

IBM Network Printers

G544-5240-04

**Ethernet and Token Ring
Configuration Guide**



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Note!

Before using this information and the product it supports, be sure to read the general information in Appendix D, "Notices" on page 275.

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This edition applies to the *IBM Network Printers: Ethernet and Token Ring Configuration Guide* and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters.

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Book at a Glance

Terminology:

NIC is used throughout the book to refer to the IBM **Network Interface Card**. (The NIC is referred to as the printer network, or PNC, by some IBM network printing software.)

Getting the latest version of this book

This is version -04 of the *IBM Network Printers: Ethernet and Token Ring Configuration Guide*. To obtain the latest version of the guide, access the IBM Printing Systems Company home page at <http://www.can.ibm.com/ibmprinters>. The home page will guide you to the list of available manuals. Download publication number G544-5240.

Forms of Attachment Described in this Book

This book describes two forms of attachment to IBM network printers:

- SERVER-TO-PRINTER attachments (see Table 1). This book is primarily concerned with this form of attachment.
- PEER-TO-PEER attachments. Refer to 23.0, "Peer-to-Peer Attachments to IBM Network Printers" on page 219.

Table 1. Server-to-printer Attachments

Server Environment	Operating System	Server-to-Printer Protocol	Datastream
AIX	IBM AIX	TCP/IP	ASCII IPDS ¹ PCL PostScript
Apple	Apple System 7	AppleTalk: EtherTalk TokenTalk	PostScript
AS/400	OS/400	TCP/IP	ASCII IPDS ² PCL PostScript
MVS	MVS	TCP/IP	IPDS ³
Novell NetWare	NetWare	IPX/SPX	ASCII PCL PostScript
OS/2	<ul style="list-style-type: none">• IBM LAN Server• Microsoft LAN Manager	TCP/IP NetBIOS	ASCII IPDS ⁴ PCL PostScript
SUN	SUN Solaris	TCP/IP	ASCII PCL PostScript
Windows NT or 95	NT or 95	<ul style="list-style-type: none">• Microsoft Service for NetWare• Novell Service for NT or 95• TCP/IP (LPR for 95)	ASCII PCL PostScript
Note: <ol style="list-style-type: none">1. IPDS requires the IPDS option on the printer and PSF for AIX.2. IPDS requires the IPDS option on the printer and PSF/400.3. IPDS requires the IPDS option on the printer and PSF for MVS.4. IPDS requires the IPDS option on the printer and PSF/2. IPDS cannot be sent with the NetBIOS protocol.			

Contents of the NIC Package

Obtain the latest version of any of the following items by accessing the IBM PSC home page at <http://www.can.ibm.com/ibmprinters>.

Note: If something is missing from the NIC package, contact IBM Support (refer to "Product Support" on page vi).

The IBM NIC package includes:

- The IBM NIC (Ethernet or Token Ring)
- This *IBM Network Printers: Ethernet and Token Ring Configuration Guide*
- Software utilities, like Network Printer Manager (NPM), on diskettes or CD-ROM
- Other notices and inserts, as required

The Configuration Guide

This *IBM Network Printers: Ethernet and Token Ring Configuration Guide* provides procedures using both command line and other methods to:

- Install and configure NICs and printers
- Monitor network printers
- Resolve printing problems
- Install and upgrade NIC microcode

Software Utilities

Several software utilities are provided on diskettes or CD-ROM and packaged with the NIC. Some of these utility programs are mentioned in other chapters of this book because they are required to successfully configure the printer network card or the printer.

For information about how to install and use each utility, refer to the READ.ME file provided with each utility.

LAN Server Printer Utility

The LAN Server Printer Utility allows you to redirect the output of as many as 16 printer queues for IBM network printers installed on your network using the TCP/IP or NetBIOS protocol. The LAN Server Printer Utility requires OS/2 2.11 or above and LAN Server 3.0 or above. You can use the graphical user interface of the LAN Server Printer Utility to install printers and to start and stop print processes on your OS/2 server. The utility also provides real-time statistics for each OS/2 server's print queue. Refer to the READ.ME accompanying the utility for further information.

LAN Manager Printer Utility

The LAN Manager Printer Utility allows you to redirect the output of as many as 16 printer queues for IBM network printers installed on your network using the NetBIOS protocol. The LAN Manager Printer Utility requires OS/2 1.3 or above and LAN Manager 2.1 or above. You can use the graphical user interface of the LAN Manager Printer Utility to install printers and to start and stop print processes on your OS/2 server. The utility also provides real-time statistics for each OS/2 server's print queue. Refer to the READ.ME accompanying the utility for further information.

TES/Kermit Utility

Novell workstations require TES and Kermit for you to login to an IBM NIC. You must login to the NIC if you want to use any of the commands in "Part 7 - NIC Command Reference" on page 225.

Printer MIBs in DOS and TAR Format

Several types of MIBs are provided:

- MIB-II
- Host Resources MIB
- Printer MIB
- IBM enterprise-specific MIB

These MIBs let you use a general-purpose MIB compiler or browser to remotely examine or manage an IBM network printer.

IBM Network Printer Manager (NPM)

NPM for OS/2, NPM for NT, and NPM for Windows 95 are also included in the NIC package. Refer to 22.0, "IBM Network Printer Manager (NPM)" on page 215 for further information.

Other Items in the NIC Package

Other items may be included in the NIC package, including addenda to the configuration procedures described in the guide.

Conventions

Our Use of Typefaces

Bold	Bold is used for keywords, defined terms, application selections, options, and to draw attention to important terms.
<i>Italic</i>	Identifies command variables and names of publications.
<u>underlining</u>	Underlining is used occasionally to indicate alternatives or for emphasis.
Examples	Monospaced text is used for command syntax and examples.
CAPITALS	Used for all command names.

Graphical User Interface Conventions

click or select	Press the left mouse button once.
double-click, run, or open	Press the left mouse button twice in quick succession.
<i>key+key</i>	Press both keys at once. (For example, ALT+P .)

Platform-Specific Conventions

We have followed the command name and usage conventions used by the network operating systems, protocols, and environments described here. For example, AIX commands are in lower case, while AS/400 commands are in UPPER case.

