[; *buildparms*]

(STOR) Transfers a local file to a file on the remote MPE/iX system. Build parameters may be used to change how the file is stored on MPE/iX. If the remote file name is not specified, the file is saved with the local file name provided the local file name is a valid name on the remote MPE/iX system.

PWD **(PWD)** Displays the name of the remote working directory on the terminal. On MPE/iX, the session information is returned as well.

QUIT (QUIT) Closes the connection to the remote system and exits from FTP.

REMOTEHELP
[*servercommand*]

(HELP) Displays the remote host (MPE/iX) FTP server commands supported. If a server command is specified with the **REMOTEHELP** command, a brief description of the command is displayed.

RENAME *remotefile*
newname

(RNFR,RNTO) Renames a remote file.

RMDIR
remotedirectory

(RMD | XRMD) Deletes a directory from the remote machine.

```
SITE <sp> HELP
      | MPE/iX
      | BUILDPARMS file-name
      | USER_LABELS filename [number]
      | STREAM file-name
```

| TIMEOUT *num-secs*

(SITE) Remote system

HELP Returns a help line.

MPE/iX Sets an internal flag indicating that the local system is an MPE/iX machine.

BUILDPARMS Gives the build parameters of the specified file.

USERLABELS Gives the user label listing of the specified file.

STREAM Streams a give job-file.

TIMEOUT Sets the server time-out to the specified value.

SIZE *remotefile*

(SIZE) Returns the size in bytes of the remote file.

SRUCT [FILE]

(STRU) Sets the FTP file transfer structure to the specified structure. The only supported structure is FILE.

SYSTEM **(SYST)** Displays the remote system type.

TYPE [*transfertype*]

(TYPE) Sets the FTP file transfer type to the specified type. The supported transfer types are ASCII and BINARY.

USER

sess,user.acct,group

(USER) Used to enter a logon name in order to establish a session on the remote host. A connection to the remote host must already have been established using OPEN. Passwords may be included in the logon string as follows:

```
sess , user / userpass . acct / acctpass , group / grp  
pass
```

Note: Passwords can only be entered once. If you enter passwords with the logon string, *do not* re-enter them at the password prompt, just press the [Return] key. If you enter passwords as part of the logon string, they are displayed in the message text of the password prompt.

FTP Architecture

This section describes the FTP architecture and the overall network architecture for a system that includes FTP.

Figure 4-1 shows the FTP client-server model. The FTP commands and replies are the messages and errors you can receive as described in Appendix A, "Error Messages."

Over the data connection, files and directory information are transferred. Data is transferred in a defined format. Once the data has been received, it is converted to the file system supported by the receiving system.

Figure 4-1 FTP Client-Server Model

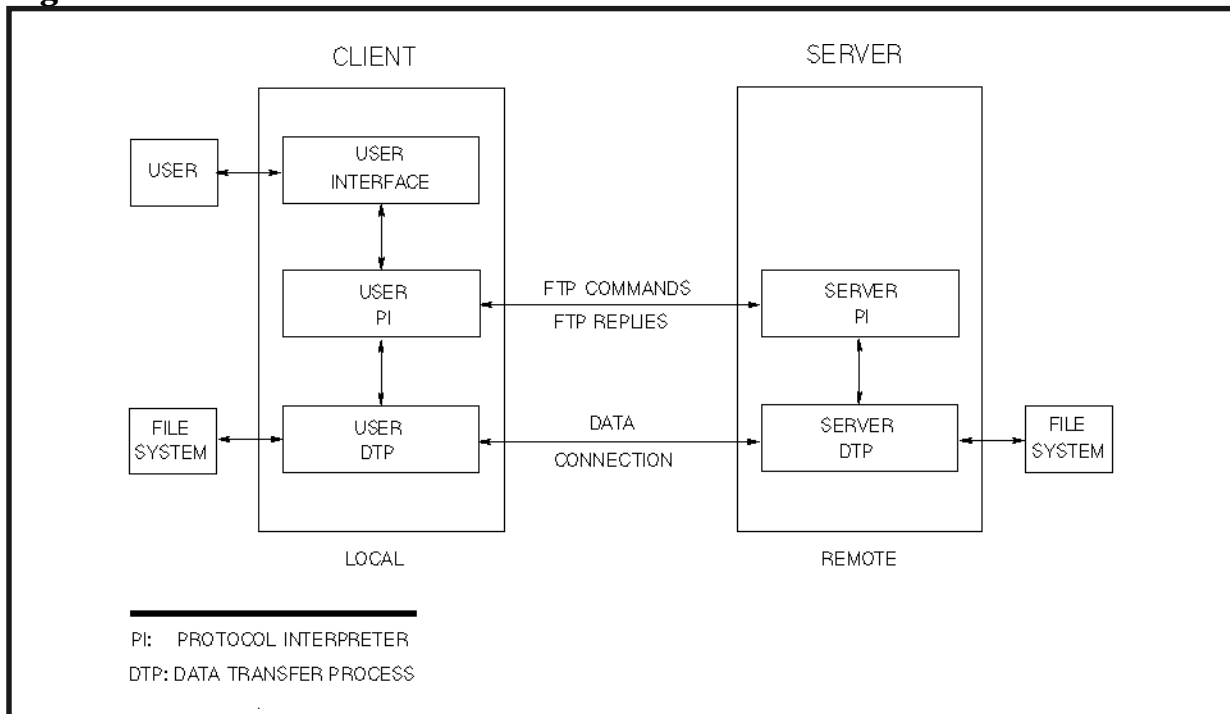
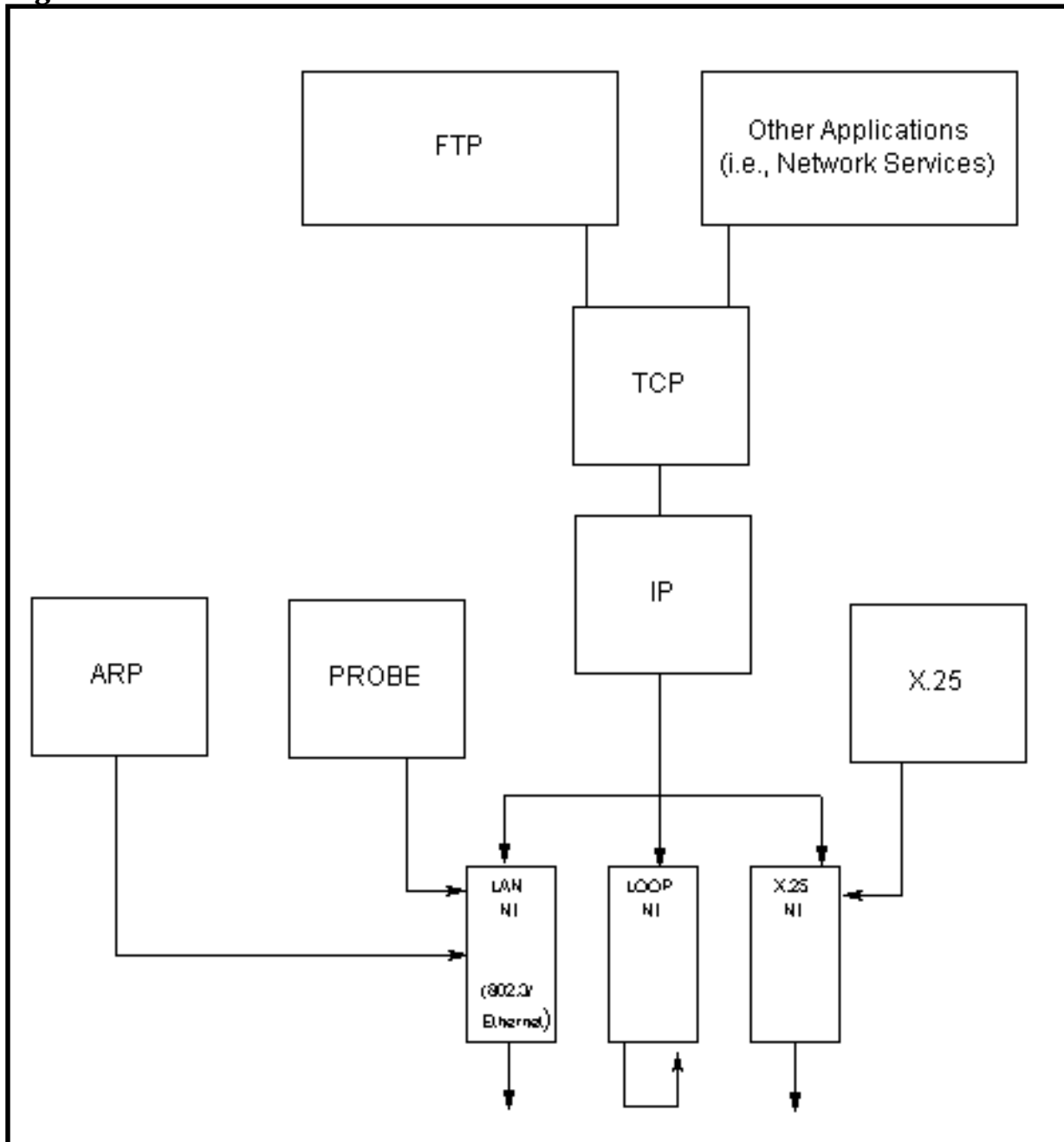


