

6400 Line Matrix Printers



Ethernet Interface User's Manual



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Ethernet Interface User's Manual

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Related Documents

Following is a list of related documentation:

- *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* — Provides information used in the unpacking and setup of the printer.
- *IBM 6400 Line Matrix Printer Operator's Guide (S544–5641)* — Includes step-by-step instructions on daily printer operations.
- *IBM 6400 Line Matrix Printer Safety Notices (G544–5389)* — Provides translated safety notices.
- *IBM 6400 Line Matrix Printer Maintenance Information Manual (S246–0117)* — Explains how to maintain and repair the 6400 line matrix printer at the field service level of maintenance. This manual covers alignments and adjustments, preventive and corrective maintenance, troubleshooting, and basic principles of operation.
- *IBM 6400 ASCII Programmer's Reference Manual (S544–5635)* — Provides descriptions of ASCII printer codes and character sets.
- *IBM 6400 Coax/Twinax Programmer's Reference Manual (S544–5636)* — Provides descriptions of coax and twinax printer control codes and character sets.
- *IBM 6400 IPDS Programmer's Reference Manual (S544–5637)* — Provides information used with the IPDS* emulation enhancement feature.
- *Coax/Twinax Multi-Platform Interface Feature Operation Guide (S544–5642)* — Describes how to install and use this feature to support coax/twinax attachment to host systems.
- *IBM 6400 Code V User's Manual (S544–5638)* — Provides information used with the optional Code V** Printronix** emulation enhancement feature. The Code V Printronix emulation allows you to create and store forms; generate logos, bar codes, and expanded characters; create other graphics, and merge graphics with alphanumeric data as a document is printed. This emulation is based on the Quality Micro Systems, Inc., graphics language.

- *IBM 6400 IGP** User's Manual (S544–5639)* — Provides information used with the optional IGP Printronix emulation enhancement feature. The IGP Printronix emulation allows you to create and store forms; generate logos, bar codes, and expanded characters; create other graphics, and merge graphics with alphanumeric data as a document is printed.

Line Matrix Printer Family

The printers are a family of line matrix printers consisting of 500, 1000 and 1500 lines per minute (lpm) models packaged in various configurations. All of the models offer software versatility and the latest refinements in line matrix printing technology.

Documentation Conventions

Command syntax and examples are formatted as follows:

- The Courier font in **boldface** indicates commands that you type.
`$ ping ftp.IBM.com`
- Regular Courier font indicates displayed results.
`ftp.IBM.com is alive`
- Variable values are shown in *italics* in command syntax, output, and in text. *Italics* also add emphasis.
`ping ipname`
`ipname is alive`
Enter the ***ipname*** at the prompt.

Notes and Notices

For your safety and to protect valuable equipment, it is very important that you read and comply with the notes and notices included in this manual. Danger and Caution notices are numbered. These numbers enable you to find translated versions of these notices in the IBM 6400 Line Matrix Printer Safety Notices booklet. Descriptions for each type of notice follow:



DANGER:

<#> The word **Danger** indicates the presence of a hazard that has the potential of causing death or serious personal injury.



CAUTION:

<#> The word **Caution** indicates the presence of a hazard that has the potential of causing moderate or minor personal injury.



CAUTION:

<#> This symbol indicates an assembly that requires two or more persons to lift or hold.

ATTENTION

An attention notice indicates the possibility of damage to a program, device, system, or data.

IMPORTANT

Important draws your attention to information vital to proper operation of the printer.

NOTE: A note gives you helpful tips about printer operation.

Safety Notices



DANGER:

- <4> Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.**
- <5> Power off the printer and disconnect the power cord before connecting or disconnecting communication port, teleport, or attachment cable connector.**

1 INTRODUCTION

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Overview

This chapter will introduce you to the Ethernet Interface architecture and special features. It also provides information on installation and configuration tools.

What is the Ethernet Interface?

The Ethernet Interface allows you to locate printers on the LAN rather than attaching them directly to a host system. Following simple configuration steps, these peripherals can be simultaneously shared with users on the network whether TCP/IP, NetBIOS over TCP/IP, or IPX (Novell).

How Does the Ethernet Interface Work?

The Ethernet Interface key physical components are:

- Network connector to attach itself and the printer to the network,
- Flash memory to store the firmware code and user-configurable settings,
- RAM to help with print job and network communication processing.

What Special Features are Available?

The Ethernet Interface offers an extensive list of features including:

- Built-in HTML forms for easy cross-platform configuration
- availability of Printer Management Utility (PMU)
- a detailed command shell built into the firmware – “npsh”
- multi-level configuration security through passwords, permission levels, and access lists
- WAN-wide communication access
- numerous printer logging methods (e.g. automatic email) to record printer errors and usage
- remote management through HTML forms, Telnet sessions, “rsh/rcmd/remsh” commands, SNMP, and pre-defined log methods
- extensive built-in troubleshooting tools
- built-in “telnet” and “ping” clients
- configurable memory usage by disabling protocols and destination services

- multiple destinations/queues for versatile printer manipulation and distinct print setups
- header and trailer strings to instruct printers on font, pitch, etc.
- flexible naming conventions
- automatic network connection and frame type sensing
- simultaneous printing across all I/O ports and all supported protocols

Indicators

The Ethernet Interface has three indicator lights, shown in Figure 1–1. These indicator lights can be seen at the rear of the printer. The LED patterns and the respective indications are given in Table 1–1. Refer to the Glossary for definitions.

Figure 1–1. Status Indicator Lights

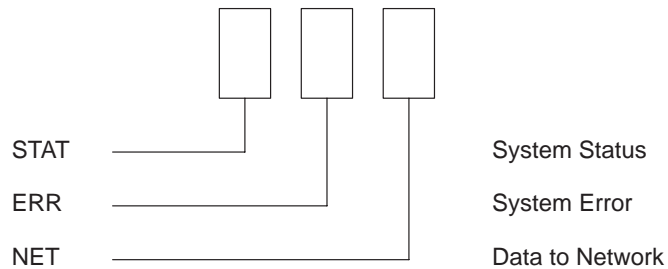


Table 1–1. LED Pattern Indications

STAT	ERR	NET	Mode
ON	OFF	ON	RAM Test
ON	OFF	OFF	ROM Test
ON	ON	OFF	EEPROM Test
OFF	ON	ON	Network Interface Test
OFF	OFF	ON	PRN1 Test
FLASH	OFF	FLASH	Run Mode
FLASH	ON	FLASH	Auto Reset Mode
FLASH	FLASH	OFF	Firmware Panic
ON	FLASH	ON	Hardware Exception

The Ethernet Interface also has a self test and internally controlled modes. These are:

Power-on Self Test

The seven stage power-on self test performs diagnostics on the Ethernet Interface processor, RAM, ROM, EEPROM, parallel port, and network interface. The STAT, ERR, and NET LEDs indicate which test is currently in progress.

Run and Auto Reset Modes

Run Mode is the normal operating state of the Ethernet Interface. Auto Reset mode is entered when the watchdog timer is triggered and the Print Server resets itself. In either mode, the STAT LED flashes differently depending on whether the unit IP address is configured. The Run Mode and Auto Reset Mode indicator descriptions are given in Table 1-2. Refer to the Glossary for definitions.

Table 1-2. Run Mode and Auto Reset Mode Indicator Descriptions

STAT	Rate	Indicates
Flashes On	once per second	Normal Mode, IP address configured
Flashes On	2.5 times per second	Monitor Mode, IP address not configured
Flashes Off	2.5 times per second	Monitor Mode or Download Mode, IP address not configured
Flashes Off	once per 2 seconds	Download Mode, IP address configured

INSTALLATION

Network Connections

The Ethernet Interface has different network connection options available upon purchase. The base Ethernet Interface model provides an RJ45 connector for 10Base-T (UTP) networks. A 10Base2 (BNC) version of the adapter is also available.

Printer Management Utility

The Printer Management Utility is a versatile and dynamic program that allows you to remotely organize all printers on the network in a single database. You can download software and printer settings from a host computer with a single mouse click. Or you can use a virtual operator panel to configure printers in the same room or around the world.

The PMU software can be obtained from the IBM World Wide Web site at:

<http://www.printers.ibm.com>

Follow the on-screen instructions for downloading and installing the software.

Connecting to the Network



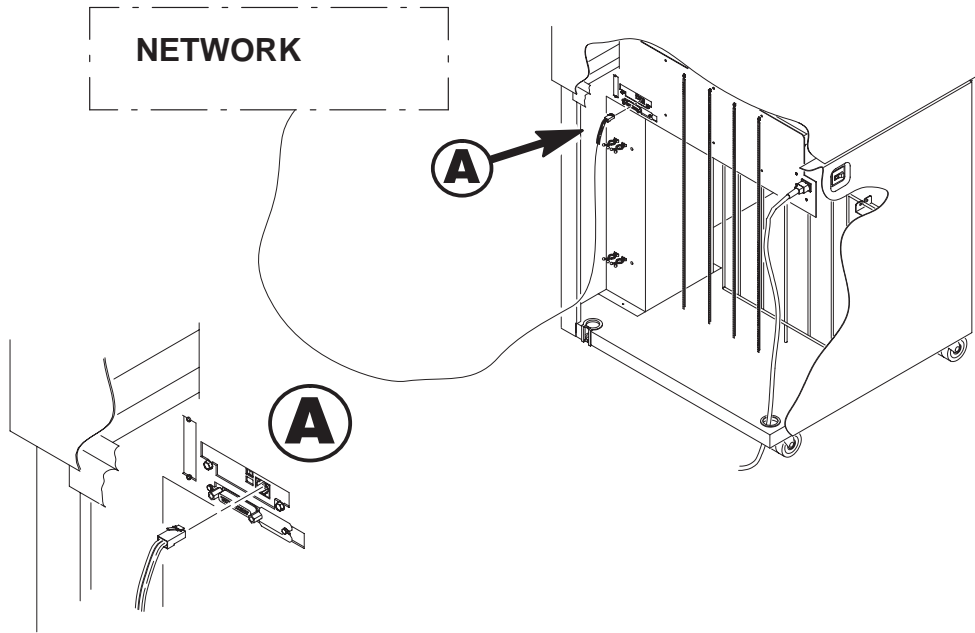
DANGER:

- <4> Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.**
- <5> Power off the print and disconnect the power cord before connecting or disconnecting communication port, teleport, or attachment cable connector.**

To attach the Ethernet Interface to the network as illustrated in Figure 1-2, you will need to plug the network cable into the Ethernet Interface connector.

Watch the LEDs in the rear of the printer as they cycle through the power on self test. When the test is complete, the STAT led is flashing.

Figure 1–2. Physical Setup



CONFIGURATION TOOLS

Two-Part Configuration

When talking about configuration, it is important to understand that there are two parts to a Ethernet Interface setup:

1. Configuring the Ethernet Interface so that it can be seen on the network. This involves network related settings (e.g. an IP address within TCP/IP environments) configured through the built-in command shell, npsh, or from the operator panel, or by using a web browser.
2. Configuring a host with a new printer so it knows how to send data to the Ethernet Interface. Just being able to see the printer on the network does not mean you can automatically print to it. A host has to be told where to send the data.

NOTE: There are some network environments that do not require any network settings to be configured on the Ethernet Interface. However, all network setups require configuration on the host end.

Available Tools

HTML Forms

The Ethernet Interface settings can be configured over TCP/IP through a standard Web browser. The Ethernet Interface Web pages provide a user friendly way to access some of the commands built in to the print server.

NOTE: If a router is used, make sure a gateway value is configured.

To access the Ethernet Interface home page:

1. Make sure the print server has an IP address and subnet mask so it is recognizable on your TCP/IP network.
2. Ensure your network station can successfully “ping” the Ethernet Interface over the network.
3. Direct your Web browser to the Uniform Resource Locator (URL) “`http://IPaddress`” (e.g. “`http://192.75.11.9`”).

The Ethernet Interface HTML structure is divided into several menus as shown in Figure 1–3.

Figure 1–3. Ethernet Interface HTML Structure

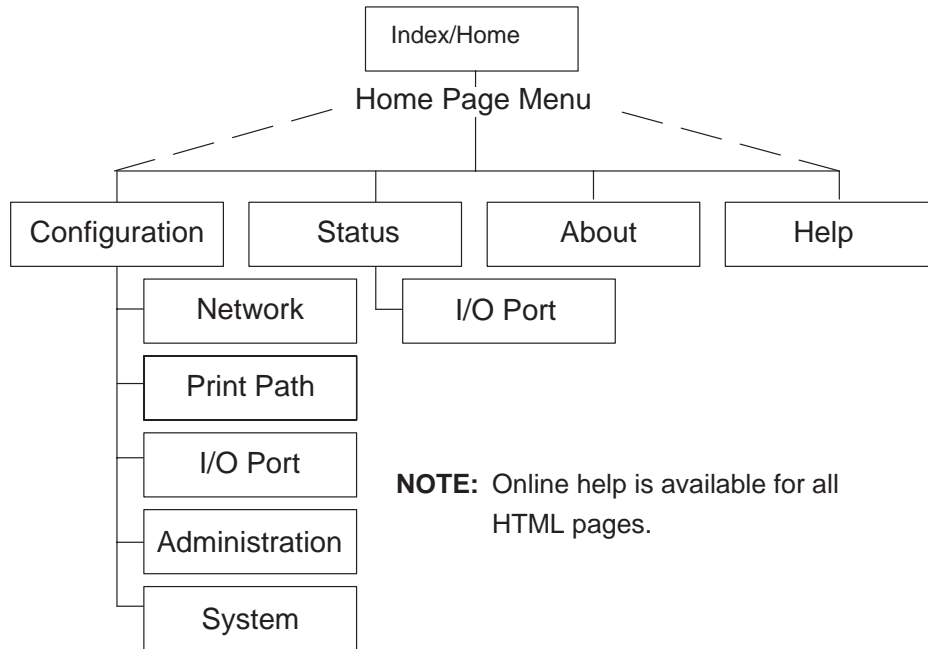
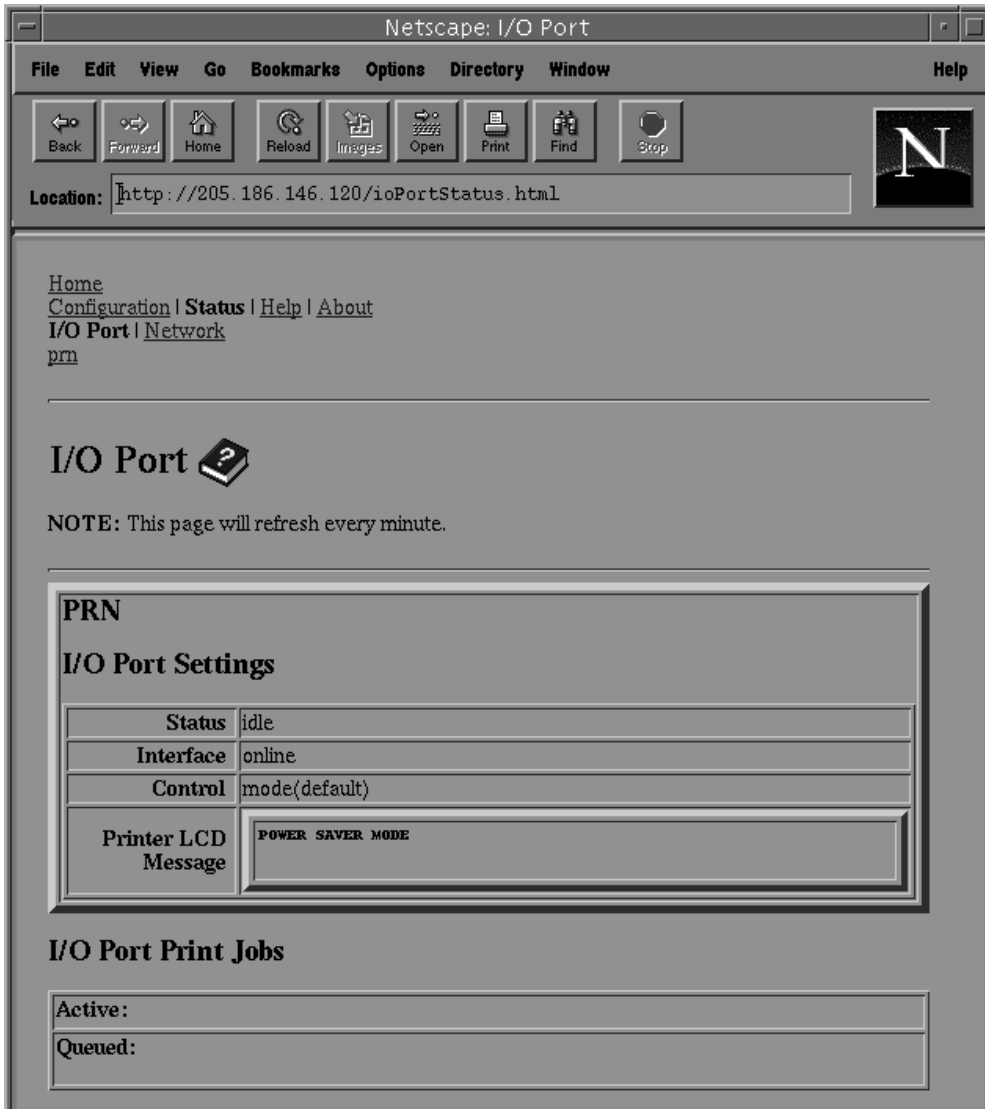


Figure 1–4. WWW Printer Status Screen



Printer Status Screen

Using the printer IPAddress and any standard web browser, you can check the status of the printer. Figure 1–4 shows the exact state of the printer by showing the printer LCD message.

Configuration Alternatives

Besides the HTML forms and software provided, the Ethernet Interface internal command shell, npsh, can also be reached using these more standard methods:

Telnet A TCP/IP command that helps configure Ethernet Interface settings remotely. A TCP/IP host starts a Telnet session with the print server and logs in to the device command shell to alter and view settings.