Indications of NPM Capability

The IBM Network Printer Manager (NPM) is a software utility, operating on OS/2, Windows NT, and Windows 95 that can be used to configure and monitor IBM network printers in several environments. When NPM for OS/2, or NPM for NT, or NPM for 95 can be used to perform a function described in a chapter or section, you will see the following indicator: **NPM-OS/2**, **NPM-NT**, or **NPM-95** immediately following the title.

Product Support

The IBM Support Center maintains current information about the IBM products described here, including updates and fixes to accompanying software.

IBM Support operates a 7x24 (seven days a week, 24 hours a day) support service in the United States and Canada. The phone number for the IBM Support Center is 1-800-358-6661. For international support, contact your local Call Center.

Please have the following information available when you call the IBM Support Center:

- A **printer** configuration page, see page 6
- A **NIC** configuration page, see page 8
- A description of the problem
- Error messages and error logs, if appropriate
- A description of the type of hardware involved
- Software levels in use at your site
- A graphical description of the network topology

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Part 1 - The IBM NIC

N
I
C

Terminology:

NIC=**N**etwork **I**nterface **C**ard

Also known as: Network Adapter, Printer Interface Card, Printer Network Card.

1.0 Start Here—Install the Network Interface Card (NIC)

ALL NIC CONFIGURATION TASKS BEGIN WITH THIS CHAPTER.

This chapter provides you with several kinds of information about IBM NICs, such as:

- How to install an IBM NIC in an IBM network printer. You need to do this procedure for each NIC you connect to the network.
- NIC procedures you should know about, such as where you can find information about upgrading, maintaining, and resetting NICs.
- A listing of the default parameters and conditions of the NIC.
- Information about the Ethernet and Token Ring frame types supported by the IBM NIC.

1.1 Installing the NIC in the Printer

The following **required** steps guide you through the process of setting up your printer, installing the NIC in it, and verifying the **physical** connection of the printer to the LAN cable.

Required Steps

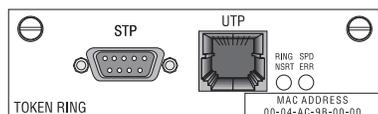
___ **1** Set up your IBM network printer. Refer to the printer's *Quick Setup* and *User's Guide*.

___ **2** Carefully open the anti-static bag in which the NIC is packaged and take the card out of it.

Beware of Static Electricity

Because static electricity can damage the NIC, care should be exercised when handling one.

___ **3** To document the NIC you are configuring, write down its MAC address. The MAC address is a twelve-character, alphanumeric number that is unique to each card. The MAC address is located on the lower, right hand side of the NIC faceplate as shown in the following illustration of the Token Ring faceplate:



MAC Address:

You **may** need this MAC address when configuring the NIC. We will tell you if and when you need it.

___ **4** If you are using a Token Ring network and your network line speed is the default 16 Mbps, go to step 5. If your network line speed is **not** the default 16 Mbps on the NIC, use the procedure in 1.7, "Setting the Line Speed for Token Ring NICs" on page 10.

___ **5** Install the NIC in the printer using the procedure on page 11. **Do not attach the NIC cable to the network at this point.**

- ___ **6** Verify the physical installation of the card in the printer by doing the procedure in 1.5.1, "Obtaining a Printer Configuration Page" on page 6. If the "Installed Options" section does not show Ethernet or Token Ring, repeat step 5.
- ___ **7** Connect the NIC **physically** to the LAN cable by referring to page 12.
- ___ **8** Verify the physical connection to the LAN cable by using the information on page 13.

Optional Steps

- ___ **9** If you are configuring an Ethernet NIC, go to step 12.
- ___ **10** If you are configuring a Token Ring NIC, following is an optional step to change your MAC address to an LAA address on **Token Ring** cards only. If you do not wish to do this step, you can go and configure your printer to work on the platform(s) of your choice by doing one or more of the procedures described in step 12.
- ___ **11** If you wish to change the MAC address on a Token Ring card to a Locally Administered Address (LAA), you can do so using one of these procedures:
 - You can use the printer operator panel as described in 17.3, "Setting the LAA from the Printer Operator Panel" on page 169.
 - You can use the IBM NPM utility. For information on how to use NPM, access its help system.

Resetting the LAA to the MAC

If you want to reset an LAA address back to the MAC address, use the procedure on page 171.

- ___ **12** NOW, GO AND DO THE CONFIGURATION PROCEDURE(S) YOU WANT. These are the available options:

AppleTalk, NetBIOS, and NetWare:

- 2.0, "AppleTalk" on page 19
- 3.0, "OS/2 NetBIOS" on page 27
- 4.0, "NetWare 3.X" on page 41
- 5.0, "NetWare 4.X" on page 51
- 6.0, "Windows NT using NetWare Services" on page 71

TCP/IP—AS/400

- 10.0, "AS/400 to Print PCL and PostScript Files" on page 99
- 11.0, "AS/400 to Print IPDS Files" on page 111

TCP/IP—MVS

- 12.0, "MVS to Print IPDS Files" on page 133

TCP/IP—OS/2

- 13.0, "OS/2 TCP/IP to Print PCL and PostScript Files" on page 143
- 14.0, "OS/2 TCP/IP to Print IPDS Files" on page 151

TCP/IP—UNIX

- 7.0, "AIX to Format and Print PCL and PostScript Files" on page 79
- 8.0, "AIX to Print Formatted PCL and PostScript Files" on page 87
- 9.0, "AIX to Print IPDS Files" on page 93

- 15.0, “SUN Solaris to Format and Print PCL and PostScript Files” on page 157

TCP/IP—Windows NT

- 16.0, “Windows NT on TCP/IP Networks” on page 161

1.2 Related NIC Information

Other sections of this book provide NIC-related information that you may want to use, such as:

- 1.5, “The Printer Configuration Page” on page 6
- 1.6, “The NIC Configuration Page” on page 8.
- 25.2, “Logging into a NIC using TCP/IP Telnet” on page 230.
- 25.1, “Logging into a NIC using NetWare IPX” on page 229
- B.2, “Updating the NIC Microcode” on page 267.
- B.1, “Resetting NIC Parameters to Factory Defaults” on page 265.

1.3 Default NIC Parameter Values

Table 2 lists the **default** parameter values for an IBM NIC and other useful information.