Figure 4-2 shows the network architecture for an installation including FTP over TCP/IP Ethernet/802.3 LAN and an X.25 wide area network.

The MPE/iX FTP implementation consists of the FTP monitor process which returns errors in the jobstream output (see Appendix A, "Error Messages," for possible errors returned).

To troubleshoot network problems, you can refer to Figure 4-2 to determine logging and tracing required. See the `NETCONTROL` command in the *NS 3000/iX Operations and Maintenance Manual* for information on starting, stopping, status, and tracing the lower level protocols and NIs.

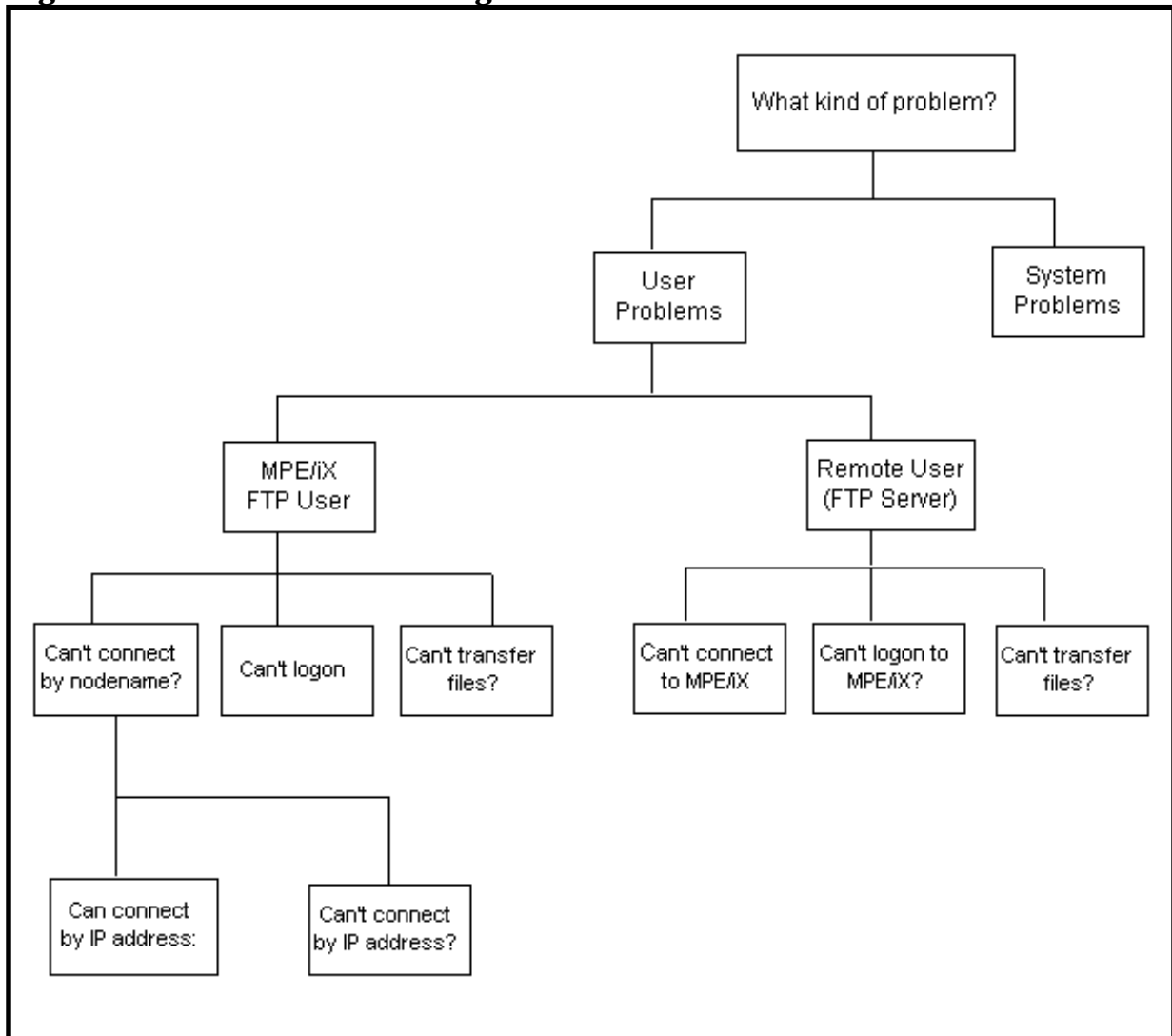
Figure 4-2 Network Architecture



This chapter describes possible problems you may encounter and methods you can use to troubleshoot them.

Refer to the diagram in Figure 5-1 and the information on the following pages to isolate the problem and resolve it.

Figure 5-1 Troubleshooting Tree



MPE/iX FTP User

Cannot Connect by Node Name (IP Address OK)

An MPE/iX FTP user cannot connect by NS node name, but can connect using the remote system IP address:

- If the node name is configured in the network directory, check to see that it is configured correctly. If it is not, configure the node name.
- For remote nodes that support probe or probe proxy, and are not configured in the network directory, examine the network configuration.

Cannot Connect by IP Address

Check that the user entered the correct IP address. The correct format for an IP address is: *nnn.nnn.nnn.nnn*

where *nnn* is a number from 000 to 255, inclusive. For example, an IP address could be: 192.1.20.125. Note that preceding zeros are not used.

Next, check the following:

- Is the network up and running on the system?
- Run PING/iX to the remote host system. PING/iX can be run as follows (see Appendix C, "PING/iX Utility," for more information):

```
:Run ping.net.sys;info="inaddress [ ,packets ]  
[ ,bytes]"
```
- Specify the remote IP address, number of packets you want to send, and bytes of data per packet. Use [CTRL-Y] to stop PING/iX.
- If PING works, is the FTP server up and running on the remote host system?
- If PING does not work, is the network link active on the remote host system?

Cannot Logon to Remote

First turn verbose and debug on.

- If an MPE/iX user cannot log on to the remote system, verify the logon account and passwords are correct.
- Try to log on to the remote system with the user's account and password(s).

Cannot Transfer Files

For FTP file transfer problems, first turn verbose and debug on.

- Use the **LS** or **DIR** command to verify the file name spelling.
- Check how the file names are entered. Some systems support both upper and lower case file names. Some systems support characters in file names that are not supported on MPE/iX.
- Supported file types for MPE/iX: must be binary, bytestream, or ASCII, fixed or variable records.
- Check the default file transfer type being used. Enter: `ftp> TYPE`
- Check the size of records, and file types supported on the remote host and MPE/iX. For MPE/iX specific information, refer to the *HP ARPA File Transfer Protocol Users Guide*.