Example:

```
telnet 192.75.11.9
```

Remote Shell (e.g. "rsh" "rcmd" "remsh") A TCP/IP command that helps configure print server settings remotely. A TCP/IP host uses this command to remotely execute a single command on the Ethernet Interface.

Example:

```
rsh spike list prn
```

This command remotely executes the npsh command "list prn" on the Ethernet Interface named **spike**.

Operator Panel The IP Address, Gateway Address, and Subnet Mask can all be set from the operator panel.

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Overview

This chapter details a complete OS/2 configuration setup including:

1. Configuring the Ethernet Interface with its TCP/IP settings
2. Configuring a new printer on an OS/2 workstation. The procedure given will be from an OS/2 Warp 4 system, but the setup is similar to OS/2 Warp 3 and v2.11.
3. OS/2 must have TCP/IP installed on it and be configured with the correct IP parameters. See OS/2 documentation/help and your network administrator.

Configuring the Ethernet Interface TCP/IP Settings

There are mandatory TCP/IP settings (i.e. an IP address and subnet mask) needed before the print server can be detected on the network. There are also some additional settings that you may want to configure but these are optional. This section offers alternative methods for configuring your Ethernet Interface within an OS/2 environment and mentions some of the more common optional settings available.

Mandatory Settings

The Ethernet Interface must be configured with an IP address and subnet mask at a minimum. Consult your network administrator to obtain the proper values for these parameters.

Optional Settings

One additional setting, the gateway address, is necessary if the OS/2 workstations must communicate with the Ethernet Interface across a router. Consult your network administrator to obtain the proper value for this parameter.

Configuration using the Printer Operator Panel

You can set any of three listed parameters from the operator panel. These parameters are located in the Ethernet Parameters menu. The available parameters are:

- IP Address
- Gateway Address
- Subnet Mask

The procedure for changing any of the parameters is the same. The procedure for changing the IP Address is given here as an example. Use the same procedure for the other required parameters. To change the IP Address parameter:

1. Power on the printer.
2. Press **STOP** to get to NOT READY state.
3. Press **Menu** to display OPERATOR MENU.
4. Press **Scroll** until PARALLEL INTERFACE is displayed, then press **Enter**.
5. Press **Scroll** until ETHERNET is displayed, then press **Enter**.
6. Press **Scroll** until IP ADDRESS is displayed, then press **Enter** and the current IP address value is displayed.
7. Press **Enter** again then **Scroll** to choose an IP address octet to change, then press **Enter**.
8. Press **Scroll** to choose the desired value for the octet, then press **Enter**. The new value is shown with an asterisk. Press **Return**.
9. Repeat steps 6 through 8 until all IP address octets are set to the desired value.
10. Press **Return** until ETHERNET is on the first display line.
11. Press **Scroll** to choose other IP parameters to change, then follow the above steps for these as well.
12. When finished, press **Return** multiple times until NOT READY is displayed.
13. Power on the printer.

Test the setting by performing a 'ping' command from an OS/2 command prompt as follows:

```
ping ip_address
```

where the *ip_address* is the IP address of the printer Ethernet Interface. If this does not work, repeat the steps to make sure the IP values on the operator panel are correct. If they are correct, contact your network administrator for possible network problems.

OS/2 Workstation Configuration

OS/2 must use the TCP/IP LPR protocol in order to send jobs to the Ethernet Interface to be printed. This section will explain how to use the LPR command and how to setup an OS/2 print queue which will forward jobs to the printer using the LPR protocol.

Using the LPR Command

At an OS/2 command prompt, enter `lpr -s ip_address -p EthernetInterface_queue filename`

NOTE: The name must be the name of an existing destination/queue on the Ethernet Interface and it must be lowercase by default. You will most likely use 'd1prn.'

Troubleshooting

NOTE: During Power Up, the printer performs an interface hardware test. The presence of the Ethernet Interface menu selections at the printer operator panel indicates that the Ethernet Interface hardware is functioning properly. See the *IBM 6400 Line Matrix Printer Setup Guide* (S544–5640) for configuration menu information.

Check the IP information on both the Ethernet Interface and the OS/2 station for correctness. Make sure the EthernetInterface_queue is actually defined on the Ethernet Interface and that you are spelling it correctly.

Using an OS/2 LPR Print Queue

This section describes how to setup an OS/2 Warp 4 print queue to print to the Ethernet Interface using the LPR protocol. TCP/IP for OS/2 must be installed on your OS/2 workstation. This procedure is similar to for OS/2 Warp 3 and v2.11.

To setup the printer queue:

1. Find the Printer template icon. It may be in the Printers folder or the Templates folder.
2. Right click on the icon then select "Install." The "Create a printer" dialog box is displayed.

3. Enter any desired name for the printer. This will be the name of the printer queue.
4. In the “Default printer driver” list, select the desired driver. Only IBM ProPrinter XL III or Epson FX–1050 are supported on the 6400 series printers. If the desired driver does not appear in the list, click on “Install new printer driver...” and follow the instructions to install the desired driver.
5. In the “Output port” list, double click on an unshaded \PIPE\LPDx port. If all are shaded, you will have to double click on a shaded port and change the parameters. If no \PIPE\LPDx ports are shown, follow these steps to install them:
 - a. Right click on a port and select “Install.”
 - b. Select the “New port drivers” radio button.
 - c. In the “Directory” field, type `d:\TCPIP\DLL` where d: is the drive where the TCPIP subdirectory exists.
 - d. Click on “Refresh.” Several \PIPE\LPDx port icons should appear in the “Output port” list. If none appear, type `d:\MPTN\DLL` in step c. and try this step again.

NOTE: If no ports appear after completing step d., search your drives for the LPRPDRVR.PDR and type the path to this file, not including the file name, in step c. If these files can not be found, contact OS/2 support to install these ports.

- e. Select all the ports with the mouse pointer and click on “Install.” The \PIPE\LPDx ports should now show in the “Output port” list.
6. The “\PIPE\LPDx – Setting” dialog box is displayed.
7. In the “LPD server” field, type the IP address of the Ethernet Interface.
8. In the “LPD printer” field, type the name of the defined destination/queue on the Ethernet Interface.

NOTE: This name must be the name of an existing destination/queue on the Ethernet Interface and it must be lowercase by default. You will most likely use ‘d1prn.’

9. Optionally, click on "Help" to understand the other parameters and enter those values.
10. Click "OK."
11. Click on "Create." The print queue is created and placed in the Printers folder or possibly on the OS/2 desktop.
12. Make sure LPRPORTD is running. Type `ctrl-Esc` and check the list for a line that contains LPRPORTD. If it is running, this process is complete. If it is not running, enter the following at the OS/2 command prompt:

```
start lprportd
```

You will probably want to put this command in your "STARTUP.CMD" file, or use the TCP/IP Configuration tool to set it to autostart on boot up.

Any jobs sent to this queue will now be forwarded to the Ethernet Interface to be printed.

Starting the LPR Port Daemon

The LPR Port Daemon must be started to enable TCP/IP printing. To start the LPR Port Daemon;

1. Open the TCP/IP folder, which is in the OS/2 System folder for Warp 3.0.
2. Open TCP/IP Configuration.
3. Select the "Autostart" tab on the notebook.
4. In "Services to Autostart," select "lprportd."
5. Select "Foreground Session" and "Minimized."
6. Close the notebook by double clicking the system icon, which is located in the upper left corner.
7. Select "Save."
8. If prompted, respond `yes` to save the configuration changes.
9. At the OS/2 command prompt, enter `tcpstart` to restart TCP.

Troubleshooting

NOTE: During Power Up, the printer performs an interface hardware test. The presence of the Ethernet Interface menu selections at the printer operator panel indicates that the Ethernet Interface hardware is functioning properly. See the *IBM 6400 Line Matrix Printer Setup Guide* (S544–5640) for configuration menu information.

Check the IP information on both the Ethernet Interface and OS/2 station for correctness.

Make sure the value in step 8 is actually defined on the Ethernet Interface. See the Configuration Tools section on page 1–7 to determine how to verify this. Verify also that you are spelling the printer name correctly.

Verify that LPRPORTD is running.

TCP/IP Access Problem

If you can “ping” the printer from a workstation, but you cannot Web browse, Telnet, or print to the printer through the Ethernet Interface, there may be an incorrect entry in the TCP access list. In order for this workstation to use the Ethernet interface in this case, one of two things must happen.

1. The TCP list must have an entry added to grant access to this workstation.
2. All entries must be deleted from the TCP list to grant all workstations/hosts access to the above TCP services.

To view the current access list:

Use the printer operator panel to access the menu. See the *IBM 6400 Line Matrix Printer Setup Guide* (S544–5640) for configuration menu information. From the Operator Print Test menu choose the Ethernet Test Page. When the page prints, look under the “TCP ACCESS TABLE” section for the TCP access list entries.

To add/delete a TCP access list entry, refer to TCP Access Lists information on page 8–3.

NOTE: When the following procedure is used, the TCP access list will be cleared but all IP addresses will need to be entered again after the procedure is complete.

To reset all TCP/IP values to the factory defaults when access is impossible:

1. Obtain a printer configuration printout using the operator panel. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.
2. Power off the printer.
3. On the Ethernet Interface, place SWITCH 2, the center switch, in the down position.
4. Power on the printer and wait for the READY state.
5. On the Ethernet Interface, place SWITCH 2, the center switch, in the up position.
6. From a workstation attached to this network segment, create an ARP entry. The ethernet IP address and hardware or MAC address are needed. At the workstation enter:

```
arp -s <ipaddress> <MACaddress>
ping <ipaddress>
```
7. Try to “ping” this IP address to see if the Ethernet Interface can be seen on your network. If the interface does not respond, verify you are on the same network segment as the printer and that the ARP entry was created.
8. Telnet into the printer Ethernet Interface using the same IP address as above. Log in as root with no password.
9. At the system prompt, enter:

```
store tcpip from default
config http on
reset
```

NOTE: This will reset all TCP/IP settings to factory default and reset the Ethernet Interface.
10. Power the printer off and then back on.
11. Set the IP address, subnet mask, and default gateway parameters to the desired values.

12. If Web browser access does not work, Telnet into the Ethernet Interface as root. Enter the following command:

```
config http on
```

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

3 AS/400 CONFIGURATION

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Overview

This chapter details a complete AS/400 configuration setup including:

1. Developing Line Descriptions with CRTLINETH or CRTLINTRN
2. Configuring the AS/400 for TCP/IP
3. Configuring the AS/400 for Printing
4. Verifying Printing of AS/400

This document assumes no AS/400 printer configuration has been done. If any configuration has been done, please follow the procedure to the point at which continued configuration is required.

Developing Line Descriptions with CRTLINETH or CRTLINTRN

For each LAN adapter on the AS/400, a line description needs to be created for the Ethernet. This is required for Release V3R1, V3R2, V3R6, and V3R7.

If a line description already exists, make sure the SSAP list includes default options “AA” and “12.” You must also know the LAN speed for the AS/400 LAN adapter.

NOTE: To change a line description, you need to vary the line off before making the change. After making the change, you need to vary the line back on.

To change an existing line description, use the CHGLINETH command. To create a line description, use CRTLINETH.

NOTE: SSAPS of “AA” and “12” are automatically set as default values in the line description when “*CALC” is used in creating new line descriptions. You do not need to set these values unless they have been changed.

To create a line description, enter the following command:

```
CRTLINETH LIND(TRETH) RSRNAME (LINE041)
```

Your completed screen should look like Figure 3–1.

Figure 3–1. Example Ethernet Line Description

```

5763SS1 V3R2M0 960517          BLDD60 09/11/96 12:25:46
Line description . . . . . : LIND      ETHLAN
Option . . . . . : OPTION    *ALL
Category of line . . . . . :          *ELAN
Resource name . . . . . : RSRCNAME  LN041
Online at IPL . . . . . : ONLINE   *YES
Vary on wait . . . . . : VRYWAIT  *NOWAIT
Local adapter address . . . . . : ADPTADR *ADPT
Exchange identifier . . . . . : EXCHID 056A1005
Ethernet standard . . . . . : ETHSTD  *ALL
Maximum controllers . . . . . : MAXCTL 40
Error threshold level . . . . . : THRESHOLD *OFF
Text . . . . . : TEXT      *BLANK
-----Active Switched Controllers-----
(No active switched controllers attached)
SSAP list . . . . . : SSAP
-----Source Service Access Points-----
SSAP      Maximum Frame  Type          SSAP      Maximum Frame  Type
  04             1496    *SNA          AA             1496    *NONSNA
  12             1496    *NONSNA      C8             1496    *HPR
Group address . . . . . : GRPADR
-----Group Addresses-----
(No group addresses found)
Link speed . . . . . : LINKSPEED 10M
Cost/connect time . . . . . : COSTCNN 0
Cost/byte . . . . . : COSTBYTE 0
Security for line . . . . . : SECURITY *NONSECURE
Propagation delay . . . . . : PRPDLY *LAN
User-defined 1 . . . . . : USRDFN1 128
User-defined 2 . . . . . : USRDFN2 128
User-defined 3 . . . . . : USRDFN3 128
Autocreate controller . . . . . : AUTOCRTCTL *NO
Recovery limits . . . . . : CMNRCYLMT
  Count limit . . . . . :          2
  Time interval . . . . . :          5

```

The following three parameters must be specified:

Line description name (LIND)

This line description name is the user’s name for the AS/400 adapter. This name must be identical to the name entered when the TCP/IP* is configured on the AS/400, as described in “Configuring the AS/400 for TCP/IP” on page 3–4.

Resource name (RSRCNAME)

System–assigned name for the interface (for example, LN041).

SSAP When *CALC is used, the values of “12” and “AA” are entered automatically as defaults. Verify that those SSAP values have not been changed.

Configuring AS/400 for TCP/IP

The next step in configuring the AS/400 for the IBM 6400 printer is to configure the interface on the AS/400 for TCP/IP.

NOTE: The AS/400 interface is not the IBM NIC. Do not set the S/400 interface address to the same address as the NIC IP address. Also do not add the NIC to the AS/400 TCP/IP interface list.

Configuring an AS/400 TCP/IP Interface with ADDTCPIFC

ADDTCPIFC is used to add a TCP/IP interface to AS/400. This step configures the AS/400 for attachments to a TCP/IP network.

At the AS/400 command line, enter the following command:

```
ADDTCPIFC INTNETADR ('9.99.15.188') LIND(ETHLAN)
SUBNETMASK('255.255.255.0')
```

Your completed screen should look like Figure 3–2.

Figure 3–2. Example ADDTCOIFC Interface

System:	BLDD6
Internet address	: 9.99.15.188
Subnet mask	: 255.255.255.0
Line description	: ETHLAN
Line type	: *Elan
Interface status	: Interactive
Type of service	: *Normal
Maximum transmission unit	: *Lind
Automatic start	: *Yes

The following parameters must be specified:

Internet Address

Internet address of the AS/400 Ethernet LAN adapter.

NOTE: Do not use the OP address of the NIC.

Subnet Mask

The Subnet Mask for this AS/400 TCP/IP interface (for example, 255.255.255.0).

Line Description

The name assigned to the AS/400 line description as described in “Developing Line Descriptions with CRTLINETH or CRTLINTRN” on page 3–2.

NOTE: Each AS/400 LAN adapter will have its own line description.

Configuring a Router Definition with ADDTCP RTE

If necessary, use the ADDTCP RTE command to create a route definition. This is required if the printer is somewhere other than on a local segment and must cross bridges.

Configuring a Local Domain and Hostname

The AS/400 print commands, described in “Setting up Printing for ASCII Files” on page 3–6, require a local name and hostname. If you have already configured LAN attached TCP/IP printers on the AS/400 system, you will have a local domain name and hostname configured on the system.

NOTE: If you already have a local domain name and hostname configured on the system, do not change your setup.

If the local domain name and hostname file is empty, the file must be setup. This control file information is used to determine if a print request comes from an authorized host.

To configure the local domain and hostname, you will run the CFGTCP command and select Option “12” from the menu. Enter a local domain name, such as *city.company.com*. Enter a local hostname, such as *as400-01*. This is the name of your AS/400 system and must match the hostname for your system in the host entry table. Refer to “Configuring a TCP/IP Host Table Entry” on page 3–6.

NOTE: If the printer and AS/400 are not on the same local LAN segment, use CFGTCP Option 2 to verify that there is a route defined in the TCP/IP route list.

Configuring a TCP/IP Host Table Entry

Although it is optional to create a TCP/IP host table entry, IBM suggests that you take this step. Add the AS/400 name and the IP address of the LAN adapter to the "Host Table Entries."

Configuring the AS/400 for Printing

The procedure for configuring an AS/400 for printing requires that you:

1. Setup the printing capability
2. Verify the setup with a print job

In order to accomplish this configuration, you need the following information:

Remote Printer Queue name

Set for any of d1prn through d4prn.

NOTE: The Remote Printer Queue name must be all lower case. Do not use PASS.

IP address

IP address for the NIC.

Setting up Printing for ASCII Files

The next step in configuring the the AS/400 for IBM network printers is to setup the remote printing capability. There are two ways to do this. You can specify the LPR parameters manually each time you send a file to the printer, or use Remote Writer and a remote output queue for automatic printing to the printer.

To use LPR manually:

1. Start TCP/IP, if it is not already running, by entering the command:

STRTCP

2. At the AS/400 command line, enter

LPR

3. The following example displays only the parameters you need to specify.

Send TCP/IP Spooled File (LPR)		
Type choices, press Enter.		
Remote system	RMTSYS	> *INTNETADR
Printer queue	PRTQ	> d1prn
Job name	JOB	*
User		
Number		
Spooled file number	SPLNMBR	*ONLY
Destination type	DETTYP	*OTHER
Transform SCS to ASCII	TRANSFORM	*YES
Manufacturer type and model	MFRTYPMDL	> *IBM6400EP
Internet address	INTNETADR	> '9.99.2.3'

The following parameter values are required:

Remote system

Enter the hostname of your printer of *INTNETADR, which then prompts you to specify the OP address of your printer.

Printer Queue (PRTQ)

Set to the capitalized word PASS. If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word TEXT.

Destination type (DETTYP)

Specify *OTHER for the DETTYP parameter.

Transform (TRANSFORM)

Specify *YES.