Note: In table 2, NCE stands for Ethernet, NCT for Token Ring, and *nnnnnn* for the last six digits of the MAC address.

<i>Table 2 (Page 1 of 2). Principal NIC Default Parameters and Conditions</i>		
Parameter/Limit	Values	Affected Area
Login passwords	<ul style="list-style-type: none"> • access (remote login) • system (privilege mode) 	<ul style="list-style-type: none"> • Telnet • TES/Kermit <ul style="list-style-type: none"> – Requires a NetWare server – Use only in DOS mode
Note: Refer to 25.2, “Logging into a NIC using TCP/IP Telnet” on page 230 and 25.1, “Logging into a NIC using NetWare IPX” on page 229.		
lpd queue (plain text)	TEXT (upper case only) Unformatted ASCII files with carriage returns (CR) or carriage returns and line feeds (CRLF)	<ul style="list-style-type: none"> • AIX for formatted files • AS/400 • OS/2 • Windows NT/95 for TCP/IP
Note: Set to the capitalized word TEXT. If you are printing PCL or PostScript files with an IBM printer driver and experience formatting problems, try using the capitalized word PASS.		
lpd queue (PostScript or PCL)	PASS (upper case only) Either binary files or files formatted for PCL or PostScript using an IBM printer driver	<ul style="list-style-type: none"> • AIX for formatted files • AS/400 • OS/2 • Windows NT/95 for TCP/IP
Note: 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.		
lpd service	TCP port 515	LPR printing
Note: Refer to 23.0, “Peer-to-Peer Attachments to IBM Network Printers” on page 219 for procedures used to configure the network printers using LPR.		
NIC Name (Node Name)	<ul style="list-style-type: none"> • NCE<i>nnnnnn</i> (Ethernet) • NCT<i>nnnnnn</i> (Token Ring) 	<ul style="list-style-type: none"> • NetBIOS • NetWare • TES/Kermit
Printer service name	<ul style="list-style-type: none"> • NCE<i>nnnnnn_1</i> (Ethernet) • NCT<i>nnnnnn_1</i> (Token Ring) 	<ul style="list-style-type: none"> • NetBIOS • NetWare
Printer service name	IBM Network Printer <i>nn</i>	AppleTalk
SNMP community name	<ul style="list-style-type: none"> • ibmpsc_admin (Read/Write) • public (Read) 	Monitoring (for example, NPM)
SNMP packet size	482 bytes	<ul style="list-style-type: none"> • Ethernet • Token Ring

Parameter/Limit	Values	Affected Area
TCP port for printing	2501	TCP/IP, LAN Server Printer Utility, LAN Manager Printer Utility
Locally Administered Address (LAA)	Replaces the default MAC address	<ul style="list-style-type: none"> Token Ring only (5.18+ microcode) Not available on Ethernet
TCP/IP port	5001	<ul style="list-style-type: none"> PSF for AIX PSF/400 PSF/2 PSF for MVS
Telnet and RCF port number	2048	Telnet, TES/Kermit
TES port number	23	TES/Kermit
Token Ring Line Speed	16 Mbps	NIC installation
Note: Refer to 1.7, "Setting the Line Speed for Token Ring NICs" on page 10.		

Note: IBM NICs do **not** support DEC network printing. You must disable DEC broadcasts on the IBM NIC to avoid problems on DEC systems. Refer to 20.2, "Disable DEC/LAT and MOP Announcements" on page 203.

1.4 Ethernet and Token Ring Frame Types on IBM NICs

The IBM NIC supports only one default frame type per protocol. To change the default frame type, refer to 27.7, "Frame" on page 239. See also 28.21, "Source Routing" on page 252.

Note: The default state of a NIC regarding NetWare frame types is "auto," which means that the IBM NIC selects the first frame type discovered as **the** frame type.

NIC Type	Protocol	Frame Type
Ethernet	AppleTalk	Ethernet_SNAP
	IPX/SPX	One of: Ethernet_802.2 Ethernet_802.3 Ethernet_II Ethernet_SNAP
	NetBIOS	Ethernet_802.2
	TCP/IP	Ethernet_II
Token Ring	AppleTalk	Token Ring_SNAP
	IPX/SPX	One of: Token Ring_802.2 Token Ring SNAP
	NetBIOS	Token Ring_802.2
	TCP/IP	Token Ring_SNAP

1.5 The Printer Configuration Page

PRINTER Configuration Page

The following procedure is used to obtain a **printer** configuration page. If you want to print the related **NIC** configuration page, refer to page 8.

1.5.1 Obtaining a Printer Configuration Page

Error 41 NETWORK OPTIONS ERROR

If you get a “41 NETWORK OPTIONS ERROR” when trying to print a printer configuration page, remove the NIC from the printer (and, of course, the network) and try printing a printer configuration page again.

To obtain a Printer Configuration Page:

1. Turn the printer on.
2. When the printer has warmed up and displays READY, press the ONLINE button to put the printer **offline**.¹
3. Press the MENU button. The Printer displays TEST MENU.
4. Press the ITEM button to display the CONFIG PAGE item.
5. Press the ENTER button to print the configuration page.
6. When the configuration page has printed, press the ONLINE button to put the printer back online.

1.5.2 Example of a Printer Configuration Page

Following is an example of a portion of printer Configuration Page.

Note: The contents of a configuration page depends on the printer type, installed options, and user-tailored values.

IBM Network Printer 24 Configuration Page

TEST MENU CONFIG PAGE PRINT PS FONTS PRINT PCL FONTS PRINT IPDS FONTS CONTINUOUS TEST RESET PRINTER FACTORY DEFAULT ONLINE HEX PRT	PS MENU COPIES=1 : IPDS MENU PAGEPROT=AUTO EMULATION=4028 : TOKEN RING MENU PERSONALITY=AUTO PORT TIMEOUT=15 IP ADDRESS=9.99.50.172 SUBNET MASK=255.255.252.0 GATEWAY ADDRESS=9.99.224.254 MAC ADDRESS=00:00:93:00:20:69 : ETHERNET MENU PERSONALITY=AUTO PORT TMEOUT=15 : PCL MENU PAGEPROT=AUTO COPIES=1 : PAPER MENU SOURCE=TRAY 2 : MAILBOX MENU BIN1=PW ENABLE : CONFIG MENU JAMRECOVERY=ON : MACHINE INFO PAGE COUNT ERROR LOG : LANGUAGE MENU LANG=ENGLISH INSTALLED OPTIONS DUPLEX PS IPDS ETHERNET TOKEN RING 32 MB Extra Memory TOTAL MEMORY=48MB PRINTER DETAILS PAGE COUNT=3243 TONER CTR=132 FUSER CTR=132 CODE LEVELS CTL 2.00 PCL 1.3.1 PS 1.11 EN 5.18 TR 5.18 IPDS 1.10
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¹ For instructions on how to use the operator panel, refer to 17.2, “Printer Operator Panel Actions” on page 169.