Remote User

A remote user accessing the MPE/iX FTP server may encounter the following problems.

Cannot Connect to MPE/iX

The remote user cannot connect to the MPE/iX FTP server.

- Run the PING utility from the remote host to MPE/iX.
- If PING is successful, Check the INETD process on MPE/iX.
- Issue the `SHOWJOB` command and verify that the INETD job is executing (EXEC).
- If the INETD is running, check whether the entry for FTP is in the configuration file (INETDCNF). If yes, check the associated SPOOL file for errors.
- If using FTP from MPE/iX works, try FTP on MPE/iX in loopback mode (see the example in Chapter 3, "Starting FTP,"). If loopback does not work, check that the LOOP type NI is active by issuing `NETCONTROL NI=niname ; STATUS`, and check the FTP logfile `FTPLOG.ARPA.SYS` for errors.
- If FTP in loopback mode on MPE/iX works, check that the network interfaces (NIs) are active. From the MPE/iX system, issue a `NETCONTROL NI=niname ; STATUS` for each configured NI. The configured LAN NI, type LOOP NI, and any X.25 NIs configured must be active.

User Cannot Log On to MPE/iX

If a user cannot log on to MPE/iX, first turn verbose and debug on.

- Did the user enter a valid logon account for MPE/iX?
- If user tried to log on from a system that supports prompting, try to log on using the FTP `USER` command:

```
ftp> USER session,user.account,group
```

- Check that passwords are entered correctly. Passwords must be entered as follows:

At the password prompt:

```
userpass,acctpass,grouppass
```

or, as part of the logon string:

```
ftp> USER sess,user/userpass.acct/acctpass,group/grouppass
```

NOTE

Passwords can only be entered once. For example, if the user enters the account password in the **USER** command string, *do not* re-enter it at the password prompt.

- Try to log on from MPE/iX (`HELLO user.account,group`)
- Check that the LOOP type NI is active by issuing `NETCONTROL NI=niname ; STATUS.`
- Check the privileges on the FTP system files: issue `a :listf @.arpa.sys,3`. For each file, the output under **SECURITY** should be as follows:

File Name in ARPA.SYS	SECURITY Field
FTP	READ : ANY EXECUTE : ANY
FTPXL	READ : ANY EXECUTE : ANY
FTPSRVR	READ : ANY EXECUTE : ANY
FTPC000	READ : ANY
FTPDOC	READ : ANY
FTPHELP	READ : ANY

Cannot Transfer Files

For remote users, first check that verbose and debug are on.

- Supported file types: must be binary, bytestream, or ASCII, fixed or variable records.
- Check The default file transfer type being used. Enter: `ftp> TYPE`
- Check the size of records, and file types supported on the remote host and MPE/iX. For MPE/iX specific information, refer to the *HP ARPA File Transfer Protocol User's Guide*.
- Check how file names are entered: some systems support both upper and lower case file names. Some systems support characters in file names that are not supported on MPE/iX.

A

Error Messages

This appendix contains messages and errors that may be received by FTP users on MPE/iX, and remote users accessing the FTP server.

FTP User Messages and Errors

These error and warning messages may be returned to FTP users on MPE/iX while using the FTP user program.

In the following list of messages and errors, the exclamation point (!) represents a variable value.

MESSAGE: Error in loading keywords from FTP catalog. (FTPERR 3)

FTPERR 3

CAUSE: The User-FTP program encountered an error while trying to load the FTP command keywords onto its program stack from the FTP catalog. This probably indicates an internal FTP error.

ACTION: Check the permissions on the file `FTPC000.ARPA.SYS`. The security for `READ` must be set to `ANY`. If the permissions are correct, note the circumstances and contact your Hewlett-Packard representative for assistance.

MESSAGE: Command must be less than or equal to 255 characters. (FTPERR 5)

FTPERR 5

CAUSE: The user entered an FTP command which exceeded 255 characters.

ACTION: Try entering the command using fewer characters.

MESSAGE: ?Invalid command. (FTPERR 6)

FTPERR 6

CAUSE: An invalid or unknown command was issued to the User-FTP program.

ACTION: Check the command for spelling. Use the help command for a list of supported HP ARPA FTP commands.

MESSAGE: Not connected. (FTPERR 8)

FTPERR 8

CAUSE: An FTP command was entered which requires a host connection and no connection was established.

ACTION: Open a host connection using the `OPEN` command and try the command again.

MESSAGE: Cannot connect to host: ! (FTPERR 9)

FTPERR 9

CAUSE: FTP was unable to open a host connection. Typically this FTP error is accompanied by a socket error which provides more information.

ACTION: Check the spelling of the host name or IP address. Otherwise, seek the assistance of your Node Manager.

MESSAGE: Invalid Command Syntax. (FTPERR 10)

FTPERR 10

CAUSE: An FTP command was entered with invalid parameter syntax.

- ACTION:** Check the syntax of the desired command.
- MESSAGE: Invalid reply code from remote server (FTPERR 11)**
- FTPERR 11 **CAUSE:** An erroneous reply code was returned from the remote server for some FTP command.
- ACTION:** Enable debug and verbose and try the operation again.
- MESSAGE: Data Transfer Request Failed. (FTPERR 13)**
- FTPERR 13 **CAUSE:** An error was detected during a data transfer. This error is accompanied by another error which indicates the problem.
- ACTION:** Use the accompanying error to resolve the problem.
- MESSAGE: Target File Could Not Be Opened. (FTPERR 14)**
- FTPERR 14 **CAUSE:** The MPE/iX target file could not be opened. This error is typically accompanied by a file system error.
- ACTION:** Use the accompanying file system error to resolve the problem.
- MESSAGE: Some records were truncated during transfer. (FTPWARN 15)**
- FTPWARN 15 **CAUSE:** A data transfer to MPE/iX resulted in some records being truncated in the target file.
- ACTION:** It may be necessary to increase the maximum record size using build parameters. Review the *HP ARPA FTP User's Guide* for more information on this subject.
- MESSAGE: End Of File encountered on target file during transfer. Target file not saved. Increase file limit and try again. (FTPERR 16)**
- FTPERR 16 **CAUSE:** A data transfer to an MPE/iX target file did not have enough records to hold the data from the source file.
- ACTION:** It may be necessary to increase the maximum number of records in the target file by using build parameters. Review the *HP ARPA File Transfer Protocol User's Guide* for more information on this subject.
- MESSAGE: End Of File encountered on target file during transfer. Data not appended to target file. Copy target file to a new file with a large limit and append to the new file. (FTPERR 16)**
- FTPERR 17 **CAUSE:** A data transfer (in APPEND mode) to an MPE/iX target file, did not have enough records to hold the extra data from the source file.
- ACTION:** Copy the target file to a new file with a larger limit and append to the new file.
- MESSAGE: We only support stream mode, sorry. (FTPWARN 18)**
- FTPWARN 18 **CAUSE:** The FTP **MODE** command was entered.