Manufacturer Type and Model (MFRTYPMDL)

Select a manufacturer type and model. This is the name of the WSCO. Select *IBM6400EP for Epson emulation or *IBM6400PR or *IBM42023 for ProPrinter Emulation if you have AS/400 V3R2 and above or V3R7 and above.

Internet Address (INTNETADR)

IP address of the NIC.

NOTE: You may specify either *INTNETADR (and the NIC IP address) or the hostname for the NIC (if you added the printer to the host table entry as directed in “Configuring a TCP/IP Host Table Entry” on page 3–6).

To create an Automatic Remote Output Queue:

1. From the AS/400 command line, enter:

CRTSOTQ

2. The following example displays the parameters you need to specify.

```

Send TCP/IP Spooled File (LPR)

Type choices, press Enter.
Output queue ..... OUTQ      > USERNAME
  Library .....                               *CURLIB
Maximum spooled file size: ..... MAXPAGES
  Number of pages .....                       *NONE
  Starting time .....
  Ending time .....
                                     + for more values
Order of files on queue ..... SEQ          *FIFO
Remote system ..... RMTSYS    > *INTNETADR

Remote printer queue ..... RMTprtQ > d1prn
Writers to autostart ..... AUTOstrWTR 1
Queue for writer messages ..... MSGQ     QSYSOPR
  Library .....                               *LIBL
Connection type ..... CNNTYPE > *IP
Destination type ..... DESTTYP   *OTHER
Host print transform ..... TRANSFORM *YES
Manufacturer type and model ..... MFRtYPMDL > *IBM6400EP
Workstation Customizing Object .. WSCST  *NONE
  Library .....

Internet address ..... INTNETADR > '9.99.57.173'
Destination options ..... DESTOPT     *NONE

Print separator page ..... SEPPAGE     *YES
User defined option ..... USRDFNOPT   *NONE
                                     + for more values

```

3. Enter values for the following parameters:

Output queue (OUTQ)

The name of the AS/400 output queue. The name can be anything you would like. This name is not the same as the printer internal queue name.

Remote system (RMTSYS)

Internet address of the NIC on the printer (*INTNETADR prompts you for this) of the hostname of the NIC.

Remote printer queue (RMTPRMQ)

Default name of the IBM network printer. Set for any of d1prn through d4prn.

Writer to Autostart (AUTOSRTWTR)

Set the value to "1." This will start the Remote Writer when the queue is created, and it is automatically starts the Remote Writer after each IPL of the AS/400 and whenever STRTCP is started.

Connection type (CNNTYPE)

Specify this value as *IP.

Destination type (DESTTYPE)

Specify *OTHER.

Transform (TRANSFORM)

Specify this value as *YES.

Manufacturer type (MFRTYPMDL)

Select a manufacturer type and model. This is the name of the WSCO. Select *IBM6400EP for Epson emulation or *IBM6400PR or *IBM42023 for ProPrinter Emulation.

Internet address (INTNETADR)

Specify the IP address of the printer.

Verify Printing on AS/400

This section verifies that the printer is capable of printing ASCII files and that the printer can be pinged on the network.

To test PCL printing:

1. Start TCP/IP, if it is not already running, by entering the command:

```
STRTCP
```

2. Verify that the AS/400 TCP/IP interface is active.
3. Ping the printer from an AS/400 workstation with the command:

```
Ping ip_address
```

Where *ip_address* is the Internet address of the remote system printer (the NIC) or the hostname of the printer (if you put the hostname in the host entry table as directed in “Configuring a TCP/IP Host Table Entry” on page 3–6).

4. If the printer cannot be pinged, proceed to the “Troubleshooting” section on page 3–11.
5. Use one of the following methods to send a spooled file to the printer:
 - Enter the LPR command on the AS/400 command line with the appropriate parameters. See the “To use LPR manually:” section on page 3–6.
 - Enter the following command on the AS/400 command line:

```
STRRMTWTR name
```

Where *name* is the name of the AS/400 remote output queue (not the printer internet queue, as described in “To create an Automatic Remote Output Queue:” on page 3–8).

NOTE: To print PCL files, you must have specified PASS in the Remote Printer queue name of CRTOUTQ, as described in “To create an Automatic Remote Output Queue:” on page 3–8).

Troubleshooting

NOTE: During Power Up, the printer performs an interface hardware test. The presence of the Ethernet Interface menu selections at the printer operator panel indicates that the Ethernet Interface hardware is functioning properly. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.

If you have trouble pinging the printer:

1. Verify the configuration of AS/400, including the printer and any intervening devices such as routers and bridges.
2. Verify that the AS/400 line description is varied on and the printer is turned on and displays a status of READY.
3. Verify that the AS/400 TCP/IP is active.

TCP/IP Access Problem

If you can “ping” the printer from a workstation, but you cannot Web browse, Telnet, or print to the printer through the Ethernet Interface, there may be an incorrect entry in the TCP access list. In order for this workstation to use the Ethernet interface in this case, one of two things must happen.

1. The TCP list must have an entry added to grant access to this workstation.
2. All entries must be deleted from the TCP list to grant all workstations/hosts access to the above TCP services.

To view the current access list:

Use the printer operator panel to access the menu. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information. From the Operator Print Test menu choose the Ethernet Test Page. When the page prints, look under the “TCP ACCESS TABLE” section for the TCP access list entries.

To add/delete a TCP access list entry, refer to TCP Access Lists information on page 8–3.

NOTE: When the following procedure is used, the TCP access list will be cleared but all IP addresses will need to be entered again after the procedure is complete.

To reset all TCP/IP values to the factory defaults when access is impossible:

1. Obtain a printer configuration printout using the operator panel. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.
2. Power off the printer.
3. On the Ethernet Interface, place SWITCH 2, the center switch, in the down position.
4. Power on the printer and wait for the READY state.
5. On the Ethernet Interface, place SWITCH 2, the center switch, in the up position.
6. From a workstation attached to this network segment, create an ARP entry. The ethernet IP address and hardware or MAC address are needed. At the workstation enter:

```
arp -s <ipaddress> <MACaddress>
ping <ipaddress>
```
7. Try to “ping” this IP address to see if the Ethernet Interface can be seen on your network. If the interface does not respond, verify you are on the same network segment as the printer and that the ARP entry was created.
8. Telnet into the printer Ethernet Interface using the same IP address as above. Log in as root with no password.
9. At the system prompt, enter:

```
store tcpip from default
config http on
reset
```

NOTE: This will reset all TCP/IP settings to factory default and reset the Ethernet Interface.
10. Power the printer off and then back on.

11. Set the IP address, subnet mask, and default gateway parameters to the desired values.
12. If Web browser access does not work, Telnet into the Ethernet Interface as root. Enter the following command:
`config http on`

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

4 WINDOWS CONFIGURATION

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Overview

This chapter details a complete Windows configuration setup including:

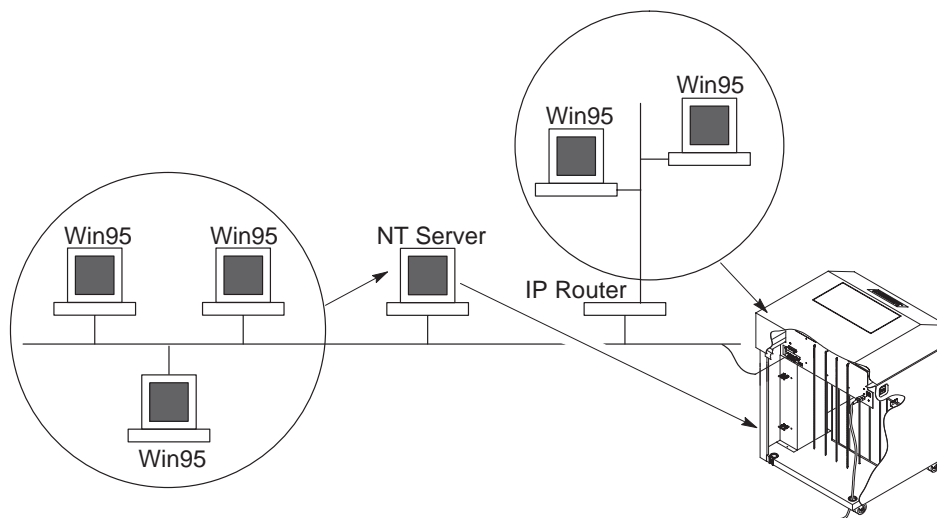
1. Identifying the Ethernet Interface on the network using TCP/IP as the underlying protocol
2. Configuring the Ethernet Interface with its mandatory TCP/IP settings (i.e. IP address and subnet mask)
3. Configuring a new printer on the Windows station

Environment Description

The Ethernet Interface supports network printing under Windows environments by using TCP/IP. In a Windows NT setup, pure TCP/IP is used as the network protocol whereas with Windows 95, NetBIOS over TCP/IP is used.

Figure 4–1 outlines two of the most common Windows setups you will see with the Ethernet Interface. The ideal configuration is a network printer defined on the NT server to be shared by Windows 95 clients. However, any Windows station can also go directly to the Ethernet Interface.

Figure 4–1. Windows Integration



Ethernet Interface Configuration

There are mandatory TCP/IP settings (i.e. an IP address and subnet mask) needed before the print server can be detected on the network. There are also some additional settings that you may want to configure but these are optional. This section offers alternative methods for configuring your Ethernet Interface within a Windows environment and mentions some of the more common optional settings available.

Mandatory

Since TCP/IP is used for Windows printing, the Ethernet Interface must be configured with a minimum of an IP address and subnet mask before it can be seen on the network.

Optional

Additional settings, like routing entries, can be configured. This allows communications across subnets.

Configuration of the Ethernet Interface can be done from the printer operator panel, web browser, or host commands.

Configuration Using the Operator Panel

You can set any of three listed parameters from the operator panel. These parameters are located in the Ethernet Parameters menu. The available parameters are:

- IP Address
- Gateway Address
- Subnet Mask

The procedure for changing any of the parameters is the same. The procedure for changing the IP Address is given here as an example. Use the same procedure for the other required parameters. To change the IP Address parameter:

1. Turn the printer power on.
2. Press **STOP** to get to NOT READY state.
3. Press **Menu** to display OPERATOR MENU.
4. Press **Scroll** until PARALLEL INTERFACE is displayed, then press **Enter**.

5. Press **Scroll** until ETHERNET is displayed, then press **Enter**.
6. Press **Scroll** until IP ADDRESS, then press **Enter** and the current IP address value is displayed.
7. Press **Enter** again then **Scroll** to choose an IP address octet to change, then press **Enter**.
8. Press **Scroll** to choose the desired value for the octet, then press **Enter**. The new value is shown with an asterisk. Press **Return**.
9. Repeat steps 6 through 8 until all IP address octets are set to the desired value.
10. Press **Return** until ETHERNET is on the first display line.
11. Press **Scroll** to choose other IP parameters to change, then follow the above steps for these as well.
12. When finished, press **Return** multiple times until NOT READY is displayed.
13. Perform a power cycle for the printer. This will set the operator panel values into the Ethernet Interface.

Test the setting by performing a 'ping' command from an OS/2 command prompt as follows:

```
ping ip_address
```

where the *ip_address* is the IP address of the printer Ethernet Interface. If this does not work, repeat the steps to make sure the IP values on the operator panel are correct. If they are correct, contact your network administrator for possible network problems.

Using ARP

To configure the Ethernet Interface with its IP settings using a manual "arp" command:

1. Log on to a Windows station with TCP/IP loaded and located on the same subnet as the Ethernet Interface.
2. Find the ethernet address (MAC address) for the Ethernet Interface on the configuration printout. It must be entered as part of this procedure.

3. Use the “arp” command to add an entry into the Windows station ARP table for the Ethernet Interface. This is the most common syntax for this command:

Syntax:

```
arp -s ipaddress ethernetaddress
```

Example for Microsoft IP stacks:

```
arp -s 192.75.11.9 00-80-72-07-00-60
```

This example specifies a Ethernet Interface using IP address **192.75.11.9** and ethernet address **00:80:72:07:00:60**.

4. Check to see if the ARP entry was accepted.

```
arp -a
```

You should see an entry in the listed ARP table with the IP address and ethernet address specified in Step 3.

5. Try to “ping” this IP address to see if the Ethernet Interface can be seen on your network.

At this point, you should be able to communicate with the Ethernet Interface from your local Windows station. This means the print server knows about an IP address and subnet mask and has these settings in its current memory. However, if the Ethernet Interface is power cycled, these settings will disappear unless you store them into flash memory. To do this:

1. Load a Web browser on your Windows station and direct it to the URL “<http://EthernetInterfaceIPAddress/networkConf.html>” (e.g. “<http://192.75.11.9/networkConf.html>”).

NOTE: If prompted for a “User ID” and password first, type “root” for the ID and press ENTER at the password prompt since there is no password by default.

2. At the “Network Configuration” HTML form that displays, click in the field below the “IP Address” heading and type in the IP address for the Ethernet Interface.
3. Under the “Subnet Mask” heading, enter the Ethernet Interface subnet mask.

NOTE: If you would like to communicate with the Ethernet Interface from across routers, you will need to fill in an entry within the “Routing” section. Please see “Communicating Across Routers” below for more details.

4. Click on the SUBMIT button when done and physically repower the printer to make the new settings take effect.

Communicating Across Routers

Since Windows environments rely on TCP/IP to communicate with the Ethernet Interface, crossing routers becomes an issue.

After following one of the Ethernet Interface configuration methods mentioned, you will most likely only be able to communicate with the print server from the same subnet. This means any hosts across a router will not be able to see your Ethernet Interface. In order for hosts across a router to see your Ethernet Interface, it is best to store a default router/gateway within the print server so that any packets destined for another subnet get forwarded to this router automatically. The router (or series of routers) can then take over ensuring the packets get to their final destination on another subnet on your network.

To configure a default router/gateway within the Ethernet Interface:

1. Load a Web browser on your Windows station and direct it to the URL “`http://EthernetInterfaceIPAddress/networkConf.html`” (e.g. “`http://192.75.11.9/networkConf.html`”).

NOTE: If prompted for a “User ID” and password first, type in “`root`” for the ID and press ENTER at the password prompt since there is no password by default.

2. At the “Network Configuration” HTML form that displays, click in the first field below the “Gateway” heading and type in the IP address of the default router/gateway for the Ethernet Interface subnet.
3. Click on the SUBMIT button when done.

Changing Workgroup Names

Windows environments define groups of related computers as “workgroups.” By default, the Ethernet Interface belongs to the workgroup called “WORKGROUP.” However, you may want to change this to suit your network better. To do this:

1. Load a Web browser on your Windows station and direct it to the URL
“`http://Ethernet InterfaceIPAddress/networkConf.html`”
(e.g. “`http://192.75.11.9/networkConf.html`”).

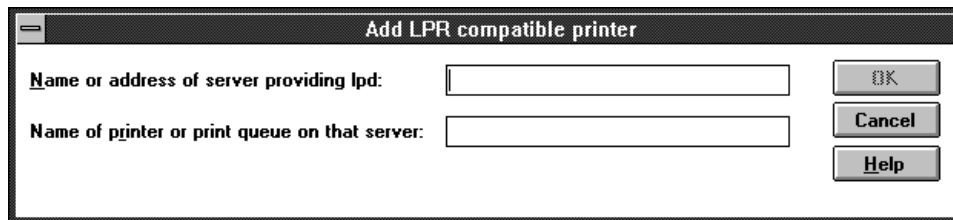
NOTE: If prompted for a “User ID” and password first, type in “root” for the ID and press ENTER at the password prompt since there is no password by default.

2. At the “Network Configuration” HTML form that displays, search for the “Windows (NetBIOS TCP/IP)” section and highlight the “Workgroup Name” field.
3. Type in the new workgroup name for the Ethernet Interface.
4. Click on the SUBMIT button when done.

Changing Destination Names

When defining some printers within Windows environments, the Ethernet Interface requires that you specify a pre-defined destination rather than any name you would like. For example, when creating a new printer under Windows NT, you are presented with a screen similar to Figure 4–2.

Figure 4–2. Windows NT Print Setup Dialogue Box



The first field requires the IP address for the Ethernet Interface and the second field must be filled in with an existing destination from the print server (e.g. d1prn). Otherwise, the Ethernet Interface will not accept this as a valid network printer. Table 4–1 outlines the default destinations to choose from.

Table 4–1. Ethernet Interface Default Destinations

Destination	Mapped I/O Port
d1prn	PRN
d2prn	PRN
d3prn	PRN
d4prn	PRN

This name can be changed to something more meaningful using the built-in HTML forms. To do this:

1. Load a Web browser on your Windows station and direct it to the URL `“http://EthernetInterfaceIPAddress/destConf.html”` (e.g. `“http://192.75.11.9/destConf.html”`).

NOTE: If prompted for a “User ID” and password first, type in `“root”` for the ID and press ENTER at the password prompt since there is no password by default.

2. At the “Print Path Configuration” HTML form that displays, select a destination link from the top of the page to bring up the appropriate destination form. By default, you should see a line near the top of the form showing the destinations listed in Table 4–1.
3. Once the desired destination HTML form displays, highlight the “Name” field and type in the new name for this destination.
4. Click on the SUBMIT button when done.

Host Configuration

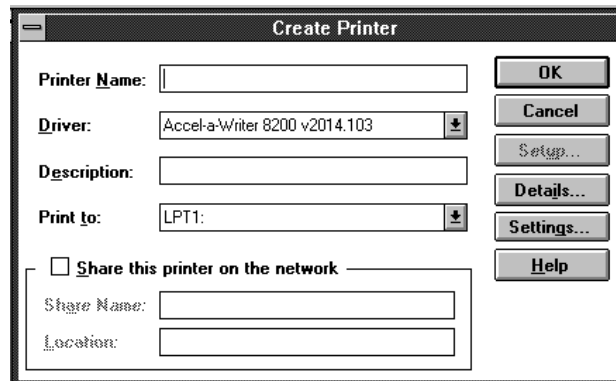
This section covers Windows NT and Windows 95 new printer setups.