1.5.3 Reading a Printer Configuration Page

When the Printer Configuration Page prints out, look at the lower, right hand corner. There you will see a column of **Printer Details**. One of the rows will say "CODE LEVELS." The CTL line indicates the printer microcode level. The EN and TR lines indicate the Ethernet and Token Ring microcode levels on the NIC.

Here is an example that shows only the Printer Details part of the printer configuration page:

```
PRINTER DETAILS
PAGE COUNT=32654
TONER CTR=42
FUSER CTR=110
CODE LEVELS
  CTL 2.00
  EN 5.18
  TR 5.18
```

1.6 The NIC Configuration Page

NIC Configuration Page

The following procedure is used to obtain a **NIC** configuration page. If you want the related **printer** configuration page, refer to page 6.

1.6.1 Obtaining a NIC Configuration Page

You can obtain a NIC configuration page in three ways and with two sets of values:

- **Disconnected from the LAN** using the printer
- **Connected to the LAN** using the NIC command line or the IBM NPM utility

The following procedure obtains a NIC configuration page from the printer. The page displays values that are permanently written in NIC storage. These values **may not** be the same as the values displayed when you obtain a page when the printer is connected to the LAN (see 1.6.1.2, "Getting a LAN-dependent Configuration Page" on page 9).

1.6.1.1 Getting a LAN-independent Configuration Page from the Printer: A LAN-independent configuration page displays values that are permanently written in NIC storage. To print a LAN-independent NIC configuration page:

1. Turn the printer **off**.
2. Disconnect the power cord from the printer.
3. Disconnect the LAN cable from the NIC.

Note: The NIC configuration page will not print if the LAN cable is connected to the NIC.

4. Plug in the AC power cord.
5. Turn the printer **on**.
6. The NIC configuration page prints automatically within two minutes. Refer to 1.6.2, "What a NIC Configuration Page Is" on page 9 for information about the NIC configuration page.

If the NIC configuration page does not print, check to make sure the NIC is installed and the printer displays **READY**.

7. Turn the printer **off**.
8. Reconnect the printer to the LAN (it was disconnected in step 3).

9. Wait a few seconds, then turn the printer **on**.

Beware of Beaconing on Token Ring Cards

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause a Token Ring card to start beaconing.

1.6.1.2 Getting a LAN-dependent Configuration Page: A LAN-dependent configuration page displays values that result from a network connection. These values may be different from those values permanently written in NIC storage.

You can obtain a LAN-dependent NIC configuration page in one of two ways:

- 1.6.1.2.1, "Obtaining a Configuration Page from the Command Line"
- 1.6.1.2.2, "Obtaining a Configuration Page with NPM"

1.6.1.2.1 Obtaining a Configuration Page from the Command Line: To display or print a LAN-dependent NIC configuration page:

1. Logon to the NIC using one of:
 - 25.1, "Logging into a NIC using NetWare IPX" on page 229
 - 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230
2. To display the configuration page online, enter the command:
`show server configuration`
3. To print the configuration page, enter the command:
`show server configuration 1`
to send the printout to a non-PostScript printer.

1.6.1.2.2 Obtaining a Configuration Page with NPM: You may also use the IBM NPM utility to obtain a network-dependent configuration page.

1. Start NPM as described in 22.2, "Starting NPM" on page 216.
2. From the NPM Main Window, select the printer, select **Network**, then select **Print Configuration Page**.

1.6.2 What a NIC Configuration Page Is

A NIC configuration page is a sheet (or more) of information that displays the network configuration settings for a NIC.

The title of a NIC configuration page is one of the following:

Network Interface Configuration for Token Ring

or

Network Interface Configuration for Ethernet

The following configuration page example has been annotated, with comments in parentheses like this (*=comment*), help you find elements you may be interested in.

The following example is for a Token Ring configuration. (The Ethernet configuration page is almost identical to the Token Ring page.)²

² The main exception is that Ethernet cards do not support changing the MAC address (to the LAA address).