	<p>ACTION: None.</p> <p>MESSAGE: We only support file structure, sorry. (FTPWARN 19)</p>
FTPWARN 19	<p>CAUSE: The FTP STRUCT command was entered.</p> <p>ACTION: None.</p> <p>MESSAGE: We only support non-print format, sorry. (FTPWARN 20)</p>
FTPWARN 20	<p>CAUSE: The FTP FORM command was entered.</p> <p>ACTION: None.</p> <p>MESSAGE: Verbose mode off. (FTPINFO 21)</p>
FTPINFO 21	<p>CAUSE: The FTP VERBOSE command was entered when verbose was enabled.</p> <p>ACTION: None.</p> <p>MESSAGE: Verbose mode on. (FTPINFO 22)</p>
FTPINFO 22	<p>CAUSE: The FTP VERBOSE command was entered when verbose was disabled.</p> <p>ACTION: None.</p> <p>MESSAGE: Debugging off (debug=0). (FTPINFO 23)</p>
FTPINFO 23	<p>CAUSE: The FTP DEBUG command was entered when debug was enabled.</p> <p>ACTION: None.</p> <p>MESSAGE: Debugging on (debug=1). (FTPINFO 24)</p>
FTPINFO 24	<p>CAUSE: The FTP DEBUG command was entered when debug was disabled.</p> <p>ACTION: None.</p> <p>MESSAGE: Using ascii mode to transfer files. (FTPINFO 25)</p>
FTPINFO 25	<p>CAUSE: The FTP TYPE command was entered without any parameters while in ASCII mode.</p> <p>ACTION: None.</p> <p>MESSAGE: Using binary mode to transfer files. (FTPINFO 26)</p>
FTPINFO 26	<p>CAUSE: The FTP TYPE command was entered without any parameters while in binary mode.</p> <p>ACTION: None.</p> <p>MESSAGE: Already connected to !; user "user" or "close" first. (FTPWARN 27)</p>
FTPWARN 27	<p>CAUSE: The user entered the FTP OPEN command during an opened session.</p>

- ACTION:** Enter the **USER** command to logon, or the **CLOSE** command before opening another connection.
- MESSAGE: FTP Unknown Error Detected. Subsystem = !, Information = ! (FTPERR 28)**
- FTPERR 28 **CAUSE:** An unknown error was detected from some underlying subsystem.
- ACTION:** Seek the assistance of your Hewlett-Packard representative for assistance.
- MESSAGE: (We only support MPEXL Fixed and Variable record format, sorry. FTPERR 29)**
- FTPERR 29 **CAUSE:** The user specified a **BUILD** command parameter for record type that was not Fixed or Variable.
- ACTION:** Only fixed and variable record format is supported. Refer to the *HP ARPA File Transfer Protocol User's Guide* for assistance.
- MESSAGE: We only support MPEXL Standard files, sorry. (FTPERR 30)**
- FTPERR 30 **CAUSE:** The user specified a build parameter for a file type that is not of type Standard (STD).
- ACTION:** Only the STD file type is supported. Refer to the *HP ARPA File Transfer Protocol User's Guide* for assistance.
- MESSAGE: We don't allow MPEXL file equates, sorry. (FTPERR 31)**
- FTPERR 31 **CAUSE:** The user attempted to use a file equate during a file transfer.
- ACTION:** File equates are not yet supported. Try the transfer again without using file equates.
- MESSAGE: Remote server receive timeout. Closing connection. (FTPERR 32)**
- FTPERR 32 **CAUSE:** The FTP user did not receive a required reply from an FTP server in the allocated time window.
- ACTION:** Close the connection and quit before trying again. Try to ping the remote system using **PING.NET.SYS**. If this does not succeed, no FTP connection can be established. Follow the troubleshooting instructions in the *Installing and Managing HP ARPA File Transfer Protocol Network Manager's Guide*.
- MESSAGE: ExitOnError mode on. (FTPERR 33)**
- FTPERR 33 **CAUSE:** The **EXITONERROR** command was entered while the **exit-on-error** feature was disabled.
- ACTION:** None.

- MESSAGE: ExitOnError mode off. (FTPERR 34)**
- FTPERR 34 CAUSE: The **EXITONERROR** command was entered while the exit-on-error feature was enabled.
- ACTION: None.
- MESSAGE: Invalid IP address. (FTPERR 35)**
- FTPERR 35 CAUSE: An invalid IP address was used while trying to open a connection.
- ACTION: Refer to the *HP ARPA File Transfer Protocol User's Guide* for assistance.
- MESSAGE: Performing an ASCII transfer to a binary file. (FTPWARN 36)**
- FTPWARN 36 CAUSE: An ASCII data transfer occurred to an MPE/iX binary file.
- ACTION: If the intent was to transfer binary data, then use the **BINARY** command to change transfer mode to binary. If the intent was to transfer ASCII data, then specify an MPE/iX ASCII file using the appropriate MPE/iX **BUILD** parameter. Refer to the *HP ARPA File Transfer Protocol User's Guide* for further assistance.
- MESSAGE: Performing an binary transfer to a ASCII file. (FTPWARN 37)**
- FTPWARN 37 CAUSE: An ASCII data transfer occurred to an MPE/iX binary file.
- ACTION: If intent was to transfer ASCII data, then use the **ASCII** command to change transfer mode to ASCII. If the intent was to transfer binary data, then specify an MPE/iX binary file using the appropriate MPE/iX **BUILD** parameter. Refer to the *HP ARPA File Transfer Protocol User's Guide* for further assistance.
- MESSAGE: Error opening data connection. (FTPERR 38)**
- FTPERR 38 CAUSE: Internal Error. An I/O completion was received for an unknown file number during the attempted establishment of a data connection.
- ACTION: Note the circumstances and seek the assistance of your Hewlett-Packard representative.
- MESSAGE: ?Ambiguous command. (FTPERR 39)**
- FTPERR 39 CAUSE: A non-unique command string was entered at the ftp> prompt.
- ACTION: Check the command spelling and try again.
- MESSAGE: Connected to !. (FTPINFO 40)**
- FTPINFO 40 CAUSE: A connection request to a remote FTP server was accepted.
- ACTION: None.

- MESSAGE: Interactive mode on. (FTPINFO 41)**
- FTPINFO 41 CAUSE: The **PROMPT** command was issued while prompting was disabled.
- ACTION: None.
- MESSAGE: Interactive mode on. (FTPINFO 42)**
- FTPINFO 42 CAUSE: The **PROMPT** command was issued while prompting was enabled.
- ACTION: None.
- MESSAGE: Interactive mode on. (FTPINFO 43)**
- FTPINFO 43 CAUSE: The **CASE** command was issued while "Forcing Lower Case" was disabled.
- ACTION: None.
- MESSAGE: Lower case off. (FTPINFO 44)**
- FTPINFO 44 CAUSE: The **CASE** command was issued while "Forcing Lower Case" was enabled.
- ACTION: None.
- MESSAGE: File accessed exclusively. (FTPERR 45)**
- FTPERR 45 CAUSE: The file is already being accessed exclusively by the system or by another user.
- ACTION: If the file is being accessed by the system, there is nothing you can do. If the file is being accessed by another user, try again later.
- MESSAGE: File name too long. (FTPERR 46)**
- FTPERR 46 CAUSE: The filename specified is longer than the maximum allowed by MPE/XL: "FILENAME/LOCKWORD.GROUPNAM.ACCTNAME". This error is typically caused by trying to copy a file from a machine running an operating system which allows longer file names. For example, "GET /user/local/lib/.../ remotefile"
- ACTION: Specify a target file name. The correct syntax for the above example would be "GET /user/local/lib.../ remotefile localfile".
- MESSAGE: Indirect file not found.**
- FTPERR 47 CAUSE: The indirect file name specified in the **mput** command was not found: "mput ^filename".
- ACTION: Make sure the indirect file exists.
- MESSAGE: Could not change directory to "!".**
- FTPERR 48 CAUSE: The directory specified does not exist or is not accessible.
- ACTION: Check to see if the directory exists and if so, what its access rights are.

- MESSAGE: Connection time-out value set to ! seconds.**
- FTPINFO 49 CAUSE: User entered "TIMEOUT [num-secs]"
- ACTION: If num-secs was specified, the connection time-out value was set. Otherwise, the current value was simply displayed.
- Note: a value of 0 indicates no time-outs.
- MESSAGE: Store unique mode on.**
- FTPINFO 50 CAUSE: The FTP `sunique` command was entered when store-unique was disabled.
- ACTION: Subsequent `put` commands will guarantee that the file will be created with a unique name on the remote machine.
- MESSAGE: Store unique mode off.**
- FTPINFO 51 CAUSE: The FTP `sunique` command was entered when store-unique was enabled.
- ACTION: None.
- MESSAGE: Receive unique mode on.**
- FTPINFO 52 CAUSE: The FTP `runique` command was entered when receive-unique was disabled.
- ACTION: Subsequent `get` commands will guarantee that the file will be created with a unique name on the local machine.
- MESSAGE: Receive unique mode off.**
- FTPINFO 53 CAUSE: The FTP `runique` command was entered when receive-unique was enabled.
- ACTION: None.
- MESSAGE: Command tracing on.**
- FTPINFO 54 CAUSE: The FTP `trace` command was entered when command tracing was disabled.
- ACTION: When an FTP connection to a remote system is established, TCP tracing will be turned on. If a connection already exists, tracing will be turned on now.
- MESSAGE: Command tracing off.**
- FTPINFO 55 CAUSE: The FTP `trace` command was entered when command tracing was enabled.
- ACTION: If an FTP connection exists to a remote system and tracing is enabled, it will be turned off.
- MESSAGE: Data tracing on.**
- FTPINFO 56 CAUSE: The FTP `trace` command was entered when data tracing was disabled.