Windows NT 3.51 Host Setup

To configure a new printer on a Windows NT station:

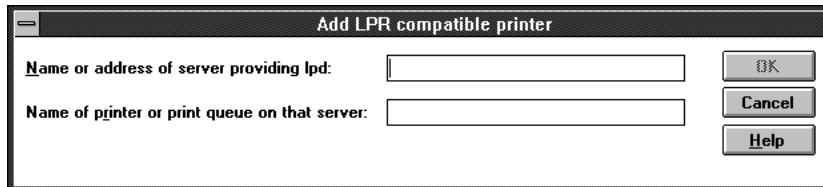
1. Open the “Control Panel.”
2. Double click on “Printers.”
3. Select “Create a Printer” from the “Printer” menu to display the dialogue box in Figure 4–3.

Figure 4–3. Create a Printer Dialogue Box



4. Define a name to represent this print setup and select the appropriate driver for the printer that will be used in this setup. For printer driver choose “generic text” or Epson “FX1050” or “Proprinter” based on print need.
5. Under the “Print To” field, select “Other...”
6. Select “LPR Port” from the list that displays and click OK to bring up a dialogue box similar to the one found in Figure 4–4.

Figure 4–4. Add LPR Compatible Printer Dialogue Box



7. Type in the IP address or host name of the Ethernet Interface in the first field.
8. Type in the name of a pre-defined destination/queue on the Ethernet Interface in the second field.

NOTE: This name must be a name of an existing destination/queue on the Ethernet Interface and it must be lowercase by default. You will probably use “`d1prn.`”

9. Click OK when done specifying these two fields.

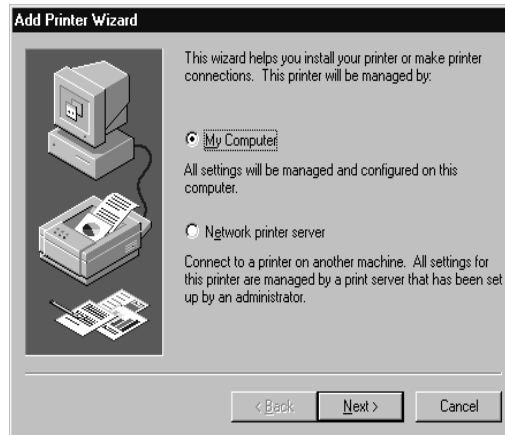
You now have a new network printer which relies on the standard TCP/IP print protocol, LPD, to print remotely to a printer with the Ethernet Interface.

Windows NT 4.0 Host Setup

There are many different configurations available for the Windows NT 4.0 printer setup. The setup shown here is used only as an example of the procedure. To configure a new printer on a Windows NT 4.0 station:

1. Select “Settings:Printers” from the “Start” menu.
2. Double click on the “Add Printer” icon. The “Add Printer Wizard” window is displayed.

Figure 4–5. Printer Management



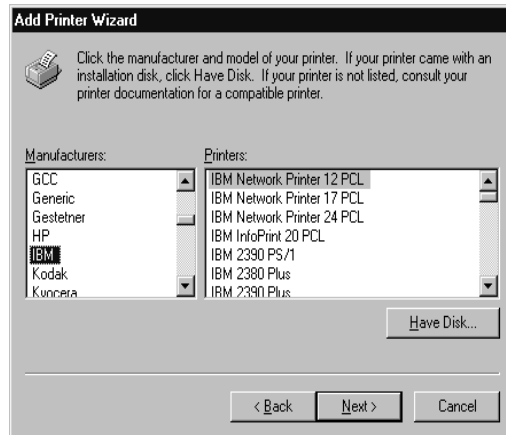
3. Select “My Computer” from the second window of the “Add Printer” wizard that loaded.

Figure 4–6. Available Printer Ports



4. At the next window, click Add Port, then double click LPR Port.

Figure 4–7. Manufacturer and Model



5. At the “Add LPR compatible printer window” dialogue box, enter the values.
6. Type in the IP address or host name of the Ethernet Interface in the first field.
7. Type in the name of a pre-defined destination/queue on the Ethernet Interface in the second field.

NOTE: This name must be a name of an existing destination/queue on the Ethernet Interface and it must be lowercase by default. You will probably use “**d1prn.**”

8. Click OK when done specifying these two fields.
9. Select “Close” then “Next.”
10. At the next window, click the manufacturer and printer model.

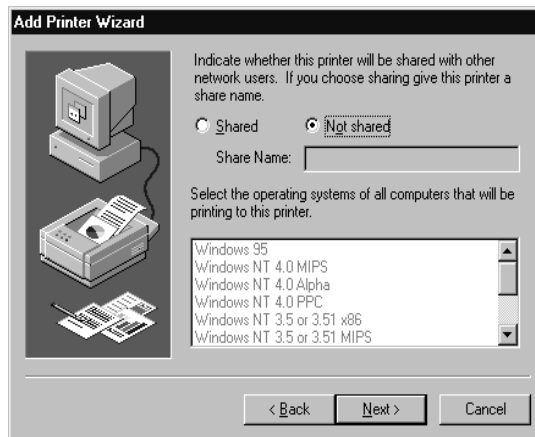
NOTE: If the printer driver is not installed, provide disk and click on “Have Disk” and “Browse” to correct location for the driver.

Figure 4–8. Identifying the Printer



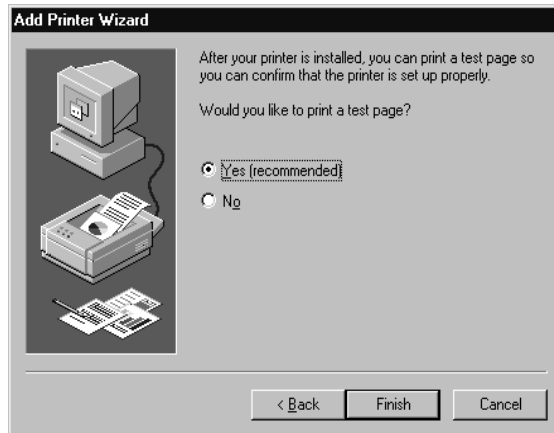
11. At the “Printer name” dialogue box, enter the name of the printer as you would like it displayed for printer selection. It is also possible for to choose this printer as the default.

Figure 4–9. Shared Printer



12. On the next wizard page presented, determine if the printer is to be shared with other network users. If it is to be shared, the shared name must be entered and the operating system of shared systems should be selected.

Figure 4–10. Print Test Page



13. The final step in the installation process is to determine if you would like to produce a test print. As indicated on the printer wizard display, this test print is recommended.

Windows 95 Host Setup

To configure a new printer on a Windows 95 station to use NetBIOS over TCP/IP:

NOTE: Testing has shown that using the following Windows 95 host setup can lead to print job/data loss if the printer is offline for longer than approximately 45 seconds. An alternative method for printing using LPR on Windows 95 is given on page 4–16.

1. Select “Settings:Printers” from the “Start” menu.
2. Double click on the “Add Printer” icon.
3. Select “Network Printer” from the second window of the “Add Printer” wizard that loaded.
4. At the next window, click on BROWSE to help fill in the network path of this printer.
5. At the “Browse for Printer” dialogue box that displays, double click on the appropriate workgroup containing the Ethernet Interface. By default, the print server falls under the workgroup, “WORKGROUP.”
6. Continue searching the network until you see the Ethernet Interface name, “M_XXXXXX”, where “XXXXXX” equals the last six digits of the print server ethernet address found when a configuration is printed.
7. Once you see the Ethernet Interface, double click on it to display a list of pre-defined destinations/queues to choose from.
8. Select a destination/queue that will use “d1prn.”
9. Click OK once you have selected a destination.
10. Back at the network path window, select NEXT since this path should now be filled in for you.
11. At the next window, select the appropriate serial matrix print driver and click on NEXT.
12. Fill in a name for this new network printer at the next window and decide if you want this to be the default printer. This printer name can be anything you would like as long as it is unique.

13. When prompted for a test page, select either “Yes” or “No” depending on the state of the attached printer and click on FINISH.

There should now be a new printer icon within the “Printers” folder. This new network printer relies on NetBIOS over TCP/IP as the underlying protocol to print to the Ethernet Interface.

NOTE: Windows may ask for a disk or CD-ROM to load the appropriate printer driver to complete this new printer setup.

Alternative Windows 95 Host Setup for LPR

To configure a new printer on a Windows 95 station to use LPR over TCP/IP:

1. Go to the Web site '<http://www.printers.ibm.com/util.html>' and follow the instructions in the section titled '*IBM Remote Printing Client for Windows 95*' to download and install the LPR software.
2. After the LPR port and help files are installed, use the Help instructions to create a printer which uses an LPR port to print to the 6400. You will need to provide the IP address or hostname of the printer network card as well as one of the internal print queue names on the card (e.g. d1prn).

There should now be a new printer icon within the “Printers” folder. This new network printer relies on LPR over TCP/IP as the underlying protocol to print to the Ethernet Interface.

Windows 3.1 Host Setup

If you are running Windows 3.1 stations on your network, you will need to rely on either TCP/IP or IPX to print to the Ethernet Interface. If IPX is used, you will have a print queue defined on a Novell file server which your Windows 3.1 stations will send their print jobs to. The Ethernet Interface will then service this print queue as either a PSERVER or an RPRINTER. Please see the Chapter 6, “Novell Configuration” for further details.

If you want to rely on TCP/IP, you will need a third party TCP stack loaded onto your Windows station since TCP/IP support did not automatically come with Windows until the introduction of Windows NT and Windows 95. You may also be running a third party stack if you decided not to use Microsoft.

Some common TCP stacks today are FTP Software's OnNet, NetManager's Chameleon, and Frontier Technologies' SuperTCP. In each case, they allow your Windows 3.1 station to communicate with other TCP/IP devices. This means you can send print jobs to the Ethernet Interface as well.

The most common print method offered with Windows TCP stacks is LPR/LPD, a multi-platform remote printing protocol used on everything from PCs to mainframes. The LPR print setup is very simplistic, involving only two parameters:

1. **Ethernet Interface IP address** – the IP address or host name of the print server you want to print to.
2. **Ethernet Interface destination/queue** – a pre-defined name on the print server telling the device which I/O port to send the jobs to. The standard name for the PRN port is "d1prn."

NOTE: This destination name is case sensitive and by default, all names are lowercase.

Troubleshooting Tips

NOTE: During Power Up, the printer performs an interface hardware test. The presence of the Ethernet Interface menu selections at the printer operator panel indicates that the Ethernet Interface hardware is functioning properly. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.

The following section provides information on possible solutions to some standard configuration errors. If you require technical support, please have as much of the following information available when you call. It will expedite the solution to the problem.

1. What level of software are you running?
2. What type of attachment do you have?
3. What is your host operating system?
4. Give a detailed description of the problem.
5. How often, and when, does the problem occur?

6. Give a detailed description of your network and the components attached.

Please follow these tips to determine what the problem may be with your Ethernet Interface configuration.

Ethernet Interface Will Not Talk on the Network

- Have you assigned it a unique and valid IP address which corresponds with the other IP addresses on your network? For example, are you sure no other device is using this IP address?
- Are you sure you are trying to talk to the Ethernet Interface from a Windows station on the same subnet? Currently, the print server can only be seen locally unless you configured a routing entry earlier.
- If you look at the back of the printer, is the STAT LED flashing once a second or is it quicker than that? A slower, once-a-second rate tells you that the print server is in fact configured with an IP address. A faster rate says it knows nothing about this so you may need to try the configuration process again.



DANGER:

<4> Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm.

<5> Power off the print and disconnect the power cord before connecting or disconnecting communication port, teleport, or attachment cable connector.

- Have you confirmed that the network connection to the Ethernet Interface is working correctly? Trying different network cables and locations will help narrow down the problem.

HTML Configuration Forms Will Not Display

- Can you “ping” the Ethernet Interface from your Windows station? If not, please refer to “Ethernet Interface Will Not Talk on the Network” on page 4–18.
- Have you used the correct URL for the Ethernet Interface home page? It should be “`http://EthernetInterfaceIPAddress`” (e.g. “`http://192.75.11.9`”).

Errors Occur when Defining an LPR Printer

- Can you “ping” the Ethernet Interface from your Windows NT station? If not, please refer to “Ethernet Interface Won’t Talk on the Network” on page 4–18.
- Did you specify the correct IP address or host name for the Ethernet Interface in the first field of the “Add LPR Compatible Printer” box?
- Did you specify a valid destination/queue on the Ethernet Interface in the second field of the “Add LPR Compatible Printer” dialogue box? If so, did you also enter it in lowercase letters?

Can Not Browse the Ethernet Interface on the Network

- Have you looked under the right Windows workgroup? By default, the Ethernet Interface will be found under “WORKGROUP.”
- Are you able to browse other Windows stations and devices on the network from this same station?
- Has this Windows station been given enough time to update its registry so it can see this newly added workgroup device? Sometimes Windows stations can take considerable time, depending on the size of the network.

Printer Errors when Printing or No Output

- Is there a large job currently printing taking up all of the printer resources? Usually when printing from Windows 95 stations, a busy printer can cause Windows to display a printer error message. This is because it demands immediate printer attention rather than holding the

data until the printer is ready again. The best way around this is to use a central spooling station like an NT server.

- Have you tried restarting the spooler under Control Panel:Services? Sometimes this is needed to get printing started.

NOTE: As a last resort, you may want to reboot the Windows station.

Sometimes this is the only option to completely clear this situation.

The Ethernet Interface usually has nothing to do with this problem.

TCP/IP Access Problem

If you can “ping” the printer from a workstation, but you cannot Web browse, Telnet, or print to the printer through the Ethernet Interface, there may be an incorrect entry in the TCP access list. In order for this workstation to use the Ethernet interface in this case, one of two things must happen.

1. The TCP list must have an entry added to grant access to this workstation.
2. All entries must be deleted from the TCP list to grant all workstations/hosts access to the above TCP services.

To view the current access list:

Use the printer operator panel to access the menu. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information. From the Operator Print Test menu choose the Ethernet Test Page. When the page prints, look under the “TCP ACCESS TABLE” section for the TCP access list entries.

To add/delete a TCP access list entry, refer to TCP Access Lists information on page 8–3.

NOTE: When the following procedure is used, the TCP access list will be cleared but all IP addresses will need to be entered again after the procedure is complete.

To reset all TCP/IP values to the factory defaults when access is impossible:

1. Obtain a printer configuration printout using the operator panel. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.
2. Power off the printer.

3. On the Ethernet Interface, place SWITCH 2, the center switch, in the down position.
4. Power on the printer and wait for the READY state.
5. On the Ethernet Interface, place SWITCH 2, the center switch, in the up position.
6. From a workstation attached to this network segment, create an ARP entry. The ethernet IP address and hardware or MAC address are needed. At the workstation enter:

```
arp -s <ipaddress> <MACaddress>
ping <ipaddress>
```
7. Try to “ping” this IP address to see if the Ethernet Interface can be seen on your network. If the interface does not respond, verify you are on the same network segment as the printer and that the ARP entry was created.
8. Telnet into the printer Ethernet Interface using the same IP address as above. Log in as root with no password.
9. At the system prompt, enter:

```
store tcpip from default
config http on
reset
```

NOTE: This will reset all TCP/IP settings to factory default and reset the Ethernet Interface.
10. Power the printer off and then back on.
11. Set the IP address, subnet mask, and default gateway parameters to the desired values.
12. If Web browser access does not work, Telnet into the Ethernet Interface as root. Enter the following command:

```
config http on
```

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

Web Browser/HTTP Problem

In some cases you may not be able to browse the printer web page simply because the Ethernet Interface HTTP may be turned off.

If you can not “ping” the Ethernet Interface IP address, make sure the IP Address, subnet mask, and default gateway are set correctly by checking the Ethernet Interface menu from the operator panel. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.

If you can “ping” the Ethernet Interface IP address but can not access the web pages, perform the following procedure to verify the Ethernet Interface HTTP is turned on.

1. Telnet into the Ethernet Interface and log in as root with no password.
2. At the system prompt enter the following commands:
`config http on`
`save`
`reset`
3. After approximately 30 seconds, point your browser to the Ethernet Interface IP address. The printer web pages should now be accessible.

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

5 UNIX CONFIGURATION

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Overview

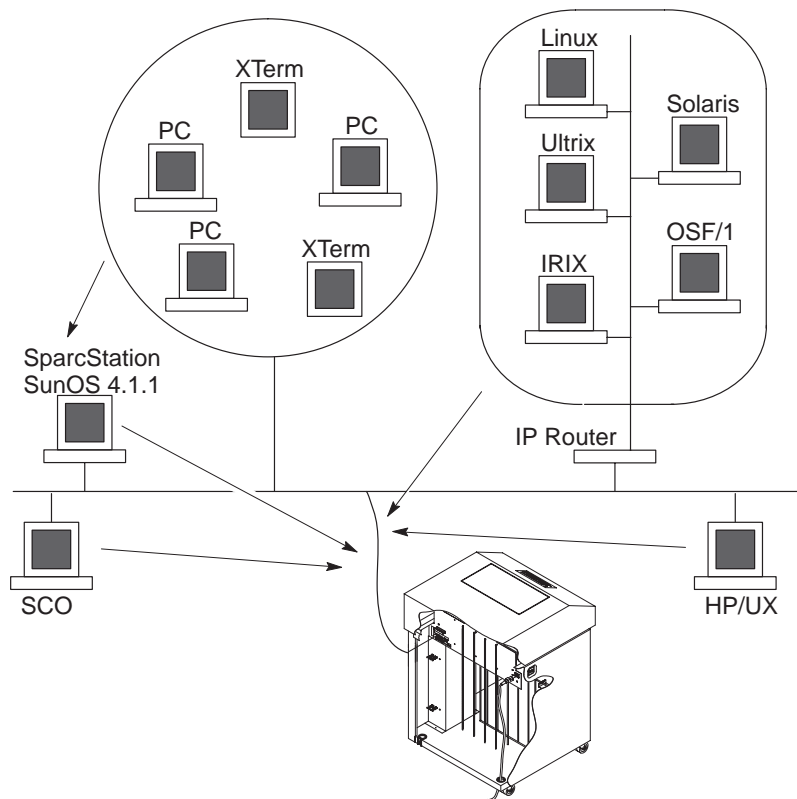
This chapter details a complete Unix setup including:

1. Configuring the Ethernet Interface with its mandatory TCP/IP settings (i.e. IP address and subnet mask).
2. Configuring the Unix host station with a new printer.