Table 3. Example of a Configuration Page for Token Ring

<p>Network Interface Configuration for Token Ring</p> <p>Server Information (=Comments) Product: Token Ring INA Hardware: A.31 (=Hardware level of NIC) Firmware: (SL) 3.06 960828 Software: 5.18 961029 (=NIC microcode) Console Port: none Load Type: Selfload (=How microcode is loaded) Uptime: 64 (0 00:01:04) (=Time up since last initialization)</p> <p>Network Information Node Name: NCT9B1234 (=NIC name) Factory MAC Addr: 00-20-35-D9-2F-B1 LAA Token Addr: 40-00-5E-50-00-01 MAC Addr: 40-00-5E-50-00-01 Circuit Timer (ms): 80 Protocols: (=Enabled protocols) NetWare TCP/IP Appletalk Phase II NetBios LAN Manager LAN Server Source Routing: State: enabled Send: single Single Route Response: specific</p> <p>TCP/IP Information IP Addr: 9.99.177.195 (=None before configuring) Subnet Mask: 255.255.252.0 (=None before configuring) Gateway: 9.99.176.254 (=None before configuring) BOOTP: 2 1 perm DHCP: 2 1 perm RARP: 2 1 perm</p> <p>NetBios Information Workgroup Name: WORKGROUP Multicast Addr: C0-00-00-00-00-80 Current Sessions: 0 Max Sessions: 10 Hi Sessions: 0 Current LLC Connections: 0 Max LLC Connections: 20</p> <p>NetWare Information Frame Defined: default Selected: 802.2 FServer: none (=Novell preferred file server) Network Number: 00-00-00-00 Rprinter: enabled Pserver: auto Rediscover: 2 min NFServer: preferred NDS Tree: none NDS Context: none</p> <p>AppleTalk Information Zone: * Network Address: 1F4.13 Flow Quantum: 8</p>	<p>Port Configuration 1 PSIO Rev. 3.0 Access: remote Queueing: disabled TBCP: disabled Backspool: enabled 2 Serial - full modem Type: softcopy Access: virtual Queueing: disabled TBCP: disabled BackSpool: enabled Modem: disabled Speed: 9600 DSRlogout: disabled Signal Check: disabled Char Size: 8 Parity: none Autobaud: disabled Flow Control: xon 3 Transparent Gateway Type: softcopy Access: virtual 4 Remote Console Type: ansi Access: remote</p> <p>Service Configuration Name: lpd Port(s): 1 Protocol(s): TCP Queueing: enabled Connections: enabled Password: disabled Telnet: disabled Filter: disabled TCP Port: 515 Name: NCT00C0DA (=Token Ring NIC name) Port(s): 3 Protocol(s): TCP, TES Queueing: disabled Connections: enabled Password: disabled Telnet: enabled Filter: disabled TCP Port: 23 Name: NCT00C0DA_1 (=Default service name) Port(s): 1 Protocol(s): TCP, NRP, NETBIOS Queueing: enabled Connections: enabled Password: disabled Telnet: disabled Filter: disabled TCP Port: 2501 Name: IBM Network Printer 17 (=Default for AppleTalk) Port(s): 1 Protocol(s): APPLE Queueing: enabled Connections: enabled Password: disabled Telnet: disabled Type: LaserWriter</p>
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1.7 Setting the Line Speed for Token Ring NICs

Use this procedure only if you have a **Token Ring** NIC that you must set to 4 Mbps (the default is 16 Mbps).

1. Lay the Token Ring card in front of you with the faceplate towards you.

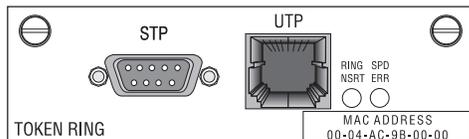


Figure 1. Token Ring Faceplate

2. On the card edge opposite the faceplate are six pins and two small jumpers.
 - If you are installing the card for a 4 Mbps network, a jumper must be placed over the pins labelled 4.

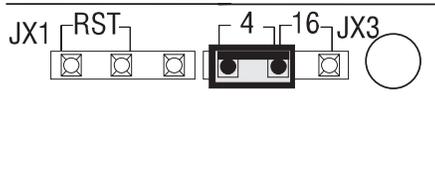


Figure 2. Jumper Placement for 4 Mbps

- If you are installing the card for a 16 Mbps network, a jumper must be placed over the pins labelled 16. (This is the default jumper position.)

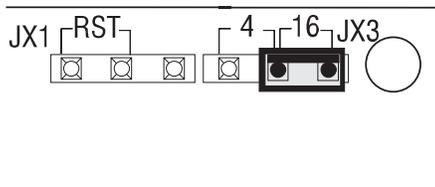


Figure 3. Jumper Placement for 16 Mbps

YOU HAVE NOW COMPLETED STEP 4 ON PAGE 3. GO TO STEP 5 ON PAGE 3 BY PERFORMING THE PROCEDURE IN 1.8, "PHYSICALLY INSTALLING A NIC IN THE PRINTER."

1.8 Physically Installing a NIC in the Printer

This procedure describes how to perform step 5 on page 3.

An IBM NIC is inserted in one of the available slots in the back of an IBM Network Printer 12, 17, or 24:

- You can install two NICs in a Network Printer 17 or Network Printer 24.
 - Note:** If two cards are installed in a Network Printer 17 or 24, they cannot be of the same type. You cannot, for example, install two Token Ring cards in the same printer.
- You can install one NIC of either type in Network Printer 12.

To install the NIC:

1. Turn the printer's power off.
2. Remove the power cord and any cables attached to the printer.
3. Remove the temporary cover on the slot on the rear of the printer. If two slots are available, IBM recommends using the **top** slot first.
4. Insert the card into the slot by gently pressing the board into position.
5. Tighten the thumb screws on the NIC to secure it in place.
6. Reattach the power cord.
7. Print a printer configuration page (refer to 1.5.1, "Obtaining a Printer Configuration Page" on page 6) to verify that you see either "TOKEN RING" or "ETHERNET" under the Installed Options section of the page.

For a detailed description of this procedure, refer to the *User's Guide* for IBM Network Printer 12, 17, or 24.

YOU HAVE NOW COMPLETED STEPS 5 AND 6 ON PAGE 4. GO TO STEP 7 ON PAGE 4 BY PERFORMING THE PROCEDURE IN 1.9, "PHYSICALLY CONNECTING A NIC TO A LAN" ON PAGE 12.

1.9 Physically Connecting a NIC to a LAN

This procedure describes how to perform step 7 on page 4.

Disconnect Power on the Printer

Disconnect the printer power cord before taking the following steps.

1.9.1 Connecting to an Ethernet LAN

The NIC is connected to an Ethernet LAN using either:

- A 10BASE-T (UTP, Unshielded Twisted Pair) cable with an RJ-45 connector
- 10BASE2 (BNC) thin wire cable with a BNC T-adapter

Cables attach to the card at the locations indicated by the following illustration:

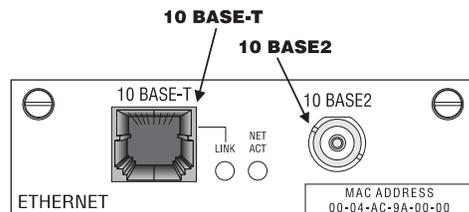


Figure 4. Ethernet Cable Connections

1.9.1.1 Ethernet 10BASE-T Connection: To connect the NIC to the LAN using the 10BASE-T connection:

1. Attach the LAN cable to the NIC's 10BASE-T port.
2. Attach the other end of the 10BASE-T cable to the network.

Note: Since you should connect cables to only one port at a time, do **not** attach anything to the 10BASE-2 port.