- ACTION:** When a connection for a data transfer is established, TCP tracing will be turned on.
- MESSAGE: Data tracing off.**
- FTPINFO 57 **CAUSE:** The FTP `trace` command was entered when data tracing was enabled.
- ACTION:** None.
- MESSAGE: Command tracing file name is !.**
- FTPINFO 58 **CAUSE:** Command tracing was turned on and a connection to a remote system was established.
- ACTION:** Use this file for debugging purposes.
- MESSAGE: Data tracing file name is !.**
- FTPINFO 59 **CAUSE:** Data tracing was turned on and a data transfer connection was established.
- ACTION:** Use this file for debugging purposes.
- MESSAGE: Using byte-stream mode to transfer files.**
- FTPINFO 60 **CAUSE:** The FTP `type` command was entered without any parameters while in byte-stream mode.
- ACTION:** None.
- MESSAGE: Unique file name cannot be created.**
- FTPINFO 61 **CAUSE:** Either the file name was so long that appending (.1) surpassed the maximum legal file name length, or every appendage from (.1 up to .99) was tried and no unique name could be found.
- ACTION:** Try a different, possibly shorter, file name.
- MESSAGE: Append mode not valid with record or file type.**
- FTPERR 63 **CAUSE:** Attempt to transfer a non-standard MPE file in append mode.
- ACTION:** Do not transfer non-standard MPE files in append mode.

FTP Server Messages and Errors

FTP users accessing the MPE/iX as an FTP server may receive the messages and/or errors as listed, which are based on the Military Standard, FTP, MIL-STD-1780.

The type of reply is based on the first digit of the number:

Number	Type
<i>1nn</i>	Positive preliminary reply
<i>2nn</i>	Positive completion reply
<i>3nn</i>	Positive intermediate reply
<i>4nn</i>	Transient negative reply which user may wish to retry
<i>5nn</i>	Permanent negative reply

The second digit in the message number represents the following function groupings (where the first digit *x* is from 1 to 5 as described above):

Number	Type
<i>x0n</i>	Syntax errors
<i>x1n</i>	Replies to requests for information (status, help)
<i>x2n</i>	Replies referring to the control and data connections
<i>x3n</i>	Replies for logon process and accounting procedures
<i>x4n</i>	Unspecified
<i>x5n</i>	Status of the server file system

In the following list of messages and errors, the exclamation point (!) represents a variable value.

	MESSAGE: 125 Data connection already open; transfer starting
125	CAUSE: Data connection has been opened, data transfer has started. ACTION: None.
	MESSAGE: 150 File ! opened; data connection will be opened
150	CAUSE: The file requested for a GET , LS , or DIR has been opened. ACTION: None.
	MESSAGE: 200 ! command ok.
200	CAUSE: The command was accepted by the server. ACTION: None.

- MESSAGE: 200 Type set to !.**
200 CAUSE: A **TYPE** command was received and accepted.
ACTION: None.
- MESSAGE: 202 Command not implemented at this site.**
202 CAUSE: The MPE/iX FTP server received a command that is not implemented.
ACTION: This command cannot be used.
- MESSAGE: "1": !.**
213 CAUSE: A file status (**SIZE** | **MDTM**) command was received and accepted. This first parameter is the filename. The second contains detailed information that differs depending on the command.
ACTION:
- MESSAGE: MPE/iX system type.**
215 CAUSE: The server received a **SYST** command.
ACTION: None.
- MESSAGE: 220 HP ARPA File Transfer Protocol Server [!] (C)
Hewlett-Packard Co. 1990**
220 CAUSE: The server has been started and is ready for user commands.
ACTION: Enter FTP commands.
- MESSAGE: 221 Server is closing command connection**
221 CAUSE: The server received a **QUIT** command and is shutting down.
ACTION: None.
- MESSAGE: 226 Transfer complete.**
226 CAUSE: A file transfer for a **GET**, **PUT**, **LS** or **DIR** has completed.
ACTION: None.
- MESSAGE: 226 Transfer complete. Some records were truncated during transfer.**
226 CAUSE: A data transfer to MPE/iX resulted in some records being truncated in the target file.
ACTION: It may be necessary to increase the maximum record size using build parameters. Review the *HP ARPA FTP User's Guide* for more information on this subject.
- MESSAGE: 230 User logged on**
230 CAUSE: A **USER** command was received and accepted. The logon has succeeded.

- ACTION:** None.
- MESSAGE: 250 File transfer completed.**
- 250 **CAUSE:** A file transfer for a **GET**, **PUT**, **LS** or **DIR** has completed.
- ACTION:** None.
- MESSAGE: ! is the current directory. "!" is the current session.**
- 257 **CAUSE:** A **PWD** command was received and accepted.
- ACTION:** None.
- MESSAGE: ! successful, "!" created.**
- 257 **CAUSE:** A directory creation (**MKD/XMKD**) has completed.
- ACTION:**
- MESSAGE: 331 Password required for !.
[userpass][,acctpass][,grouppass]**
- 331 **CAUSE:** A **USER** command has been received, the server is waiting for the password.
- ACTION:** Enter the passwords required.
- MESSAGE: 350 File exists, ready for destination name.]**
- 350 **CAUSE:** An **RNFR** (rename from) command has been received, the server is waiting for a **RNTO** (rename to). This is part of the user **RENAME** command.
- ACTION:** None.
- MESSAGE: 426 Data transfer aborted**
- 426 **CAUSE:** The data connection could not be opened or there was a network error during the file transfer.
- ACTION:** Try the transfer again. If this doesn't work, try exiting FTP and connecting again, then transferring the file. If that doesn't work, check for a networking problem (resources, connection establishment, etc.) on both systems.
- MESSAGE: 500 Unknown command**
- 500 **CAUSE:** The MPE/iX FTP server received an unrecognized command.
- ACTION:** This command cannot be used.
- MESSAGE: 501 Syntax error in parameter !**
- 501 **CAUSE:** One of the parameters in the command was not correct. The ! will contain the parameter in question.
- ACTION:** Check the parameter and try again.

- MESSAGE: 502 Command not implemented by this server.**
- 502 CAUSE: The MPE/iX FTP server received an unrecognized command.
ACTION: This command cannot be used.
- MESSAGE: 503 Illegal sequence of commands**
- 503 CAUSE: The server was sent a series of commands that were in the wrong order (example: RNT0 before RNFR).
ACTION: Check the commands and send them in the correct order.
- MESSAGE: 504 Command not implemented for parameter !**
- 504 CAUSE: A parameter was specified that is not supported. For example TYPE EBCDIC is NOT supported by the MPE/iX FTP server.
ACTION: Specify a parameter which is supported.
- MESSAGE: 530 User log on unsuccessful**
- 530 CAUSE: The server received a user account and/or password which were not valid.
ACTION: Specify the correct user account and password. If the user is sure that they are correct, notify the network manager and have him/her refer to the *Installing and Managing HP ARPA File Transfer Protocol Network Manager's Guide*.
- MESSAGE: 530 Please login with USER and PASS.**
- 530 CAUSE: The user entered a command without being logged on to the FTP server.
ACTION: Log on with the **USER** command, then enter the command again.
- MESSAGE: 550 File request not taken: !**
- 550 CAUSE: An MPE/iX File System error was received. The parameter will contain the text of the specific File System error.
ACTION: Refer to the *MPE/iX Error Messages Manual*.
- MESSAGE: 553 Illegal file name**
- 553 CAUSE: The file name specified was not a valid MPE/iX file name.
ACTION: Use the correct file name format: either *filename* or *filename.group.account* where each file name part is up to eight alphanumeric characters, beginning with an alphabetic character.