Environment Description

The Ethernet Interface supports network printing under various TCP/IP environments including all variations of Unix. Printing can come from multiple hosts directly or through central spooling machines. Figure 5-1 illustrates this.

Figure 5-1. Unix Integration



Ethernet Interface Configuration

There are mandatory settings needed before the print server can be detected on the network. There are also some additional settings that you may want to configure but these are optional. This section offers alternative methods for configuring your Ethernet Interface and mentions some of the more common optional settings available.

Mandatory

Since TCP/IP is used, the Ethernet Interface must be configured, at a minimum, with an IP address and subnet mask before it can be seen on the network.

Optional

Additional settings, like routing entries, can be configured allowing for communication across subnets.

Configuration of the Ethernet Interface can be done from the operator panel or through host commands.

Configuration Using the Operator Panel

You can set any of three listed parameters from the printer operator panel. These parameters are located on the Ethernet Parameters menu. The available parameters are:

- IP Address
- Gateway Address
- Subnet Mask

The procedure for changing any of the parameters is the same. The procedure for changing the IP Address is given here as an example. Use the same procedure for the other required parameters. To change the IP Address parameter, proceed as follows:

1. Turn the printer power on.
2. Press **STOP** to get to NOT READY state.
3. Press **Menu** to display OPERATOR MENU.
4. Press **Scroll** until PARALLEL INTERFACE is displayed, then press **Enter**.
5. Press **Scroll** until ETHERNET is displayed, the press **Enter**.

6. Press **Scroll** until IP ADDRESS, then press **Enter** and the current IP address value is displayed.
7. Press **Enter** again then **Scroll** to choose an IP address octet to change, then press **Enter**.
8. Press **Scroll** to choose the desired value for the octet, then press **Enter**. The new value is shown with an asterisk. Press **Return**.
9. Repeat steps 6 through 8 until all IP address octets are set to the desired value.
10. Press **Return** until ETHERNET is on the first display line.
11. Press **Scroll** to choose other IP parameters to change, then follow the above steps for these as well.
12. When finished, press **Return** multiple times until NOT READY is displayed.
13. Perform a power cycle for the printer. This will set the operator panel values into the Ethernet Interface.

Using ARP

To configure the Ethernet Interface with its TCP/IP settings using a manual “arp” command, the syntax is:

```
arp -s ipaddress ethernetaddress
```

To use either of these commands:

1. Log on to a Unix station as superuser or root. This station must be located on the same subnet as the Ethernet Interface since ARP is limited to subnets.
2. Find the ethernet address for the Ethernet Interface by printing a configuration or reading it from the operator panel. It must be entered as part of this procedure.
3. Use the “arp” command to add an entry into the Unix station ARP table for this Ethernet Interface. This is the most common syntax for this command:

Syntax:

```
arp -s ipaddress ethernetaddress
```

Example for TCP stacks:

```
arp -s 192.75.11.9 00:80:72:07:00:60
```

This example specifies a Ethernet Interface using IP address **192.75.11.9** and ethernet address **00:80:72:07:00:60**.

4. Verify that the ARP entry was properly applied.

```
arp -a
```

You should see an entry in the listed ARP table with the IP address and ethernet address specified in Step 3.

5. Try to “ping” this IP address to see if the Ethernet Interface can be seen on your network.

At this point, you should be able to communicate with the Ethernet Interface from your local Unix station. This means the printer knows about an IP address and subnet mask and has these settings in its current memory. However, if the Ethernet Interface is power cycled, these settings will be lost unless you store them into flash memory. To do this:

1. Load a Web browser on your Unix station and direct it to the URL “`http://EthernetInterfaceIPAddress/networkConf.html`” (e.g. “`http://192.75.11.9/networkConf.html`”).

NOTE: If prompted for a “User ID” and password first, type in “`root`” for the ID and press **Enter** at the password prompt since there is no default password.

2. At the “Network Configuration” HTML form that displays, click in the field below the “IP Address” heading and type in the IP address for the Ethernet Interface.
3. Under the “Subnet Mask” heading, enter the Ethernet Interface subnet mask.

NOTE: If you would like to communicate with the Ethernet Interface from across routers, you will need to fill in an entry within the “Routing” section. Please see “Communicating Across Routers” on page 5–8 for further details.

4. Click on the SUBMIT button when done.

Using RARP

RARP allows you to dynamically assign an IP address to the Ethernet Interface upon bootup. To configure the Ethernet Interface with its TCP/IP settings using RARP:

1. On your RARP server, make an entry in the `/etc/ethers` file for the Ethernet Interface.

Syntax:

```
ethernetaddress EthernetInterfaceIPAddress
```

Example:

```
00:80:72:07:00:60 192.75.11.9
```

2. Start the RARP daemon on the RARP server if not already running. If it is running, send an HUP signal to it with the “`kill`” command:

Syntax:

```
kill -HUP pid
```

where *pid* is the process ID of the RARP daemon.

3. Power on the Ethernet Interface so that it immediately sends out an RARP request. Wait one minute to allow the address assignment process to complete. You should see the STAT LED on the front of the Ethernet Interface slow down indicating it knows about an IP address to use.
4. Try to “`ping`” the Ethernet Interface IP address from a local Unix station to see if it can be seen on your network.

NOTE: You will only be able to communicate with the Ethernet Interface from a network station on the same subnet as the print server. The Ethernet Interface needs to be told about a default router/gateway so any packets that come in from a different subnet can be returned via this gateway. Please see “Communicating Across Routers” on page 5–8 to set this up.

Using BOOTP

BOOTP allows you to dynamically assign an IP address to the Ethernet Interface upon bootup. In addition, the BOOTP server can provide additional details like a default router/gateway address. To configure the Ethernet Interface with its TCP/IP settings using BOOTP:

1. On your BOOTP server, make an entry in the `/etc/bootptab` file for the Ethernet Interface.

Syntax:

```
EthernetInterfaceIPname:\
:sm=netmask:\
:hd=homedirectory:\
:bf=null:\
:gw=defaultgateway:\
:ht=ethernet:\
:ha=ethernetaddress:\
:ip=ipaddress:\
:ts=timeserver:\
:to=timezone:
```

Example:

```
spike:\
:sm=255.255.255.0:\
:hd=/usr/null:\
:bf=null:\
:gw=192.75.11.1:\
:ht=ethernet:\
:ha=008072070060:\
:ip=192.75.11.9:\
:ts=192.75.11.7:\
:to=25200:
```

2. Turn the Ethernet Interface on so that it immediately sends out a BOOTP request. Wait one minute to allow the IP address assignment process to complete. You should see the STAT LED, in the back of the printer, slow down indicating it knows about an IP address to use.
3. Try to “ping” the Ethernet Interface IP address from a network station to see if it can be seen on your network.

NOTE: You will be able to communicate with the Ethernet Interface from network stations on different subnets if the print server has been told about its default router/gateway in the BOOTP response from the BOOTP server.

Communicating Across Routers

Since Unix environments rely on TCP/IP to communicate with the Ethernet Interface, crossing routers becomes an issue.

After following one of the Ethernet Interface configuration methods mentioned (other than the BOOTP method), you will most likely only be able to communicate with the print server from the same subnet. This means any host across a router will not be able to see your Ethernet Interface. In order to communicate across a router, it is best to store a default router/gateway within the print server so that any packets destined for another subnet get forwarded to this router automatically. The router (or series of routers) can then take over ensuring the packets get to their final destination on another subnet on your network.

To configure a default router/gateway within the Ethernet Interface:

1. Load a Web browser on your Unix station and direct it to the URL
“`http://EthernetInterfaceIPAddress/networkConf.html`”
(e.g. “`http://192.75.11.9/networkConf.html`”).

NOTE: If prompted for a “User ID” and password first, type in “**root**” for the ID and press **Enter** at the password prompt since there is no default password.

2. At the “Network Configuration” HTML form that displays, click in the first field below the “Gateway” heading and type in the IP address of the default router/gateway for the Ethernet Interface subnet.
3. Click on the SUBMIT button when done.

Host Configuration

There may be times when you would prefer to or have to perform the manual setup steps for a new printer definition. There may also be times when you require a less common print solution such as direct socket capabilities. This section covers these additional setups.

Manual System V Host Setup

This setup involves any Unix operating system using System V print spooling (e.g. SCO, Solaris, HP/UX, DG/UX, etc.). This means an interface file is used for each defined printer and in the case of any System V print setup involving an Ethernet Interface, the RSHD protocol is used to transfer data from the host to the print server.

To manually configure a new System V printer on a Unix station:

Create a dummy device file that acts as a locking mechanism between contending print jobs.

Syntax:

```
touch /dev/EthernetInterfacename.portname
```

where *EthernetInterfacename* is the host or IP name of the print server and *portname* is one of its four I/O ports.

Example:

```
touch /dev/spike.prn
```

Manual LPR/LPD Host Setup

The Ethernet Interface also supports Unix operating systems which follow a BSD print system (e.g. SunOS 4.1.x). This means a printcap file is used to define all printers available on the host and interface scripts are not commonly used. Instead, LPR/LPD printers are defined.

To manually configure an LPR/LPD printer on a BSD Unix system:

1. Define an entry for this new printer within the printcap file, /etc/printcap.

Syntax:

```
printername:  
:sh:pw#80:mx#0:\  
:rm=EthernetInterfacename:\  
:rp=EthernetInterfacename:\  
:lp=:\  
:sd=/usr/spool/lpd/printername:\
```

```
:lf=/usr/spool/lpd/printername/log:\
:af=/usr/spool/lpd/printername/acct:
```

where *printername* is any name you would like to give to this new printer, *EthernetInterfacename* is the host or IP name of the print server, and *EthernetInterfacedestination* is one of the pre-defined destinations/queues on the device.

Example:

```
6400:
:sh:pw#80:mx#0:\
:rm=spike:\
:rp=dlprn:\
:lp=:\
:sd=/usr/spool/lpd/ 6400:\
:lf=/usr/spool/lpd/ 6400/log:\
:af=/usr/spool/lpd/ 6400/acct:
```

2. Create the spool directory specified by the “sd=” entry in the printcap entry for this printer.

Example:

```
touch /usr/spool/lpd/ 6400
```

3. Create the log and account files specified by the “lf=” and “af=” entries in the printcap entry for this printer.

Example:

```
touch /usr/spool/lpd/6400/log
```

```
touch /usr/spool/lpd/6400/acct
```

4. Change permissions and ownership on the spool directory and everything within it.

Example:

```
chmod -R g+rwX,o+rX /usr/spool/lpd/ 6400
```

```
chmod -R daemon.daemon /usr/spool/lpd/ 6400
```


5. Start the printer daemon for this new printer.

Example:

```
lpc start 6400
```

You now have a new printer which relies on LPR/LPD to print to a Ethernet Interface printer. Use the following command to test printing:

Syntax:

```
lpr -Pprintername filename
```

Example:

```
lpr -6400 /etc/hosts
```

Printing from AIX

Version 4.0 and higher of AIX® offers LPR/LPD support for network printing. This means, to set up a new printer under this operating system, you only need to use these two parameters:

1. **Ethernet Interface IP address** – the IP address or host name of the print server you want to print to.
2. **Ethernet Interface destination/queue** – a pre-defined name on the print server telling the device which I/O port to send the jobs to. You will most likely use “d1prn” for the PRN.

Setting Up AIX 4.x

1. Ensure the 6400 AIX driver/colon files are installed on the AIX machine.

Syntax:

```
lsdev -P -c printer -F "type subclass description" | sort -u |  
grep 6400
```

If “ibm6400” does not appear in the list, the proper driver files are not installed. Obtain the driver files and follow the instructions included with them to install the files on your machine.

2. At the command prompt, enter `smitty mkvirprt`.

3. At the “Add a Printer Queue” screen, select “remote.”
4. At “Type of Remote Printing,” select “Local Filtering....”
5. At “Remote Printing Type,” select “IBM.”
6. At the next “Remote Printing Type,” select “ibm6400.”
7. At “Add a Remote Print Queue with Local Filtering,” perform the following:
 - a. Type in any print queue names desired in the entry fields next to the desired emulation(s).

NOTE: At least one print queue name field must be filled in.

- b. In the “HOSTNAME” field, type in the hostname or IP address of the printer NIC.
 - c. In the “QUEUE” field, type in one of the 4 possible print queue names found on the printer NIC. **d1prn**, **d2prn**, **d3prn**, and **d4prn**, are the four default LPD print queues on the NIC. If the defaults have not been changed, choose any one of these queues.
 - d. In the “TYPE” field, leave the value as “AIX Version 3 or 4.”
 - e. Leave “PASS-THROUGH FLAG” field as “yes.”
 - f. Press “**Enter**” to complete the setup.
 - g. After processing has finished, press F10 to exit SMIT.
8. At the command prompt, enter `enq -A` to view the print queues just entered.
9. Enter `qprt -Pqueuename filename` to send a job to the printer.

Printing with FTP

Print jobs can also be sent to the Ethernet Interface using the File Transfer Protocol (FTP). To do this:

1. On your network station, change to the directory containing the file you want to print.

2. Open an FTP session with the Ethernet Interface.

Syntax:

```
ftp EthernetInterfaceIPAddress
```

3. Log in as "root."
4. At the password prompt, press ENTER since there is no default password.
5. Change to the **dest** directory.

Syntax:

```
cd dest
```

6. List the contents of this directory using the "**dir**" command and determine which destination/queue you would like to send the print job through. Most likely you will select "**d1prn**" for the PRN port.
7. Change to this destination directory.

Example:

```
cd d1prn
```

8. Change the mode to correspond with the type of file you are going to print. By default, ASCII is set for text-only files but if you need to print both text and graphics, select binary using the "**bin**" command.
9. Place the file to be printed within this directory on the Ethernet Interface so it can be spooled and printed.

Syntax:

```
put filename
```

10. Close the FTP session, unless you have more jobs to print.

Syntax:

```
quit
```

Direct Socket Printing

Within TCP/IP environments, there are some setups which require the host to print directly to a TCP port number on the Ethernet Interface, bypassing all of the higher level destination/queue names. If you run into a setup which requires this, you will need to define two parameters for a new print setup:

1. **Ethernet Interface IP address** – the IP address or host name of the print server you want to print to.
2. **Ethernet Interface TCP port number** – a pre-defined number for the I/O port on the print server. 9100 is the default port number.

Though the host will be sending directly to a TCP port number on the Ethernet Interface, the port numbers are still mapped to destinations/queues in case there is some type of special processing or logging to be done to the job. However, the destination name is of no concern in this type of printer definition. Only the two parameters mentioned above need to be defined for printing to work.

Troubleshooting Tips

NOTE: During Power Up, the printer performs an interface hardware test. The presence of the Ethernet Interface menu selections at the printer operator panel indicates that the Ethernet Interface hardware is functioning properly. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.

The following section provides information on possible solutions to some standard configuration errors. If you require technical support, please have as much of the following information available when you call. It will expedite the solution to the problem.

1. What level of software are you running?
2. What type of attachment do you have?
3. What is your host operating system?
4. Give a detailed description of the problem.
5. How often, and when, does the problem occur?
6. Give a detailed description of your network and the components attached.

Please follow these tips to determine what the problem may be with your Ethernet Interface configuration.

Ethernet Interface Will Not Talk on the Network

- Have you configured the Ethernet Interface with a unique and valid IP address which corresponds with the other IP addresses on your network? For example, are you sure no other device is using this IP address?
- Are you sure you are trying to talk to the Ethernet Interface from a Unix station on the same subnet? Currently, the print server can only be seen locally unless you configured it with a routing entry.
- If you look at the back of the printer, is the STAT LED flashing once a second or is it quicker than that? A slower, once-a-second rate tells you that the print server is in fact configured with an IP address. A faster rate says it knows nothing about this so you may need to try the configuration process again.



DANGER:

- | | |
|-----|--|
| <4> | Do not connect or disconnect any communication port, teleport, attachment connector, or power cord during an electrical storm. |
| <5> | Power off the print and disconnect the power cord before connecting or disconnecting communication port, teleport, or attachment cable connector. |

- Have you confirmed that the network connection to the Ethernet Interface is working correctly? Trying different network cables and locations will help narrow down the problem.

Nothing Prints

- Can you “ping” the Ethernet Interface from your Unix station? If not, please refer to “Ethernet Interface Will Not Talk on the Network,” above.

- Is the Ethernet Interface able to communicate with the attached printer?
To test this, you can:
 1. “telnet” to the print server (e.g. “telnet 192.75.11.9”) and log in as “root.”
 2. Enter the command “start fox prn.”
 3. Execute “stop prn” right after starting the test.

This test will send the same text line over and over to the attached printer.
- Is the job getting stuck in the Unix host queue? If so, check that the printer is online. If this is correct, there is a configuration error on the Unix station so creating a new print setup may be needed.
- Is the operator panel showing any activity to indicate it is receiving data? If so, but there is nothing printing, check to see if a manual formfeed is needed. Also, ensure that the printer can support the type of job coming through.
- Do all jobs fail or just certain ones? For example, is it possible that jobs from a certain application are the only ones to fail. If so, check the type of data it sends to make sure it matches the printer emulation. Check the application printer configuration for mistakes.

Stair-Stepped Output

Stair-stepped output is when the output starts at the top left of the page but every line thereafter, starts a little further over to the right. It also refers to Unix jobs that print one line of text at the top of a page followed by a series of blank pages.

This unique output will happen only with Unix text jobs if carriage return insertion is not incorporated into the print setup. The printer may be told to do a linefeed but the Unix job does not specify anything about a carriage return to follow this.