1.9.1.2 Ethernet 10BASE2 Connection: You can attach the card either to:

- The middle of a cable segment
- The end of a cable segment

To attach the card to the middle of a cable segment, use the 10BASE2 (BNC) T-adapter. To connect the NIC to the end of a cable segment, attach the LAN cable to one side of the 10BASE2 T-adapter and a 50-Ohm terminator to the other side.

Note: Since you should attach cables to only one port at a time, do **not** attach anything to the 10BASE-T port.

1.9.2 Connecting to a Token Ring LAN

The NIC is connected to a Token Ring LAN using either:

- UTP (Unshielded Twisted Pair) cable with an RJ-45 connector
- STP (Shielded Twisted Pair) cable with a DB-9 connector

1.9.2.1 Token Ring UTP Connection: To connect the NIC to the LAN using the UTP connector:

1. Attach one end of the UTP cable to the NIC using a RJ-45 connector.
2. Attach the other end of the UTP cable to the LAN.

Note: Since you should connect cables to only one port at a time, do **not** attach anything to the STP port.

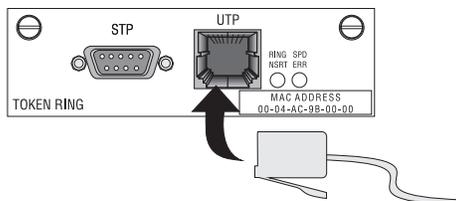


Figure 5. Token Ring UTP Connection

1.9.2.2 Token Ring STP Connection: To connect the NIC to the LAN using the STP connector:

1. Attach one end of the STP cable to the NIC using a DB-9 connector.
2. Attach the other end of the STP cable to a Token Ring LAN.

Note: Since you should connect cables to only one port at a time, do **not** attach anything to the UTP port.

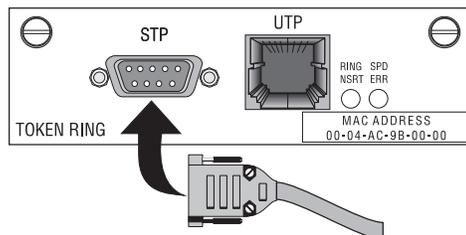


Figure 6. Token Ring STP Connection

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 4. GO TO STEP 8 ON PAGE 4 BY PERFORMING THE PROCEDURE IN 1.10, "VERIFYING A PHYSICAL NIC-TO-LAN CONNECTION."

1.10 Verifying a Physical NIC-to-LAN Connection

This section describes how to perform step 8 on page 4.

You can verify that the NIC is physically connected to the LAN by:

1. Powering up the printer
2. Verifying the LAN connection using the lights on the NIC

1.10.1 Powering Up

1. Reattach the power cord to the printer.
2. Turn the printer on.
3. Wait approximately **one minute** for the printer to do its self-tests. When the tests are complete, the printer's operator panel displays **READY**.

1.10.2 Checking the Lights on the NIC

The NIC is properly connected to the LAN if the lights show:

Token Ring	<ul style="list-style-type: none"> The RING NSRT light is On The SPD ERR light is Off
Ethernet	<ul style="list-style-type: none"> For a UTP connection: <ul style="list-style-type: none"> The LINK light is On The NET ACT light is On and flashes intermittently. For a BNC connection: <ul style="list-style-type: none"> The LINK light is Off The NET ACT light is On and flashes intermittently.
<p>Note: Refer to Table 5 for Token Ring NICs or Table 6 on page 15 for Ethernet NICs for a description of what the lights show if a NIC is not connected properly.</p>	

Sections 1.10.2.1, "Token Ring NIC Lights" and 1.10.2.2, "Ethernet Lights" describe the lights in more detail.

1.10.2.1 Token Ring NIC Lights: The Token Ring NIC lights, labelled **RING NSRT** and **SPD ERR**, may light up, depending on the NIC condition.

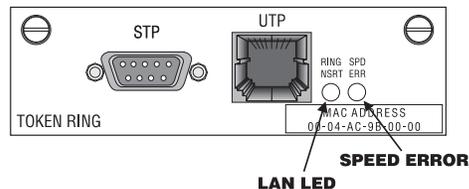


Figure 7. Token Ring Lights

Table 5 shows the Token Ring NIC's light settings.

Condition	RING NSRT	SPD ERR
Power Off	Off	Off
Power On		
Not Connected to LAN	Blinking	Off
Connected to LAN	On	Off
Connected at Wrong Speed	On	On

1.10.2.2 Ethernet Lights: The Ethernet NIC's lights, labelled **LINK** and **NET ACT**, may light up, depending on the NIC condition.

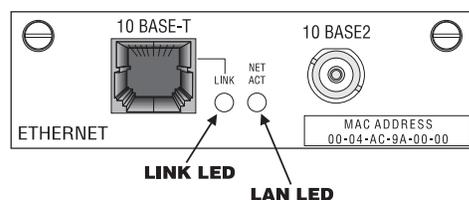


Figure 8. Ethernet Lights

Table 6 on page 15 shows the Ethernet NIC's light settings.

<i>Table 6. Ethernet NIC Light Settings</i>		
Condition	LINK	NET ACT
Power Off	Off	Off
Power On		
Not connected to LAN	Off	Off
Connected UTP	On	On (Intermittent)
Connected BNC	Off	On (Intermittent)
Connected Error	On	Blinking

YOU HAVE NOW COMPLETED STEP 8 ON PAGE 4. THE INSTALLATION OF THE IBM NIC IS COMPLETED. RETURN TO STEP 9 ON PAGE 4 AND COMPLETE THE OPTIONAL STEP(S).

Part 2 - AppleTalk Configuration

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2.0 AppleTalk

NPM-NT or **NPM-95**

Use this chapter to configure AppleTalk to print PostScript files on your IBM network printer.