Error Messages
FTP Server Messages and Errors

B**Using the FTP Server**

This appendix provides information for remote users accessing the MPE/iX FTP server.

Who Should Use This Appendix

This appendix contains information for non-MPE/iX system users accessing the MPE/iX FTP server.

This information is also provided in an online text file:
FTPDOC.ARPA.SYS which can be transferred to remote users using
FTP.

Sample FTP Session: Accessing MPE/iX

The purpose of this sample session is to provide help for a remote user accessing the MPE/iX FTP server. More detailed information about FTP behavior follows the sample.

In order to follow the same steps as the sample of your system, you must obtain the following from your network administrator:

- Internet Protocol (IP) address of the MPE/iX system
- MPE/iX logon account and the passwords
- Names of the groups in the logon account containing the files you want to access.

Start FTP

Start FTP from your system.

Connect to the Remote MPE/iX System

To open a connection to MPE/iX use the **OPEN** command followed by the internet protocol (IP) address for the MPE/iX system. For example:

```
ftp> OPEN 192.50.43.21
220 MPE/iX File Transfer Protocol Server [A00020001] (C) Hewlett-Packard Co. 1990
```

Log On to MPE/iX

Supply the MPE/iX logon account and password when prompted, or use the **USER** command. For example:

```
ftp> USER sess1,user,myacct,mygroup
331 Password required for SESS1,USER.MYACCT,MYGROUP [userpass]
                                     [,accountpass][,grouppass]
Password: userpass,acctpass,grouppass      (enter passwords)
230 User logon on.
```

Check the Session and Group

Check the session and group you are accessing. This example shows the user logged on with the working group, MYGROUP.

```
ftp> PWD
257 "MYACCT/MYGROUP" is the current directory.
257 "SESS1,USER.MYACCT,MYGROUP" is the current session.
```

View Files in the Working Group

Examine the files in the working group using the FTP **DIR** command:

```
ftp> DIR *
200 PORT command ok.
150 File LISTF opened; data connection will be opened
ACCOUNT = MYACCT          GROUP = MYGROUP
FILENAME  CODE           -----LOGICAL RECORD-----
          SIZE          TYP          EOF          LIMIT
NSCREEN1  256B          FA           800          10000
NSCREEN2   80B          FA           500          14000
NSPROGX  PROG          VB          4551          9480
PROGRAMX  256W          FB           700          1350
226 Transfer complete
```



```
nnn bytes received in n.nn seconds (n.nn Kbytes/sec)
ftp>
```

Transfer a File to Your System

Transfer a remote MPE/iX file to your system using the **GET** command:

```
ftp> GET nscreen1
200 PORT command ok.
150 File NSCREEN1 opened; data connection will be opened
226 Transfer complete
nnn bytes received in n.nn seconds (n.nn Kbytes/sec)
ftp>
```

The file will be saved as nscreen1 on you system.

View Files in a Different Group

Examine the files in another group using the **LS** command with the group name:

```
ftp> LS @.group1
200 PORT command ok.
150 file LISTF opened; data connection will be opened<R> AFILE.GROUP1
TSCREEN.GROUP1
TSCREEN2.GROUP1
NSPROG1.GROUP1
NSPROG2.GROUP1
NSPROG3.GROUP1
NSPROGRAM.GROUP1
226 Transfer complete
nnn bytes sent in n.nn seconds: (n.nn Kbytes/sec)
ftp>
```

Note that this display is different than using the **LS** command with no group name which displays only file names.

Transfer a File From Another Group

Transfer a binary file from MPE/iX to your system from other than the current working group:

```
ftp> BINARY
200 Type set to I.
ftp> GET NPROGRAM.GROUP1
```

The MPE/iX file will be saved as NPROGRAM.GROUP1 on your system.

Using the FTP Server
Start FTP

Transfer Multiple Files from MPE/iX to Your System

To transfer multiple files from MPE/iX to your system use the **MGET** command:

```
ftp> MGET @
```

All files in the working group will be transferred and have the same names as on MPE/iX (up to 8 alphanumeric characters, all capitals).

Transfer multiple files from other than the working group on MPE/iX to your system.

```
ftp> MGET N@.GROUP1
```

The resulting file names are:

```
NSPROG1.GROUP1  
NSPROG2.GROUP1  
NPROGRAM.GROUP1
```

Transfer a File from Your System to MPE/iX

Transfer a local file to the MPE/iX working group using the **PUT** command:

```
ftp> PUT yfile ixFILE
```

Use File Building Parameters

Transfer a local file to other than the MPE/iX working group, using MPE/iX file building parameters:

```
ftp> PUT file2 newfile.group1;rec=-78, ,f,ascii
```

Transfer multiple ASCII files to MPE/iX using the **MPUT** command:

```
ftp> ASCII  
200 Type set to A.  
ftp> MPUT A*
```

If your system supports prompting, you are prompted whether or not (yes or no) to transfer each file in the selected group of files.

Check that the files transferred:

```
ftp> DIR *  
200 PORT command ok.  
150 File LISTF opened; data connection will be opened  
ACCOUNT = MYACCT          GROUP = MYGROUP  
FILENAME  CODE            -----LOGICAL RECORD-----  
          SIZE           TYP           EOF           LIMIT  
AFILE     80B            FA            800           104800  
AFILE123  80B            FA            800           104800
```

```
AFILE1234          80B      FA        800      104800
AFILENAM          80B      FA        800      104800
AFILEXX           80B      FA        800      104800
226 Transfer complete
nnn bytes received in n.nn seconds (n.nn Kbytes/sec)
ftp>
```

If the file names are longer than eight characters, the file transfer fails. Note that all files were saved with the default FTP ASCII file attributes: records of fixed length and 80 bytes.

More Information About FTP and MPE/iX

This section describes in more detail MPE/iX logon syntax and file system behavior when using FTP.

MPE/iX User Accounts

MPE/iX user logon accounts are in the form:

```
ftp> USER sessname,username.acctname,groupname
```

The *sessionname* parameter (*sessname*) is optional. Passwords may be required for all three parts of the user account:

```
userpass,accountpass,grouppass
```

You can enter the user logon account and passwords together as follows:

```
ftp> USER session1,username/userpass.acctname/acctpass,groupname/grouppass
```

Press the return key when prompted for passwords.

The following example shows: no session, and a password for the account only:

```
ftp> USER myname.myacct/acctpass
331 Password required for MYNAME.MYACCT/ACCTPASS [userpass]
      [,accountpass][,grouppass]
Password:                               (press return)
230 USER LOGON ON.
ftp> pwd
257 "MYACCT/MYPUB" is the current directory.
257 ",MYNAME.MYACCT,PUB" is the current session.
```

NOTE Each password can only be entered once. For example, if you enter the account password as part of the **USER** string, you *cannot* re-enter it at the password prompt.

If you enter passwords as part of the logon string, they are displayed in the message text of the password prompt.

Groups

An MPE/iX user account can contain many groups, each containing files. A group is comparable to a directory, but only to one level. Unlike UNIX systems, the MPE/iX file system is not hierarchical.

The MPE/iX account manager can assign a default group for a user account. For example, the user account MYNAME . ARPACCT is assigned a default group PUB (with no group password). The user logon is as follows:

```
ftp> USER MYNAME/userpw.ARPACCT/acctpw
331 Password required for MYNAME/USERPW.ARPACCT/ACCTPW [userpass]
      [,accountpass][,grouppass]
Password:                               (press return)
230 USER LOGON ON.
ftp> PWD
257 "MYACCT/MYGROUP" is the current directory.
257 ",MYNAME.ARPACCT,PUB" is the current session.
```

Changing Groups

To change groups you CD as follows:

```
ftp> PWD
257 "MYACCT/MYGROUP1" is the current directory
257 ",MYNAME.MYACCT, GROUP1" is the current session
ftp>cd ../GROUP2
250 CWD file action successful
ftp> PWD
257 "MYACCT/GROUP2" is the current directory
257 ",MYNAME.MYACCT, GROUP1" is the current session
```

File Naming on MPE/iX

The MPE/iX file system is not case sensitive: file1 is the same file as FILE1.