To fix this, carriage return insertion must be enabled somewhere in the print setup. The easiest and most common location is on the Ethernet Interface itself within the appropriate model. The feature is called “onlcr” and the command syntax is:

```
set model modelname stty onlcr
```

```
save
```

For example, if printing to the destination, **d1prn**, the associated model is **m1**. Therefore, the command is:

```
set model m1 stty onlcr
```

```
save
```

No Formfeed or Extra Page Comes Out

Unix text jobs may also have problems outputting the last page of a job especially when the BSD Remote (LPD) print method is used. This means the form feed button has to be pressed on the printer to get this last page out.

To make this process automatic, tell the Ethernet Interface to handle this task by setting this feature on in the appropriate model. The command syntax is:

```
set model modelname trailer $FF
```

```
save
```

For example, if printing to the destination, **d2prn**, the associated model is **m2**. Therefore, the command is:

```
set model m2 trailer $FF
```

```
save
```

For default destination model mappings of the Ethernet Interface, please see "Ethernet Interface Naming Scheme" on page 8-7.

TCP/IP Access Problem

If you can "ping" the printer from a workstation, but you cannot Web browse, Telnet, or print to the printer through the Ethernet Interface, there may be an incorrect entry in the TCP access list. In order for this workstation to use the Ethernet interface in this case, one of two things must happen.

1. The TCP list must have an entry added to grant access to this workstation.
2. All entries must be deleted from the TCP list to grant all workstations/hosts access to the above TCP services.

To view the current access list:

Use the printer operator panel to access the menu. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information. From the Operator Print Test menu choose the Ethernet Test Page. When the page prints, look under the “TCP ACCESS TABLE” section for the TCP access list entries.

To add/delete a TCP access list entry, refer to TCP Access Lists information on page 8–3.

NOTE: When the following procedure is used, the TCP access list will be cleared but all IP addresses will need to be entered again after the procedure is complete.

To reset all TCP/IP values to the factory defaults when access is impossible:

1. Obtain a printer configuration printout using the operator panel. See the *IBM 6400 Line Matrix Printer Setup Guide (S544–5640)* for configuration menu information.
2. Power off the printer.
3. On the Ethernet Interface, place SWITCH 2, the center switch, in the down position.
4. Power on the printer and wait for the READY state.
5. On the Ethernet Interface, place SWITCH 2, the center switch, in the up position.
6. From a workstation attached to this network segment, create an ARP entry. The ethernet IP address and hardware or MAC address are needed. At the workstation enter:

```
arp -s <ipaddress> <MACaddress>
ping <ipaddress>
```
7. Try to “ping” this IP address to see if the Ethernet Interface can be seen on your network. If the interface does not respond, verify you are on the same network segment as the printer and that the ARP entry was created.
8. Telnet into the printer Ethernet Interface using the same IP address as above. Log in as root with no password.

9. At the system prompt, enter:
`store tcpip from default`
`config http on`
`reset`

NOTE: This will reset all TCP/IP settings to factory default and reset the Ethernet Interface.

10. Power the printer off and then back on.
11. Set the IP address, subnet mask, and default gateway parameters to the desired values.
12. If Web browser access does not work, Telnet into the Ethernet Interface as root. Enter the following command:
`config http on`

If you are still experiencing difficulty accessing or browsing the printer, contact technical support for further assistance.

6 NOVELL CONFIGURATION

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Overview

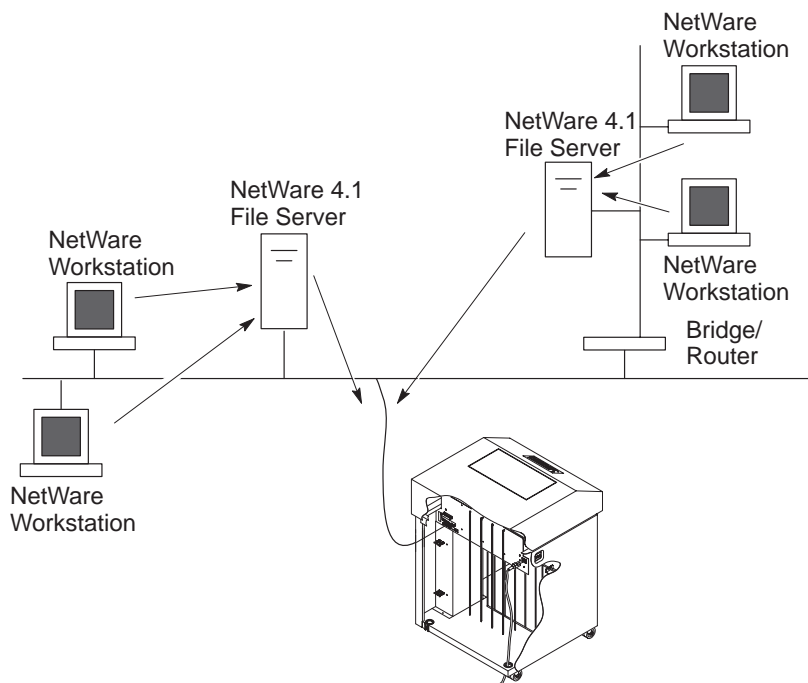
This chapter details a complete Novell setup including:

1. Identifying the Ethernet Interface on the network.
2. Configuring the Ethernet Interface with its mandatory print setup settings.
3. Configuring a new print queue on the file server.

Environment Description

The Ethernet Interface supports network printing under Novell environments by using IPX. It supports all 3.1X versions of NetWare. Figure 6–1 provides a Novell setup overview. Version 4.1X is supported under bindery emulation only.

Figure 6–1. Novell Integration



Ethernet Interface Configuration

Under all Novell environments, the Ethernet Interface does not require any network settings to make it visible on the network. Simply plug it in to your network and power it on. However, with a new print queue setup on a Novell file server, there can be some mandatory settings needed on the Ethernet Interface.

When defining a new print queue on a Novell file server, a new print server must be defined to represent the Ethernet Interface. This name must match the pre-defined name given to the print server. By default, this name is in the format "M_XXXXXX" where "XXXXXX" equals the last six digits of the Ethernet Interface ethernet address found on a configuration printout or operator panel settings under ethernet parameters, MAC Address (e.g. M_071C1A).

If using the HTML forms to do this:

1. Load a Web browser on a network station that can communicate with the print server over TCP/IP.
2. Direct your Web browser to URL
`"http://EthernetInterfaceIPAddress/adminConf.html"`
(e.g. `"http://192.75.11.9/adminConf.html"`).

NOTE: If prompted for a "User ID" and password first, type in "root" for the ID and press ENTER at the password prompt since there is no password by default.

3. At the "Administration Configuration" HTML form that displays, highlight the field beside the "Name" heading and type in the new name of the print server.
4. Click on the SUBMIT button when done.

Host Configuration

Under all versions of NetWare, both PSERVER and RPRINTER setups are supported by the Ethernet Interface. Since a PSERVER setup is the most common, you will find the necessary steps to configure the Ethernet Interface as a PSERVER shown first. Configuration for RPRINTER and NPRINT setup follow the PSERVER information.

NOTE: The Ethernet Interface can service up to four printers on one file server. It can not service multiple file servers at one time.

NetWare Version 3.x PSERVER Setup

To configure a print queue on a NetWare 3.1x network:

1. Log on to the Novell file server as supervisor.
2. Enter PCONSOLE.
3. Select "Print Queue Information" from the PCONSOLE Main Menu.
4. Press INSERT to add a new queue to the list of currently defined queues showing.
5. Type in the name of this new queue when prompted and press ENTER. This can be any name you would like.
6. Press ESCAPE to return to the Main Menu.
7. Select "Print Server Information" and press ENTER.
8. Press INSERT when the list of existing print servers displays.
9. Type the name of the Ethernet Interface when prompted for a print server name and press ENTER when done. By default, the Ethernet Interface is named "M_XXXXXX" where "XXXXXX" equals the last six digits of the print server ethernet address found on configuration printouts or reading MAC address on operator panel. (e.g. M_071C1A).
10. Back at the print server list, select this newly defined Ethernet Interface and press ENTER.
11. Select "Print Server Configuration" from the menu that displays.
12. Select "Printer Configuration" from the next menu to display a list of configured printers.

13. Select the first item listed as “NOT INSTALLED” and press ENTER.
14. At the printer configuration window, type in the name for this new printer. This name must be one of the pre-defined destinations/queues on the Ethernet Interface. This will normally be “**d1prn.**”
15. Go to the “Type” field and press ENTER to see the possible choices.
16. Select “Defined Elsewhere” from this list.
17. When done, press ESCAPE and select “Yes” to save the changes to this new printer.
18. Press ESCAPE again to return to the “Print Server Configuration” menu.
19. Select “Queues Serviced by Printer.”
20. Select this new printer from the printer list that displays and press ENTER.
21. At the empty queue list that displays, press INSERT.
22. Select the queue created in step 5 and press ENTER.
23. When prompted for the priority, press ENTER to select the default or select a priority.
24. Press ESCAPE until back at the PCONSOLE Main Menu.
25. Repower the printer.
26. Wait two minutes and then select “Print Queue Information” from the PCONSOLE Main Menu.
27. Select this new queue from the menu that displays, and select “Currently Attached Servers” to see which print server is servicing this queue.

At this point, the Ethernet Interface name (e.g. M_071C1A) should show within this window. This means the Ethernet Interface knows about this new Novell print queue it must service as a PSERVER. Therefore, it will poll this queue regularly looking for jobs to print.

NOTE: The Ethernet Interface can service up to four printers on one file server. It can not service multiple file servers at one time.

NetWare Version 3.x RPRINTER Setup

NOTE: These steps are for Novell environments with Netware 3.x (or earlier) file servers.

To configure a new RPRINTER on a NetWare 3.x network:

1. Log in to the Ethernet Interface command shell, npsh, as root.

If you have TCP/IP available and this print server already has an IP address stored within it, you can use the built-in HTML configuration forms or a Telnet session. Please see the Configuration Tools in chapter 1 for further details. If you have only Novell available, you will need to use a PC, laptop, or terminal.

NOTE: If you use HTML configuration, you will need to go to the "Network Configuration" HTML form

(i.e. "`http://EthernetInterfaceIPAddress/networkConf.html`"; e.g. "`http://192.75.11.9/networkConf.html`") and look under the "Novell" section. The

settings in the following step are found there. If using a Telnet session, you will need to manually execute the commands listed in the next step.

2. Store the RPRINTER settings on the Ethernet Interface. This will refer to an existing PSERVER.NLM on the file server or to one that you will create later in these steps.

Syntax:

```
store rprinter add PSERVERname printernumber  
EthernetInterfacedestination
```

Example for an RPRINTER servicing printer **0** of the PSERVER.NLM called **pserver1** and sending jobs to the Ethernet Interface destination **d1prn**:

```
store rprinter add pserver1 0 d1prn
```

3. Leave this Ethernet Interface login session and log on to the NetWare 3.x file server as Supervisor.
4. Enter PCONSOLE.

5. Select "Print Queue Information" from the PCONSOLE Main Menu.
6. Press INSERT to add a new queue to the list of currently defined queues.
7. Type in the name of this new queue when prompted and press ENTER. This can be any name you would like.
8. Press ESCAPE to return to the Main Menu.
9. Select "Print Server Information" and press ENTER.
10. Press INSERT when the list of existing print servers displays.
11. Select the print server that you want the Ethernet Interface to service as an RPRINTER. This is the PSERVER name in step 2.
12. Select "Print Server Configuration" from the menu that displays.
13. Select "Printer Configuration" from the next menu to display a list of configured printers.
14. Select an item from the list (i.e. either an existing printer name or a "Not Installed" one) to display the printer configuration window.
15. Assign a name (if not an existing printer) to this printer. Use one of the defined destination queues on the Ethernet Interface (e.g., "d1prn.")
16. At the "Type" field, select "Remote Other/Unknown."
17. Press ESCAPE to save the changes.
18. Press ESCAPE until back at the "Print Server Configuration" menu.
19. Select "Queues Serviced by Printer" to display a list of defined printers.
20. Select the printer you just defined and press ENTER.
21. At the list of queues that displays, press INSERT to add a queue to the list.
22. Select the queue defined and press ENTER.
23. When prompted for a priority, press ENTER to select the default or select a priority.
24. Press ESCAPE until you have exited PCONSOLE.
25. Load the PSERVER.NLM that is to serve the Ethernet Interface as an RPRINTER.

26. Repower the Ethernet Interface by turning the printer off and then back on.
27. Wait two minutes and then check your PSERVER to see if the appropriate printer is being serviced. The PSERVER should indicate that the printer is "Waiting for job."

At this point, the Ethernet Interface knows to receive any jobs this PSERVER.NLM has to send to it through the defined printer.

NetWare Version 4.x PSERVER Setup

NOTE: Ethernet Interface destinations are case sensitive and will not be recognized if they are typed incorrectly. By default, they are all lower case. If you are setting up a NetWare 4 environment, the destination must be renamed to uppercase to match the PCONSOLE entry.

The Ethernet Interface can be used in a NetWare 4 environment with either of the following options:

- Set the Ethernet Interface up as a PSERVER, replacing a dedicated printer.
- Set the Ethernet Interface up as an RPRINTER, interacting with an existing PSERVER.

NOTE: Following a PSERVER setup, bindery emulation is required.

To configure the Ethernet Interface as a PSERVER in a NetWare 4 environment:

1. Log in to the Novell as supervisor.
2. Enter PCONSOLE.
3. Press F4 to enter Binder Emulation.
4. Select PRINT QUEUES.
5. Press INSERT to add a queue.
6. Type in new queue name and press ENTER.
7. Press ESCAPE.
8. Select PRINT SERVERS.
9. Press INSERT to add the new print server.

10. Type the name of the Ethernet Interface. By default, it is M_XXXXXX where XXXXXX equals the last six digits of the ethernet address. (e.g. M_000BF5)
11. Select this new print server and press ENTER.
12. Select PRINTERS.
13. Press INSERT to add a printer to the list.
14. Type in the name of one of the default destinations on the unit for the NAME field and go to the type field.
15. Press ENTER at this field and select DEFINED ELSEWHERE. If DEFINED ELSEWHERE is not available, choose PARALLEL.
16. Press ENTER on the Print Queues Assigned field.
17. Press INSERT to display all queues; select the one you defined in step 5 and press ENTER.
18. Select a priority and press ENTER. Priority 1 should be sufficient.
19. Press ESCAPE until you are back to Main Menu.
20. Reboot the Print Server by repowering the printer.
21. Check the CURRENTLY ATTACHED SERVERS and verify the print server is active.
22. Press ESCAPE until you are out of the PCONSOLE.

Even though the entire print set up is done through PCONSOLE, you may want to communicate directly with the print server in order to modify settings, monitor the unit, etc. To communicate with the print server, the optional host software, **npsh.exe**, is included. **npsh.exe** is a DOS executable program that can be run from a DOS prompt on a NetWare workstation.

npsh.exe performs the following:

- | | |
|----------------------|---|
| npsh nvplist | Lists all of the Ethernet Interface devices on the network; each name is in the default format M_XXXXXX (where XXXXXX equals the last six digits of the unit ethernet address). This is regardless of whether it is configured as a PSERVER or an RPRINTER. |
| npsh unitname | Starts a Telnet-like session with the named print server, allowing you to configure, monitor, and troubleshoot the unit with the built-in command set. |

npsh unitname command Initiates a single Command with guest access only to the unit instead of entering into a complete session.

To communicate with the unit using **npsh.exe**:

1. From a DOS prompt on a Novell workstation, begin a npsh session with the unit.

npsh unitname

Starts a Telnet-like session with the named print server with guest access only.

2. To obtain root access to the unit, type:

supervisor

A standard login screen is displayed prompting you for the login name and password.

3. Login to the unit as root user.

root

NOTE: Root users require the use of a password as configured in the unit user list.

4. Enter the password. If this password is not yet set, press enter at the password prompt. Otherwise, enter the password that is already stored in the unit.

password

You are now logged in to the unit as a root user and can access any npsh command on the unit.

NOTE: Because **npsh.exe** makes use of broadcasts, you may have problems communicating across a router.

Troubleshooting Tips

NOTE: During Power Up, the printer performs an interface hardware test. The presence of the Ethernet Interface menu selections at the printer operator panel indicates that the Ethernet Interface hardware is functioning properly. See the *IBM 6400 Line Matrix Printer Setup Guide* (S544–5640) for configuration menu information.

The following section provides information on possible solutions to some standard configuration errors. If you require technical support, please have as much of the following information available when you call. It will expedite the solution to the problem.

1. What level of software are you running?
2. What type of attachment do you have?
3. What is your host operating system?
4. Give a detailed description of the problem.
5. How often, and when, does the problem occur?
6. Give a detailed description of your network and the components attached.

Please follow these tips to determine what the problem may be with your Ethernet Interface configuration.

NetWare 3.x – No PSERVER Connection

- Has the Ethernet Interface been power cycled once the PCONSOLE steps were completed? This will make the print server boot up and realize which print queue and file server it needs to service.
- Is the Ethernet Interface already servicing a queue on another file server? If so, it can not service another file server at the same time.
- When defining a new “**print server**” within PCONSOLE, did you use the correct name for the Ethernet Interface (e.g. M_071C1A)? By default, it only recognizes itself as “M_XXXXX” where “XXXXX” equals the last six digits of its ethernet address found on the configuration printout.

- When defining a new “**printer name**” within PCONSOLE, did you use a pre-defined destination/queue rather than a name of your own? By default, the Ethernet Interface only recognizes names like “**d1prn**.” All other names will be ignored by the device.
- Is the Ethernet Interface in **Bindery** mode as seen under the “**list pserver**” output on the device? If servicing only a NetWare 3.x file server, it must be set to handle Bindery services. The default setting is Bindery.
- Is there an available NetWare user license for the Ethernet Interface to use while it acts as a PSERVER? Every PSERVER takes up one user license since it logs in to the Novell file server.
- Have you given the connection process some time after repowering the Ethernet Interface? In larger Novell environments, the file server identification and connection process can take several minutes.