2.1 Requirements

Verify that you have the following Apple software:

AppleTalk Phase 2 with EtherTalk or TokenTalk, depending on the cabling system used on all Macintosh workstations or servers that use the printer

Macintosh computers running System 7 or higher

2.2 Configuration Checklist

Required Steps:

- ___ **1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- ___ **2** Install the IBM Network Printer driver using the procedure in 2.3, "Installing the IBM PostScript Printer Driver" on page 20. The driver is included with the PostScript option for the printer.
- ___ **3** Configure your printer using the procedure in 2.4, "Configuring AppleTalk to Print to IBM Network Printers" on page 20.
- ___ **4** Verify the configuration by sending a print job to the printer, as described in 2.5, "Verifying the AppleTalk Configuration" on page 22.
- ___ **5** Change the default name of your printer as described in 2.6, "Changing the Name of the Printer on AppleTalk" on page 22.

Optional Steps:

- ___ **6** If you are not using NetWare printing on your network and you have a Telnet capability on the Macintosh, NetWare can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.
- ___ **7** If you have a TCP/IP Telnet capability on the Macintosh and you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.
- ___ **8** If you want to monitor your printer with tools other than those on the Macintosh, refer to Table 18 on page 215.

2.3 Installing the IBM PostScript Printer Driver

The IBM network printer driver for AppleTalk comes with the PostScript option for IBM Network Printer 12, 17, and 24.

Drivers and Utilities on the WWW

To obtain the current version of the Macintosh PostScript printer driver, access the PSC home page:

<http://www.can.ibm.com/ibmprinters>

and follow the directions to the Macintosh printer driver.

The IBM network printers driver for Macintosh can be obtained from two sources: a diskette/CD-ROM or the Web.

1. For a driver obtained from the Web, do the following steps first; otherwise, go to step 2.
 - a. Access the IBM Network Printers home page.
 - b. Navigate to the Printer Drivers Product Update screen, then scroll to the Macintosh driver.
 - c. Read the Readme file to find out what you have to do to use the driver.
 - d. Download the printer driver to the Mac.
 - e. If necessary, obtain the conversion utility, also from the web.
 - f. If necessary, run the conversion utility to convert the "HLQ" file on the Macintosh. Once decoded, you will see an icon labelled "IBM Network Printer Installer."
 - g. Go to step 3.
2. If you have the IBM AppleTalk driver on a diskette or CD-ROM, insert it into the appropriate drive.
3. An untitled dialog displays with two folders. Select the Macintosh folder.
4. Select Installer.
5. A dialog box with the IBM logo displays. Click **Install** to install the driver.
6. When done, click **Quit** to exit the Installer program.

YOU HAVE NOW COMPLETED STEP 2 ON PAGE 19. GO TO STEP 3 ON PAGE 19 BY PERFORMING THE PROCEDURE IN 2.4, "CONFIGURING APPLTALK TO PRINT TO IBM NETWORK PRINTERS."

2.4 Configuring AppleTalk to Print to IBM Network Printers

2.4.1 Data Requirements

You need the following data to configure the printer.

Parameter	Description	Your Value
Printer service name	The default is IBM Network Printer <i>nn</i> . 2.6, "Changing the Name of the Printer on AppleTalk" on page 22 describes the procedure for changing this name after you have completed the configuration.	

2.4.2 Configuration Procedure

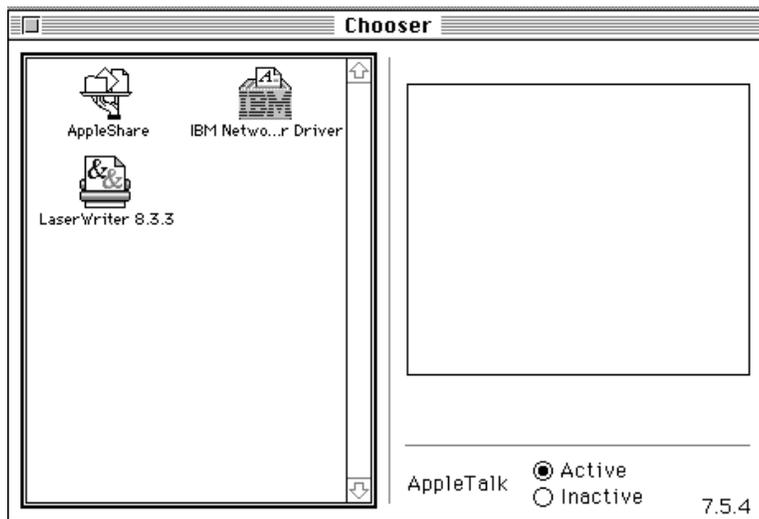
Summary of Configuration Procedure:

- ▶ Associate the printer with its printer driver.
- ▶ Select the printer's PPD.

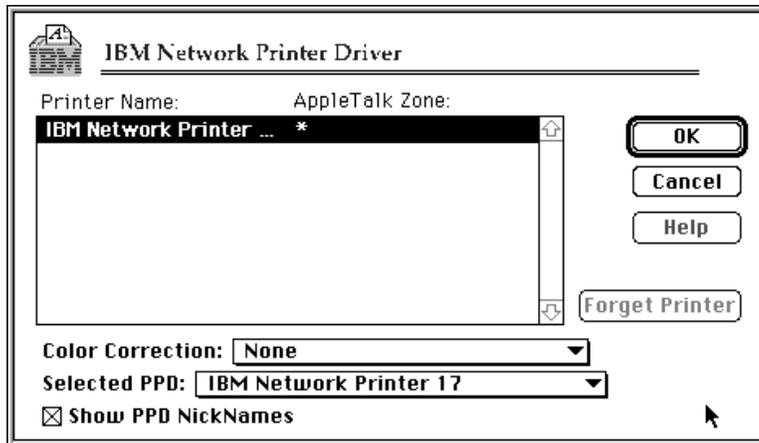
Detailed Configuration Procedure:

Note: The following examples are for the IBM Network Printer 17. If you have a different IBM network printer, replace the **17** with the appropriate number.

1. Verify that AppleTalk is enabled on the NIC.
 - If you have not changed the NIC default parameters, then AppleTalk is enabled by default.
 - If you have changed NIC default parameters, verify that AppleTalk is enabled by printing a NIC configuration page (refer to 1.6.1.2, "Getting a LAN-dependent Configuration Page" on page 9) and looking for "AppleTalk" under the Network Information section.
2. Make sure that the printer is online and ready.
3. Select **Chooser**.