A fully-qualified MPE/iX filename is in the form:

filename.groupname.account

Each part, (*filename*, *groupname*, and *account*) is 1–8 alphanumeric characters, beginning with an alphabetic character. To avoid file naming problems, always explicitly specify resulting filenames in correct MPE/iX format.

Using Metacharacters

Be aware if you use metacharacters (wildcards) and specify a group and/or account with **MGET**. The resulting filenames will be fully qualified MPE/iX file names (*filename.groupname.account*), a maximum of 26 characters, including periods. If your system supports fewer characters than MPE/iX, the filenames may be truncated. Use the **LS** command to verify the set of files you are transferring.

Both ***** and **@** can be used as wildcard characters with the **LS** and **DIR** commands.

Changing File Building Parameters

When transferring files from your system to MPE/iX, you can use file building parameters following the **PUT** command string:

```
ftp> PUT localfile remotefile, buildparms
```

The supported build parameters are:

```
;REC=[-resizebytes] [ , blkfactor[ , [{F}][ , {BINARY}]]]
                {V}      {ASCII
                {B}
```

```
[ ;DEV=device]
```

```
[ ;CODE=filecode]
```

```
[ ;DISC=[numrec] [ , [numextents] [ , [initialloc]]]
```

The parameter **REC=** can also be specified in words (two bytes per word) using a positive integer value. The default *blkfactor* size is one. For more information about the build command, see the *MPE/iX Commands Reference Manual*.

The default MPE/iX file-transfer specifications for the **PUT** command in the form of file-building parameters are:

```
ASCII:REC=80 , , F , ASCII , DISC=204800
```

```
Binary:REC=-252 , , v , BINARY ; DISC=204800
```

```
Bytestream:REC= , , B ; DISC=16384000
```

Examples

The following example shows how to transfer a file to MPE/iX with a record size of 150 bytes:

```
ftp> PUT filex files2;REC=-150 , , V , ASCII
```

In the following example, using only **CODE=PROG** defaults to a file of fixed binary, with records of 128 words (which are the **BUILD** command **REC=** defaults).

```
ftp> PUT filex file2;CODE=PROG
```

Supported MPE/iX File Types

The following types of MPE/iX files can be transferred to a remote host using FTP.

Standard MPE files, with fixed, variable, or bytestream format, and either binary or ASCII data types.

In addition, the latest enhancements enable the transfer of the following types of non-standard types between two HP 3000 machines. Both the FTP server and the client must be running the latest version.

1. Circular files
2. Message files
3. RIO files
4. CM KSAM files
5. NM KSAM files
6. HPSPOOL files

Of these, SPOOL files are transferred as fixed ASCII files. The above non-standard file transfers are not possible between an MPE and a non-MPE system. However, SPOOL files can be transferred as fixed ASCII files from an MPE to a non-MPE system.

The following MPE/iX file type cannot be transferred with FTP.

- HFS (Hierarchical File System) directories

In addition, undefined (U) record format files cannot be transferred.

This appendix describes the PING/iX utility and is organized as follows:

- What is PING/iX
- How to Use PING/iX
- PING/iX Error and Information Messages

What is PING/iX

PING/iX is an interactive utility that can be used to confirm the reachability of a remote node that supports the internet protocol (IP). It can also be used to estimate round trip times before proceeding with lengthy transactions.

PING/iX sends Internet Control Message Protocol (ICMP) Echo Requests to the remote node once a second, and monitors the echo replies that arrive.

If you choose to send four or more bytes of data with the Echo Requests, PING/iX displays the round trip times in milliseconds. Since the echo is performed at layer 3 of the ISO OSI model, PING/iX cannot be used to find out if a particular application is available on the remote node, or to estimate application-level round trip times.

How to Use PING/iX

To use PING/iX, you need the internet protocol (IP) address of the remote node. If you do not wish to use the default values, you can optionally specify the number of packets to send, and number of data bytes per packet. The defaults are 64 bytes per packet, with an infinite number of packets. Use [CTRL-Y] to stop sending packets.

You must have NA and NM capabilities to use PING/iX.

PING/iX can be run from a menu by entering:

```
:RUN PING.NET.SYS
```

or, from the command line using an INFO string in the form:

```
:RUN PING.NET.SYS;INFO= "ipaddress [ , packets ] [ , bytes ]"
```

Examples of both the menu-driven and the command-line interface are provided in the following sections.

NOTE

If you have active PING/iX processes while bringing up or shutting down the network, the processes will exit to the menu display and IP address prompt after printing error messages. It is highly recommended that you run PING/iX *after* bringing up the networks, and have no active PING/iX processes when you shut the network down.

Using Menu-Driven PING/iX

When you run PING/iX without parameters, the display shows the input parameters available. For example, enter:

```
:RUN PING.NET.SYS
```

The following menu is displayed:

```
----- PING/iX (ICMP Echo Requestor) : Version B0300003 -----
```

```
Information on Input Parameters:
(CONTROL-Y at any point to exit to main level)
IP address      -      In decimal form; (.e.g.,) 15.13.131.55;
                  RETURN to quit program
# packets      -      Between 1 and 65544; RETURN for the
                  default of infinite packets, and CONTROL-Y
                  to stop sending.
data bytes     -      Between 0 and 2048; should be 4 or more to
                  get round trip times; RETURN for the default
                  of 64 bytes.
```

```
IP address [RETURN to quit program.] ?
```

Enter the IP Address

This is a *required* parameter. Enter the IP address of the remote node in decimal notation at the IP address prompt. For example:

```
IP address [RETURN to quit program.] ? 15.13.131.55
```

Enter the Number of Packets

This is an *optional* parameter. Once a valid IP address has been entered, you are prompted for the number of packets. For example, 20 packets has been entered below:

```
# of packets [1 to 65534] ? 20
```

The number of packets entered must be between 1 and 65534. The default is to send a continuous stream of packets which can be selected by pressing the [Return] key at the prompt. If you use the default (a continuous stream), you must enter [CTRL-Y] to stop sending packets.

Enter the Number of Bytes

This is an *optional* parameter. Once a valid number has been entered for the number of packets to be sent, you are prompted for the number of bytes to be sent per packet. For example, 1000 has been selected:

```
# of bytes of data [0 to 2048] ? 1000
```

The number of data bytes entered must be between 0 and 2048. The default is to send 64 bytes of data with each packet, which can be selected by pressing the [Return] key at the prompt.

If four or more bytes of data is sent, the round trip time for each request-reply is displayed.

Stopping PING/iX

From the menu displaying the IP address prompt, you can exit from PING/iX by pressing the [Return] key. Note that you cannot use the [Break] key to exit.

You can exit to the menu display by entering [CTRL-Y] at any point while entering parameters. You can also enter [CTRL-Y] to stop sending packets.

If you choose to send a continuous stream of packets, you *must* use [CTRL-Y] to stop sending packets.

PING/iX times out after two minutes if it does not get any response to its requests. This can occur if there is a problem with the local node or the remote node.

If you do not want to wait for the two minute limit to be reached, you can enter [CTRL-Y] to exit to the menu display and IP address prompt, then press the [Return] key to exit from PING/iX.