NetWare 4.x – No PSERVER Connection

- Has the Ethernet Interface been power cycled once the PCONSOLE steps were completed? This will make the print server boot up and realize which print queue and file server it needs to service.
- Is the Ethernet Interface already servicing a queue on another file server? If so, it can not service another file server at the same time.
- When defining a new “**print server**” within PCONSOLE, did you use the correct name for the Ethernet Interface (e.g. M_071C1A)? By default, it only recognizes itself as “M_xxxxx” where “xxxxx” equals the last six digits of its ethernet address found on the configuration printout.
- When defining a new “**printer name**” within PCONSOLE, did you use a pre-defined destination/queue rather than a name of your own? By default, the Ethernet Interface only recognizes names like “**d1prn**.” All other names will be ignored by the device.
- Is the Ethernet Interface in **Bindery** mode as seen under the “**list pserver**” output on the device? If servicing only a NetWare 4.x file server, it must be set to handle Bindery services. The default setting is Bindery.

- Is there an available NetWare user license for the Ethernet Interface to use while it acts as a PSERVER? Every PSERVER takes up one user license since it logs in to the Novell file server.
- Have you given the connection process some time after repowering the Ethernet Interface? In larger Novell environments, the file server identification and connection process can take several minutes.

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Command Shell Overview

The Ethernet Interface comes with an in-depth command shell called “**npsh**.” It allows you to manipulate objects like destinations, I/O ports, and models and provides monitoring and troubleshooting capabilities as well.

npsh Access Methods

There are many ways this command shell can be accessed. This includes:

- built in HTML forms
- a Telnet session from a TCP/IP host to the Ethernet Interface
- a single remote shell command (i.e. rsh, rcmd, remsh) from a TCP/IP host

Main npsh Command Prefixes

All configurable commands either start with “**store**” or “**set**,” troubleshooting commands usually start with “**debug**,” and view commands start with “**list**.”

NOTE: If the “**store**” prefix is used, the Ethernet Interface must be repowered to make the changes take effect. Since “**store**” affects flash memory settings only, the print server must reset and read the new settings now in flash memory.

NOTE: If the “**set**” prefix is used, a “**save**” command must be executed as well so that the new settings are retained after power cycles. Since “**set**” only affects the settings in memory, they will be lost after a power cycle unless they are saved to flash memory.

Getting Command Help

The Ethernet Interface command shell provides several online help tools. These include:

“?” Command	Typing “?” when logged in to the command shell will produce a full listing of all commands available.
Command Prefixes	Typing in the first portion of a command will produce an error message showing the correct syntax. For example, typing in “ store tcpip ” will produce a list of all commands that start with this prefix.

Complete Command List

This section outlines the entire Ethernet Interface command set including the command syntax, a description, and in most cases, an example for each command listed.

NOTE: If you see the word “*ifnum*” in any npsd commands, you should substitute a “1” unless told otherwise. This “1” represents the one network interface (i.e. Ethernet) supported.

store Commands

These commands change the settings stored in flash memory and do not affect the current or working settings in memory. A power cycle is needed before the stored settings become current.

```
store ifc ifnum utp [-]li [-]rx
```

```
store ifc 1 utp li
```

Modify the physical UTP interface properties where **li** enables link integrity and **rx** enables the increased receive threshold.

```
store ifc from default
```

Set all UTP settings back to factory defaults.

```
store ifc from current
```

Store all current UTP settings to flash memory so they are retained after a power cycle. This ensures all current settings match what is stored in flash memory.

```
store pserver opts [[-]jobsecurity] [jobtimeout seconds]
```

```
store pserver opts jobsecurity jobtimeout 5
```

If **jobsecurity** is disabled, any user can cancel queued jobs on the Ethernet Interface including guest users. If **jobtimeout** is set to some value other than 0, the Ethernet Interface will only wait this amount of **seconds** when getting printer feedback. This is only used if you have a logpath port and type set on a particular destination.

```
store pserver tcpsocket TCPportnumber port newTCPportnumber
```

```
store pserver tcpsocket 4000 port 5000
```

Change a pre-defined **TCP port number** on the Ethernet Interface to a **new TCP port number**. The default numbers are 9100 for prn.

```
store pserver tcpsocket TCPportnumber dest destination
```

```
store pserver tcpsocket 5000 dest dlprn
```

Assign a pre-defined **TCP port number** to a particular **destination** on the Ethernet Interface. Therefore, if you are using a print method that sends jobs directly to a TCP port number, you still have the option to process the job data through this destination setting.

```
store pserver novell passwd password
```

```
store pserver novell passwd mplex
```

Store the **password** for the Ethernet Interface to use when logging in to a Novell file server. This **password** would have to match one set on the file server.

```
store pserver novell user name username
```

```
store pserver novell user name micro1
```

Define a **username** on the Ethernet Interface to be used when it logs into a Novell file server to find information. This **username** must match a user pre-defined on the Novell file server.

```
store pserver novell user passwd password
```

```
store pserver novell user passwd mplex2
```

Define a **password** on the Ethernet Interface for the Novell user already defined. This **password** must match the one stored on the Novell file server. Passwords are optional as long as there is not one defined on the file server for the user.

```
store pserver novell fserver add|del fileservername
```

```
store pserver novell fserver add fs1
```

Add or remove a server entry on the Ethernet Interface for the Novell file server it will be servicing.

```
store pserver smb workgrp newworkgroupname
```

```
store pserver smb workgrp eng
```

Define a different Windows workgroup as defined by *newworkgroupname* for the Ethernet Interface to be visible within. By default, the print server only comes up within the group called "WORKGROUP."

```
store pserver from default
```

Set all general print server settings back to factory defaults.

```
store pserver from current
```

Store all current general print server settings to flash memory so they are retained after a power cycle. This ensures all current settings match what is stored in flash memory.

```
store rprinter add|del printservername printernumber destination
```

```
store rprinter add pserver1 0 d1prn
```

Add or delete the RPRINTER settings on the Ethernet Interface for a Novell environment. The *printservername* must be the name of an existing PSERVER.NLM on your Novell file server. The *printernumber* is the printer number within this PSERVER.NLM. The *destination* is the queue on the Ethernet Interface where the print jobs will be sent to.

```
store tcpip ifnum addr IPaddress
```

```
store tcpip 1 addr 192.75.11.9
```

Store the IP address for the Ethernet Interface.

```
store tcpip ifnum mask netmask
```

```
store tcpip 1 mask 255.255.255.0
```

Store the subnet mask for the Ethernet Interface.

```
store tcpip ifnum opts [[-]rarp] [[-]bootp]
```

```
store tcpip 1 opts -rarp -bootp
```

Enable or disable the automatic RARP and BOOTP requests for IP addresses upon bootup. If you are storing the Ethernet Interface TCP/IP network settings within the device, you will not need to rely on RARP or BOOTP for new settings.

```
store tcpip ifnum frametype [[-]ethernet2] [[-]802.2snap]
```

```
store tcpip 1 frametype ethernet2 802.2snap
```

Control which frame type(s) is supported with the TCP/IP protocol. By default, both **Ethernet II** and **802.2snap** are enabled but normal TCP/IP communications rely on Ethernet II. This setting has no affect on other supported network protocols (e.g. Novell).

```
store tcpip route add|del host|net IPaddress ifnum
```

```
store tcpip route add net 192.75.12.0 1
```

```
store tcpip route del net 192.75.12.9 1
```

Add or delete a static route to a particular TCP/IP host or subnet specified by **IPaddress** so the Ethernet Interface knows how to communicate with it. Normally one entry for a default router/gateway is all that is needed for communications between different subnets. Please see the next command for details.

```
store tcpip route add|del default routerIPaddress ifnum
```

```
store tcpip route add default 192.75.11.1 1
```

Store a default router/gateway defined by **routerIPaddress** so the Ethernet Interface knows where to direct packets destined for another subnet. It is easier to store one default entry rather than an entry per remote host or network as in the previous command.

```
store tcpip tcp rxwin packets
```

```
store tcpip tcp rxwin 2
```

Determine the receive window size for the Ethernet Interface. Usually the ***packets*** value ranges from 2 to 8 with the lower number allowing for more simultaneous TCP connections with the print server.

```
store tcpip tcp opts [-]keepalive          [-]disbufmgmt
```

```
store tcpip tcp opts keepalive -disbufmgmt
```

Control whether the Ethernet Interface maintains a connection with a host when data can not be accepted into its buffer. Normally the **keepalive** feature is enabled so when the printer can not accept data, the print job connection is maintained and continued once the situation clears. If **disbufmgmt** is disabled (i.e. "-"), the Ethernet Interface will not buffer any data when there is a blocked situation with the printer. Normally it is best to have both **keepalive** and **disbufmgmt** enabled.

```
store tcpip tcp access [root] add|del      IPaddress
```

```
store tcpip tcp access add 192.75.11.25
```

Add or remove an entry from the Ethernet Interface TCP access list defined by ***IPaddress***. If the list has an entry, only this host can print to and remotely interact with the print server.

```
store tcpip proxy add|del targetIPaddress
```

```
store tcpip from default
```

Set all TCP/IP network settings back to factory defaults.

```
store tcpip from current
```

Store all current TCP/IP network settings to flash memory so they are retained after a power cycle. This ensures all current settings match what is stored in flash memory.

set Commands

These settings alter the current or working settings in memory only. Therefore, they will be lost if the Ethernet Interface is power cycled. To ensure this does not happen, be sure to issue a “**save**” command so the current settings get written to flash memory.

```
set date year month day
```

```
set date 1997 02 10
```

Set the current date noting the four-digit **year**, the two-digit **month** from 1 through 12, and the **day** being the number in the month. If the Ethernet Interface is reset, this value will be lost so you will need to set the date again.

```
set dest destination name newname
```

```
set dest dlprn name laser
```

Change the current name of the **destination** to a new name as indicated by **newname**. This **newname** must be nine characters or less or it will be truncated. These names are case sensitive.

```
set dest destination backchannel prn [prn]
```

```
set dest dlprn backchannel prn
```

Establish a return path for printer feedback for a given **destination**. Since the Ethernet Interface I/O port is bi-directional, however, you will most likely use the same I/O port that the **destination** is currently sending jobs to.

```
set dest destination model modelname
```

```
set dest dlprn model m4
```

Associate a model with a destination. Jobs sent to the named **destination** are processed according to the options defined in the named model.


```
set dest destination logpath logpathname
```

```
set dest dlprn logpath l4
```

Associate a logpath with a destination. Jobs sent to the named ***destination*** are logged according to the settings defined in the named logpath.

```
set dest destination service [[-]socket][[-]lpd] [[-]lpsched]  
[[-]rprinter] [[-]pserver] [[-]netbios] [[-]ftpd]
```

```
set dest dlprn service -netbios
```

Set the ***destination*** to handle only certain print services. To add a service, specify the service name. To disable a service, use “-” before the name. The available services are:

socket	Direct socket printing via TCP/IP.
lpd	LPR printing with TCP/IP including LPR clients on any platform.
lpsched	LP or System V printing with TCP/IP.
rprinter	Novell RPRINTER support.
pserver	Novell PSERVER support.
netbios	Windows 95 and Windows for Workgroups printing.
ftpd	Printing using the File Transfer Protocol (FTP) via TCP/IP.

```
set dest from default
```

Set all destination settings back to factory defaults.

```
set dest from stored
```

Set all current destination settings to the values stored in flash memory.

```
set logpath logpath name newname
```

```
set logpath 11 name pagecount
```

Change the current name of the **logpath** to a new name as indicated by **newname**. This **newname** must be nine characters or less or it will be truncated. These names are case sensitive.

```
set logpath logpath type [[-]job] [[-]user] [[-]pgcnt] [[-]cksum]
[[-]printer] [[-]ioport]
```

```
set logpath 12 type job user printer pgcnt
```

Establish the type of printer and print job logging to be done within this **logpath**. The options are:

- job** Job ID, username, etc.
- user** User ID along with three messages per job about start and finish.
- cksum** 16-bit checksum value to confirm integrity of data printed.
- ioport** Printer error messages determined through the parallel port pins.

```
set logpath logpath port TCPportnumber| email|syslog
```

```
set logpath 13 port 2000
```

Determine where the log information should be sent for a print job or attached printer. The choices are:

- TCPportnumber** TCP port number ranging from 1024 to 65000.
- email** Particular user's email address. This address is set using the "**set sysinfo email *emailname@IPaddress***" command.
- syslog** A central TCP/IP host running the SYSLOG daemon. This host is set using the "**set sysinfo syslog *IPaddress***" command.

```
set logpath from default
```

Set all logpath settings back to factory defaults.

```
set logpath from stored
```

Set all current logpath settings to the values stored in flash memory.

```
set model model name newname
```

```
set model m1 name landscape
```

Change the current name of the *model* to a new name as indicated by *newname*. This *newname* must be nine characters or less or it will be truncated. These names are case sensitive.

```
set model model type raw
```

```
set model m2 type raw
```

Set the model **type** to **raw** so that it does not process the data passing through it in any way.

```
set model model banner [ps|text|auto [after]]
```

```
set model m2 banner text
```

Determine whether a banner page should be added for print jobs passing through the *model* mapped destination/queue. **auto** will determine which type is needed depending on the type of print job data passing through. By default, banner pages are added to the front of the job. However, if **after** is set, the banner page will come at the end.

```
set model model stty [[-]onlcr] [[-]descramble] [xtab tablength|none]
```

```
set model m4 header $PCL-RST
```

Set a header string to be sent to the printer ahead of any print jobs passing through this **model. headerstring** can consist of up to nine elements. An example element is a hexadecimal code (e.g. 0x04) or a pre-defined variable on the print server (e.g. \$PCL-RST for a printer reset). Use “**list var**” to see all available variables.

```
set model model trailer trailerstring
```

```
set model m7 trailer $FF
```

Set a trailer string to be sent to the printer at the end of any print jobs passing through this **model. trailerstring** can consist of up to nine elements. An example element is a hexadecimal code (e.g. 0x04) or a pre-defined variable on the print server (e.g. \$FF for a formfeed). Use “**list var**” to see all available variables.

```
set model from default
```

Set all model settings back to factory defaults.

```
set model from stored
```

Set all current model settings to the values stored in flash memory.

```
set prn [-]autofd
```

```
set prn -autofd
```

Assert or do not assert the $\overline{\text{AUTOFD}}$ line for carriage return insertion. This only affects printers that support this function such as impact printers.

```
set prn flush
```

```
set prn flush
```

Flush the data in the parallel port input and output buffers.

```
set prn unlock
```

```
set prn unlock
```

Release the access lock on the parallel port.

```
set prn timeout minutes|none
```

```
set prn timeout none
```

Terminate the print job sent to the parallel port if it is not printed after the timeout period in *minutes* expires. The *minutes* value ranges from 0 to 255 with 0 indicating no timing out to take place. This is the default setting and should be fine for most print setups.

```
set prn [-]opost
```

```
set prn -opost
```

Allow or disallow output processing on the parallel port such as carriage return insertion (i.e. onlcr).

```
set prn [-]onlcr
```

```
set prn -onlcr
```

Enable or disable carriage return insertion on the parallel port. This may be needed for Unix text jobs coming through with solitary linefeeds. This feature is almost always set at the model level rather than the I/O port level though.

```
set prn xtab tablength/none
```

```
set prn xtab none
```

Set the tabstop width as indicated by *tablength*. The range is 1 to 16 spaces.

```
set prn from default
```

Set all parallel port settings back to factory defaults.

```
set prn from stored
```

Set all current parallel port settings to the values stored in flash memory.

```
set sysinfo name newname
```

```
set sysinfo name salesprinter
```

Set a descriptive name defined by **newname** for Ethernet Interface identification purposes. This is not used in the operation of the print server in any way.

```
set sysinfo location description
```

```
set sysinfo location salesdept
```

Set the physical location of the Ethernet Interface. This is for identification purposes and is not used in the operation of the print server in any way.

```
set sysinfo contact contactname
```

```
set sysinfo contact Paul_Harris
```

Set a person or department to contact in case of print server trouble.

```
set sysinfo loginfo [-]sys | [-]tcp | [-]ipx | [-]spx
```

```
set sysinfo loginfo -sys ipx
```

Set the Ethernet Interface debugging information type. Usually this information includes unexpected errors or exceptions from the print server divided into these groups:

sys General system messages.

tcp TCP stack messages.

ipx IPX stack messages.

spx SPX stack messages.

NOTE: This is not printer or job logging information.

```
set sysinfo logport null|syslog
```

```
set sysinfo logport null
```

Define where the debugging information should be sent to. This can be sent to an output device off of the Ethernet Interface I/O port or to a central TCP/IP host running a SYSLOG daemon. To set this host, use the command "set sysinfo syslog hostIPaddress."

```
set sysinfo email emailname@IPaddress
```

```
set sysinfo email joe@192.75.11.5
```

Define the user email address to receive printer and job logging information from a particular logpath on the Ethernet Interface. **emailname** is the host or IP name of the user and **IPaddress** is the IP address where the mail is stored on your network.

```
set sysinfo syslog hostIPaddress
```

```
set sysinfo syslog 192.75.11.30
```

Set the IP address of the host running the SYSLOG daemon. Ethernet Interface debugging or print job and printer logging information can be sent to that IP address.

```
set sysinfo dns DNSserverIPaddress
```

```
set sysinfo dns 192.75.11.2
```

Set your DNS server IP address so the Ethernet Interface can resolve host names when used with its built-in Telnet and Ping clients.

```
set sysinfo descramblekey hexvalue
```

```
set sysinfo descramblekey 1234
```

Set the key value used for descrambling print jobs that have passed through IBM **npsscramble** utility on a TCP/IP host. This key is a four-digit hexadecimal value obtained from the host software, npsscramble. Within the npsscramble source code, there is a variable called SR_KEY which contains the default key value. This can be changed to any four-digit value you would like.

```
set sysinfo module [[-]novell] [[-]netbios]
```

```
set sysinfo module -novell
```

Enable and disable certain network protocol stacks within the Ethernet Interface. Sometimes it helps to disable any protocols you are not using on your network.

```
set time hours [minutes [seconds]]
```

```
set time 10 30
```

Set the current time noting the **hours** based on the 24-hour system and the **minutes** and **seconds** ranging from 0 to 59. If the Ethernet Interface is reset, this value will be lost so you will need to set the time again.

```
set user add|del username
```

IMPORTANT *Be careful not to delete the root user, or you will be unable to configure any further settings on the print server. You will have to go back to factory defaults to correct this problem.*

!

```
set user add eng
```

Add or remove a user on the Ethernet Interface defined by **username**.

```
set user passwd username password
```

```
set user passwd eng mplex1
```

Assign a **password** to a defined user on the Ethernet Interface. This **password** must be less than eleven characters.


```
set user type username root/guest
```

```
set user type eng root
```

Assign root or guest privileges to a particular user defined by **username**. Guest permissions allow viewing of settings only. Root permissions allow complete control of the Ethernet Interface.

```
set user from default
```

Set all user settings back to factory defaults.

```
set user from stored
```

Set all current user settings to the values stored in flash memory.

```
set var variablename variablestring
```

```
set var LANDSCAPE 0x1b 0x26 0x6c 0x31 0x4f
```

```
set var FINISH $FF $PCL-RST
```

Define a new variable to be used in header, trailer, or switch strings on the Ethernet Interface and call it **variablename**. **variablestring** can be a space-separated list of words, hexadecimal numbers (e.g. 0x04), or references to other pre-defined variables. It is easiest to make up the **variablestring** with hexadecimal values as shown in the example.