Sample Session

The following example illustrates using menu-driven PING/iX.

```
:RUN PING.NET.SYS
----- PING/iX (ICMP Echo Requestor) : Version B0300003 -----
```

```
Information on Input Parameters:
(CONTROL-Y at any point to exit to main level)
IP address      -      In decimal form; (.e.g.,) 15.13.131.55;
                  RETURN to quit program
# packets       -      Between 1 and 65544; RETURN for the
                  default of infinite packets, and CONTROL-Y
                  to stop sending.
data bytes      -      Between 0 and 2048; should be 4 or more to
                  get round trip times; RETURN for the default
                  of 64 bytes.
```

```
IP address [RETURN to quit program.] ? 15.13.131.59
```

```
-----
Remote IP address in hex : $0F0D833B
-----
```

```
# of packets [1 to 65534]      ?    10
# of bytes of data [0 to 2048] ?    10
```

PING/iX Utility
Using Menu-Driven PING/iX

```
--PING/iX $0F0D833B : 10 byte packet(s), 10 packet(s)--  
10 byte(s) from $0F0D833B : icmp_seq = 1, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 2, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 3, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 4, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 5, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 6, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 7, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 8, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 9, time = 23 ms  
10 byte(s) from $0F0D833B : icmp_seq = 10, time = 23 ms  
  
--- $0F0D833B PING Statistics ---  
10 packet(s) transmitted, 10 packet(s) received, 0 % packet loss  
round trip (ms) min/avg/max = 22/24/35
```

Using PING/iX From the Command Line

You can run PING/iX from the command line by using an INFO string. The INFO string must contain the IP address of the remote node, and optionally, the number of packets and number of bytes:

```
:RUN PING.NET.SYS;INFO=" ipaddress [,packets] [,bytes]"
```

Within the INFO string, commas are required to separate parameters.

The number of packets and bytes that can be sent are the same as using the menu-driven option. The default number of packets is a continuous stream, and the default number of bytes is 64.

Stopping PING/iX

You can enter [CTRL-Y] at any time to exit from PING/iX. If you send a continuous stream of packets, you must enter [CTRL-Y] to stop sending packets. The program exits without displaying the menu.

Example

This example shows an INFO string containing the IP address, and specifying five packets. The number of data bytes defaults to 64. The statistics displayed by PING/iX are also included.

```
:run ping.net.sys;info=" 15.13.131.59,5"

----- PING/iX (ICMP Echo Requestor) : Version B0300003 -----
PARAMETERS INPUT:
-----

Remote IP address in hex      :$0F0D833B
Number of packets             :5
Number of data bytes          :Default of 64 bytes

--- PING $0F0D833B : 64 bytes packet(s), 5 packet(s) ---

64 bytes(s) from $0F0D833B : icmp_seq = 1, time = 26 ms
64 bytes(s) from $0F0D833B : icmp_seq = 2, time = 24 ms
64 bytes(s) from $0F0D833B : icmp_seq = 3, time = 23 ms
64 bytes(s) from $0F0D833B : icmp_seq = 4, time = 23 ms
64 bytes(s) from $0F0D833B : icmp_seq = 5, time = 24 ms

--- $0F0D833B PIN Statistics ---

5 packet(s) transmitted, 5 packet(s) received, 0 % packet loss
round trip (ms) min/avg/max = 22/24/26

END OF PROGRAM
```

PING/iX Error and Information Messages

In addition to the normal reply message details and statistics, PING/iX can display informational and/or error messages which are described below.

MESSAGE: Receive timeout occurred. Shutting Down. . .

CAUSE: The PING/iX process has not received any response to its requests for two minutes. So it shuts itself down, assuming that the local or the remote side is inactive.

ACTION: This could indicate that the remote node is unreachable. Also check if the local node is congested or hung causing the local ICMP Server not to respond. (The local ICMP Server interacts with PING/iX to send ICMP Echo Requests to the remote, and passes incoming replies to the right PING/iX process.)

MESSAGE: Cannot contact local ICMP Server. Shutting down. . .

CAUSE: PING/iX cannot contact the above mentioned local ICMP Server.

ACTION: Check if the Transport is active. If not, start the transport.

MESSAGE: Server not accepting requests, as it is busy. Please try later.

CAUSE: Only 15 PING/iX processes can be active at any time. That is, only 15 users can run PING/iX at the same time. Additional users trying to run PING/iX will get this error message.

ACTION: Wait, and try later. One of the other PING/iX processes might have completed, allowing you to run the program.

MESSAGE: Cannot resolve path to remote. Path Error, Parm_Value. Refer PATH RESULT CODES table in NS 3000/iX Error Messages Manual.

CAUSE: A suitable path out of the local node to reach the remote node could not be found.

ACTION: Look up the table mentioned in the message, under the Parm_Value code, and take the action recommended therein.

MESSAGE: Arithmetic trap Parm. Program Quitting

CAUSE: This is an internal error.

ACTION: Submit an SR with the Parm value, a description of what you were trying to do, and any other error messages printed on the terminal. To submit an SR, see the *NS 3000/iX Operations and Maintenance Manual*.

Internal Errors

The following messages are all internal errors, and should not happen under normal circumstances. In each case, submit an SR (see the *NS 3000/iX Operations and Maintenance Manual*).

- Error opening \$STDIN. Program quitting.
- Error opening \$STDLIST. Program quitting.
- Cannot create port. Program quitting.
- Internal Error in server. Shutting Down...
- Buffer Error in server. Shutting Down...

PING/iX Utility
Internal Errors

A

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

address resolution In NS networks, the mapping of node names to IP addresses and the mapping of IP addresses to subnet addresses. *See also: probe protocol, ARP.*

ARP Address resolution protocol. ARP provides IP to LAN station address resolution for Ethernet nodes on a LAN.

ARPA Advanced Research Projects Agency.

ASCII American Standards Committee on Information Interchange. A standard used by computers for interpreting binary numbers as characters.

B

binary mode 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.

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

C

control connection The communication path between the FTP User PI and the Server PI used to exchange commands and replies. This connection follows the TELNET Protocol guidelines.

D

data connection A full duplex connection over which data is transferred in a specified mode and type. The path may be between a server-DTP and a user-DTP, or between two server DTPs.

directory See working directory.

DTP The data transfer process that establishes and manages the data connection.

E

environment A session that is established on a remote node.

Ethernet A Local Area Network system that uses baseband transmission at 10 Mbps over coaxial cable. Ethernet is a trademark of Xerox Corporation.

F

file equation Assignment statement used to associate a file with a specific device or type of device during execution of a program.

file system The part of the operating system that handles access to input/output devices, 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.

H

host computer The primary or controlling computer on a network. The computer on which the network control software resides. For HP purposes, it may also be used to distinguish the MPE/iX system (host) from the DTC.

I

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

Internet Protocol (IP) A protocol used to provide routing between different local networks in an internetwork, as well as among nodes in the same local network. *See also* **IP address**.

intrinsic System routine accessible by user programs which provides an interface to operating system resources and

functions. Intrinsic perform common tasks such as file access and device control.

IP address Internet Protocol address. An address used by the Internet Protocol to perform internet routing. A complete IP address comprises 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.

L

loopback The routing of messages from a node back to itself.

N

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 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`.

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 NS 3000/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.

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.

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.

NS 3000/iX Link Software and hardware that provides the connection between nodes on a network. Some of the NS 3000/iX links available are the ThinLAN 3000/iX Link and its ThickLAN option, the DTC/X.25 iX Network Link, and the NS Point-to-Point 3000/iX Link.

NS 3000/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**.

P

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 NS 3000/iX IEEE 802.3 networks to obtain information about other nodes on the network. It provides name to IP address resolution, and IP to IEEE 802.3 address resolution.

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.

protocol A set of rules that enables two or more data processing entities to exchange information. In networks, protocols are the rules and conventions that govern each layer of network architecture.

They define what functions are to be performed and how messages are to be exchanged.

PI Protocol interpreter. In the FTP client-server model, describes the processing of FTP commands and replies over the control connection between the user and server.

R

remote node A node on an internetwork other than the node you are currently using or referencing.

V

Virtual Terminal A network service that allows a user to establish interactive sessions on a node.

W

working directory While using FTP, the directory on the remote system currently being accessed. Terminology used on UNIX and MS DOS systems. On MPE/iX, a comparable structure is group

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.

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