NOTE: One variable counts as one element within header and trailer strings.

NOTE: Defined variables are referenced in strings by placing a "\$" before the variable name (e.g. "set model m1 trailer \$FF").

```
set var from default
```

Set all variable settings back to factory defaults.

```
set var from stored
```

Set all current variable settings to the values stored in flash memory.

list Commands

These commands list the current or working settings for a particular section within the command shell. To view stored settings in flash memory, you will need to add in "stored" within the beginning of any of the following commands. For example, "list prn" shows you the current prn settings but "list stored prn" shows you the settings sitting in flash memory. Normally these should match.

`list tcpip`

List all current TCP/IP network settings (e.g. IP address and subnet mask).

`list pserver`

List the current general print server settings (e.g. print server name and Novell mode).

`list dest`

List the current destination settings (e.g. names and mapped I/O ports, models, and logpaths).

`list model`

List the current model settings (e.g. names and mapped destinations).

`list logpath`

List the current logpath settings (e.g. names and mapped destinations).

`list prn`

List the current parallel port setting (e.g. mode).

`list sysinfo`

List the current Ethernet Interface system information (e.g. contact name and protocol stacks enabled).

list ifc

List the current UTP interface settings (e.g. link integrity).

list user

List the current user definitions (e.g. user names and types).

list logins

List any active user logins on the Ethernet Interface.

list arp

List the current ARP table that the Ethernet Interface adheres to in a TCP/IP network.

list var

List all pre-defined variables including any newly created ones. Any of these defined variables can be referenced in a string by placing a "\$" before the variable name (e.g. "set model m1 trailer \$FF").

list rprinter

List any current RPRINTER definitions.

list time

List the current time on the Ethernet Interface.

list date

List the current date on the Ethernet Interface.

list test

List the status of output tests on the I/O ports.

`list key`

List the license details and license key number.

`list diff`

List the differences between the current settings and the stored settings in flash memory. Normally, you want these values to match so issue a `save` command followed by a `reset.`

debug Commands

The `debug` set of commands help troubleshoot problems that may occur on the Ethernet Interface. Some of the output may be cryptic but it helps when troubleshooting.

`debug tcp`

List TCP stack statistics.

`debug ip`

List IP stack statistics.

`debug netbios`

List NetBIOS (i.e. Windows 95 and WfW) statistics.

`debug mem`

List statistics from the Ethernet Interface memory module.

`debug lpq`

List statistics from the queue module.

`debug io`

List statistics from the I/O port module.

`debug eeprom`

List ROM contents.

`debug nif`

List network interface statistics.

Miscellaneous Commands

These commands do not fall under any specific section of the command shell but they are used quite frequently.

`save [default]`

Save the current settings to flash memory so they are available after power cycles. Sysinfo, destination, model, logpath, variable, user, and I/O port settings will be saved. If `default` is specified as well, factory settings will be saved, overwriting any new settings you have configured.

`reset`

Perform a warm boot or hardware reset simulating a power-on reset. Restores current settings to those stored in flash memory since the flash memory settings will be read and loaded into memory upon bootup.

`load [default]`

Load the settings stored in flash memory and use them as the current or working settings. If `default` is specified as well, factory settings will be loaded.

`lpstat [ioport] [jobID]`

`lpstat prn`

Display active and queued jobs and I/O port status for a given *ioport* or *jobID*. Specifying one of these parameters will shorten the output focusing on the particular I/O port or print job specified.

```
cancel jobID
```

```
cancel d1prn-10
```

Remove a job from an I/O port queue. Use “**lpstat**” to find a particular job ID first.

```
start fox|tts|loopb prn
```

```
start fox prn
```

Begin a debugging test on one of the I/O ports on the Ethernet Interface. The tests available are:

fox A continuous stream of text sent to the attached printer. This is a good test for troubleshooting hardware as long as the attached printer supports text output.

tts A continuous stream of Gandalf 400C TTS-compatible text sent to the attached printer.

loopb Loopback test. Any input characters from the device attached to the I/O port is echoed back.

```
stop prn
```

```
stop prn
```

Stop an output test on an I/O port.

```
disable ioport|destination
```

```
disable prn
```

Disable an **I/O port** so that queued jobs are not printed, or disable a **destination** so jobs can not be queued to it.

```
enable ioport/destination
```

```
enable prn
```

Enable an ***I/O port*** so that queued jobs are printed, or enable a ***destination*** so jobs can be queued to it.

```
close tcp TCPindexnumber
```

```
close tcp 3
```

Force a TCP/IP connection between a TCP/IP host and the Ethernet Interface to close. The ***TCPindexnumber*** can be retrieved from “debug tcp” output.

```
ping [-s] hostIPAddress [datasize                    [packetnumber]]
```

```
ping 192.75.11.30
```

“ping” another TCP/IP host specified by ***hostIPAddress*** on the Ethernet Interface network. ***datasize*** is the datagram packet size which defaults to 64 bytes if no size is included in the syntax and ***packetnumber*** is the number of requests to be sent.

NOTE: To use a host or IP name instead of the address, you must have set the DNS server on the Ethernet Interface. Use the command “set sysinfo dns...” to do this.

```
telnet hostIPAddress [escapecharacter]
```

```
telnet 192.75.11.35
```

Start a Telnet session with another TCP/IP host specified by ***hostIPAddress*** on the Ethernet Interface network. If ***escapecharacter*** is used, it resets the key sequence used to exit the Telnet session. It will return you to the telnet> prompt where you can execute “quit.” Use the “**keycode**” command to find out exact escape characters if needed. The default character is CTRL-].

NOTE: To use a host or IP name instead of the address, you must have set the DNS server on the Ethernet Interface. Use the command “set sysinfo dns...” to do this.

`chr string`

Echo ***string*** or redirect ***string*** to an I/O port using “`chr string > ioport.”`”

`keycode`

Determine the hexadecimal value for a key to be used as the escape character with the Ethernet Interface built-in “`telnet`” command.

8 EXTRA FEATURES

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Ethernet Interface Security

There are TCP access lists available to restrict host connections with the device.

Users and Passwords

The Ethernet Interface supports two user types:

root	Access to everything within the print server including all configurable settings.
guest	Ability to list settings only.

Passwords can be set for each user type. However, most often you would just set a password for the root user to protect the Ethernet Interface configuration. Guest users can not alter the print server configuration in any way.

To configure a root password on your Ethernet Interface:

1. Load a Web browser on a network station that can communicate with the print server over TCP/IP. The commands to set a root password are:

Syntax:

```
set user passwd username password  
save
```

Example:

```
set user passwd root your_password_for_root  
save
```

2. Direct your Web browser to URL
“<http://EthernetInterfaceIPAddress/adminConf.html>”
(e.g. “<http://192.75.11.9/adminConf.html>”).

NOTE: If prompted for a “User ID” and password first, type in “`root`” for the user ID and press ENTER at the password prompt since there is no password by default.

3. At the “Administration Configuration” HTML form that displays, scroll down to the “Passwords” section.

4. Click within the “Old” field beside the “Root Password” heading and enter the existing root password. By default, there is no root password so you can go to the next step without typing anything in this field.
5. Within the “Root Password” section, click within the “New” field and enter the new root password.
6. Within the “Root Password” section, click within the “Confirm” field and enter the new root password again. Remember this is case sensitive.
7. Click on the SUBMIT button when done.

From this point on, anytime you log in to the Ethernet Interface as “**root**”, you will need to specify this password or your login attempt will fail.

NOTE: To clear this password or change it, use the same “Administration Configuration” HTML form. Just enter the appropriate “Old” password and put in the new one (or nothing if you do not want a root password any longer). The commands directly on the Ethernet Interface are:

```
set user from default
save
```

TCP Access Lists

Within TCP/IP environments, the Ethernet Interface can restrict host access to destinations/queues and remote command (i.e. rsh, rcmd, remsh and telnet) execution services. This is done using an access list similar in function to the Unix .rhosts file.

To view the current access list on the print server:

NOTE: Access list settings are not configurable through the HTML forms provided with the Ethernet Interface.

1. Start a Telnet session with the Ethernet Interface.

Syntax:

```
telnet EthernetInterfaceIPAddress
```

2. Log in as “root” and press ENTER at the password prompt since there is no password by default (or your password for your home set).
3. List the current access list.

Syntax:

```
List tcpip
```

If the list is empty, all hosts have access to the Ethernet Interface services. If there are entries in the list, only those hosts specified have access to printing and remote command execution.

To add and delete access list entries, the commands are:

Syntax:

```
store tcpip tcp access add|del hostIPAddress|networkaddress  
reset
```

where ***hostIPAddress*** is the IP address of a TCP/IP host on your network and ***networkaddress*** is the address of a subnet on your network.

Example:

```
store tcpip tcp access add 192.75.11.25  
store tcpip tcp access add 192.75.12.0  
store tcpip tcp access del 192.75.11.25  
reset
```

NOTE: Although the maximum number of entries in the access list is 10, each entry can refer to a network rather than a specific host. This allows all hosts on that specified network to have access plus any individual hosts specified in the list.

Printer Monitoring and Logging

One of the key aspects of maintaining a computing environment is monitoring printer status and logging this information to useful places. The Ethernet Interface allows this through its built-in HTML forms, command set, and logpaths.

Printer and Print Job Monitoring

To view the current status of an I/O port on the Ethernet Interface, two methods are available:

1. Selecting the desired I/O port on the “Status” HTML form (i.e. “`http://EthernetInterfaceIPAddress/indexStatus.html`”; e.g. “`http://192.75.11.9/indexStatus.html`”) that comes with the Ethernet Interface.
2. “`lpstat`” command directly on the print server once logged in as “`guest`” or “`root.`”

In each case, you are given a description of each I/O port status and a list of queued jobs. Table 1 describes some of the common terms you may encounter wh

Table 8–1. Key Printer Logging Terms

Term	Description
“idle”	There is no job queued for the Ethernet Interface I/O port.
“blocked”	The printer is not allowing the Ethernet Interface to send data to it. Check that there is not a printer error and it is online and ready to go.
“waiting”	The Ethernet Interface knows about a print job but is waiting for the host to send more data or to send an expected packet.

Printer Logging Through Logpaths

Within the Ethernet Interface product manual, destinations are described as logical queues with associated models and logpaths. Models determine if any extra processing is needed with the print jobs passing through and logpaths determine whether any logging is needed for each job.

Each logpath on the Ethernet Interface consists of two parts:

Type	The type of log information to be captured. The choices are “ <code>job</code> ” for job ID and username, “ <code>user</code> ” for user ID (and three messages per job), “ <code>pgcnt</code> ” for total pages printed in a job, “ <code>cksum</code> ” for file checksums, “ <code>printer</code> ” for special printer feedback, and “ <code>ioport</code> ” for parallel printer status messages.
-------------	--

Port Where this log information will be sent to. The choices are a **TCP port number** (e.g. 2000), an **email address** (including an alias), a central host running a **SYSLOG daemon**.

To view the current logpath settings on the print server:

1. Load a Web browser on a network station that can communicate with the print server over TCP/IP or using Telnet (e.g. Telnet "ipaddress"). The command to view the logpath settings is:

NOTE: If prompted for a "User ID" and password first, type in "root" for the ID and press ENTER at the password prompt since there is no password by default.

Syntax:

```
list logpath
```

2. Direct your Web browser to URL
"http://*EthernetInterfaceIPAddress*/destConf.html"
(e.g. "http://192.75.11.9/destConf.html").

NOTE: If prompted for a "User ID" and password first, type in "root" for the ID and press ENTER at the password prompt since there is no password by default.

3. At the "Print Path Configuration" HTML form that displays, select a destination link (e.g. d1prn1) from the top of the page to bring up the appropriate destination form.
4. Once the desired destination HTML form displays, scroll down to the "Logpath Type" and "Logpath Port" sections to view the current logpath settings for this particular destination.

At this point, you can alter any of these settings and then click on the SUBMIT button to store them into the Ethernet Interface.

Ethernet Interface Naming Schemes

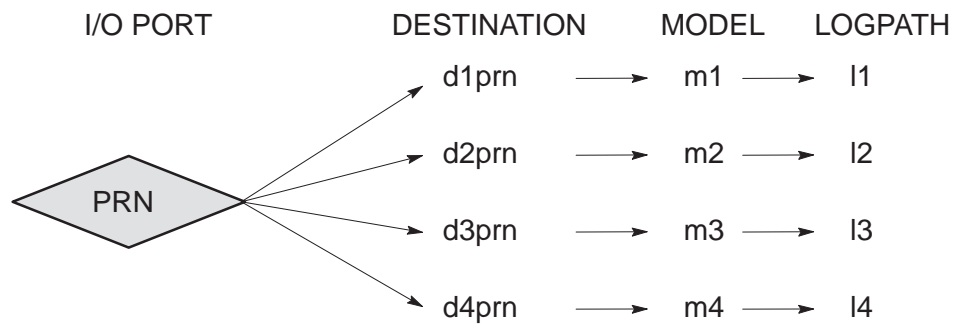


Figure 8–1. Ethernet Interface Default Names

GLOSSARY

ARP	Address Resolution Protocol. Associates a selected IP address with a network device Ethernet address.
bps	Bits per second.
Centronics	Parallel port interface standard found on most printers.
daemon	A continuously running process that handles system-wide functions like print spooling.
default router	Local device that forwards any IP packets destined for another subnet.
destination	Logical print queue on the Ethernet Interface which hosts send their print jobs to. There are eight destinations (two per I/O port) by default.
DHCP	Dynamic Host Configuration Protocol. Allows a network device to discover its IP address dynamically upon bootup. The IP address does not need to be stored within the device itself permanently.
Download Mode	Refers to the condition of the Ethernet Interface when in a startup condition, downloading configuration information.
DNS	Domain Name Server. Host providing responses to queries for a given host name IP address.
factory defaults	Settings shipped with the Ethernet Interface.
Factory Settings	S2 jumper position stating all factory default settings are to be used while the Ethernet Interface is up and running.
Firmware Panic	Unrecoverable errors detected by the Ethernet Interface firmware force the Print Server into Firmware Panic mode. Manually reset the Ethernet Interface to resume operation.
Flash	Stores firmware code and configurable settings. Allows for upgrades without replacing hardware inside the Ethernet Interface.
FTP	File Transfer Protocol. Used for transferring files from one TCP/IP host to another and used in the upgrade process.
Hardware Exception	Buss errors, address errors, and illegal instructions force the Ethernet Interface into this non-operational mode.

HTML	HyperText Markup Language. Format used for documents viewable on the World Wide Web.
ifnum	Interface Number. Represents the network interface. With a Ethernet Interface, this will always be "1" for Ethernet.
interface script	Unix host filter file that processes the print job before it is sent over the network to the Ethernet Interface.
I/O port	Port for attaching peripherals. The Ethernet Interface provides one: PRN.
logpath	Determines type of print job and printer logging needed per job. One logpath is associated with every destination.
LPD/LPR	Line Printer Daemon. The most common TCP/IP remote printing protocol that crosses all hardware utilizing IP.
MIB	Management Information Base. A set of variables (database) managed by an SNMP manager application.
model	Defines how a print job should be processed (e.g. banner pages added, ASCII to PostScript conversion) as it passes through the Ethernet Interface. One model is associated with every destination.
NetBIOS	Network Basic Input Output System. Common interface among PC networks.
Monitor Mode	Refers to the condition of the Ethernet Interface with no configuration or IP address loaded.
npsh	Extensive built-in command shell within the Ethernet Interface.
PDF	Portable Document Format. Encodes different types of documents enabling them to be read across multiple platforms.
ping	Standard command to test a TCP/IP connection. (e.g. "ping 192.75.11.9")
print path	Three-stage path a print job takes when it is sent from a host to a printer through the Ethernet Interface.
PSERVER	Print Server. A Novell print method where the Ethernet Interface continuously polls the Novell file server print queue looking for print jobs.

RAM	Random Access Memory. Volatile memory within the Ethernet Interface that contains current/working settings. Settings are lost once the power is removed.
RARP	Reverse Address Resolution Protocol. Allows a network device to discover its IP address dynamically upon bootup. The IP address does not need to be stored within the device itself permanently.
router	A device that forwards IP packets to their destination. Also called a gateway.
RPRINTER	Remote Printer. A Novell print method where the Ethernet Interface waits for jobs to be sent to it from a defined PSERVER.
SNMP	Simple Network Management Protocol. A standard protocol used to monitor network devices called "SNMP agents."
socket	TCP connection between two hosts consisting of a source and destination TCP port number at each end.
subnet mask	A binary value used to divide IP networks into smaller sub-networks or subnets. This mask is used to help determine whether IP packets need to be forwarded on to other subnets.
TCP/IP	Suite of protocols that act as the base protocol for the Internet.
TCP port	A logical connection point in the software of a TCP host or device. When two IP devices talk, they establish a socket which consists of a source and destination TCP port number on both ends.
telnet	Command and protocol to establish a terminal connection between two hosts on an IP network.

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