4. Make sure that AppleTalk is **Active**.
5. Select the zone if there is one.
6. Select the IBM Network Printer Driver.
7. When you select the driver, a list of printers to which the driver could be associated is shown in the window on the right. Among the list of printers will be an IBM network printer with a default name like **IBM Network Printer 17**. Select the printer with which to associate the previously selected driver.
8. Click the **Setup** button.
9. Select the PPD with the same name as the printer.



10. Click **OK**.
11. The PPD is now compiled automatically. When completed, a small icon displays to the left of the printer name.
12. Set background printing on or off.

YOU HAVE NOW COMPLETED STEP 3 ON PAGE 19. GO TO STEP 4 ON PAGE 19 BY PERFORMING THE PROCEDURE IN 2.5, "VERIFYING THE APPLE TALK CONFIGURATION."

2.5 Verifying the AppleTalk Configuration

Run any program on the Macintosh and send a print job to the printer from it.

YOU HAVE NOW COMPLETED STEP 4 ON PAGE 19. GO TO STEP 5 ON PAGE 19 BY PERFORMING THE PROCEDURE IN 2.6, "CHANGING THE NAME OF THE PRINTER ON APPLE TALK."

2.6 Changing the Name of the Printer on AppleTalk

As part of the printer installation process, IBM recommends that you use the IBM Printer Utility or the Macintosh LaserWriter Utility to change the default name of the printer to a different name.

2.6.1 Why the Printer Name Should be Changed

The reason for this recommendation is that when multiple IBM network printers of the same model (for example, 12, 17, or 24) are connected to the LAN, the default printer name changes each time a printer is powered up or connected to the network.

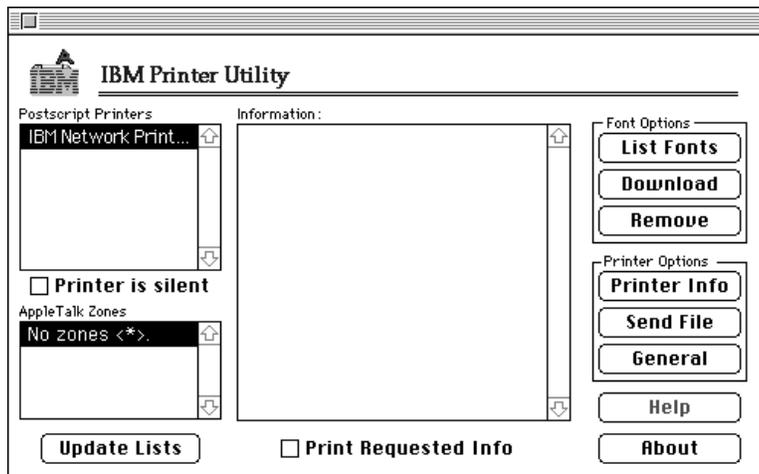
The example in the following table shows what happens when several IBM Network Printer 17 printers are turned on one after the other.

When the first Network Printer 17 on the network is turned on, it will be listed as:	17
When the second Network Printer 17 on the network is turned on, it will be listed as:	171
When the third Network Printer 17 on the network is turned on, it will be listed as:	172
When the fourth...	And so on...

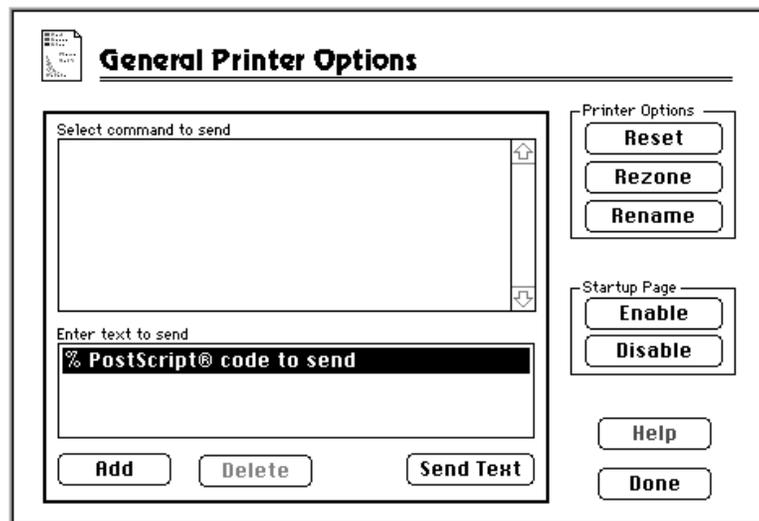
2.6.2 Changing the Printer Name

To change the name of the printer:

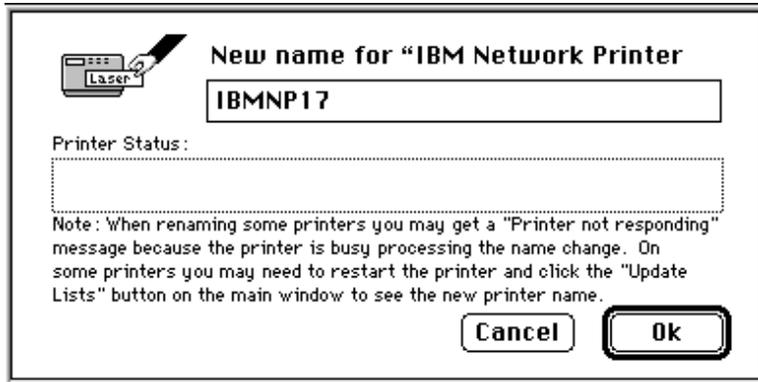
1. Open the **IBM Network Printer** folder.
2. Select the **IBM Printer Utility** icon.
3. When the dialog for the utility displays, select the printer.
4. From the **Printer Options** list, select **General**.



5. At the **General Printer Options** dialog, click **Rename**.



6. Type in the new name, then click **OK**, then **Done**.



7. The printer, under its new name, will show up in the IBM Printer Utility dialog.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 19. GO TO STEP 6 ON PAGE 19 BY PERFORMING THE OPTIONAL PROCEDURE IN 20.1, "DISABLE NETWORK IF YOU'RE NOT USING IT" ON PAGE 203.

Part 3 - NetBIOS Configuration

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3.0 OS/2 NetBIOS

NPM-OS/2

Use this chapter to configure IBM Lan Server for OS/2 or Microsoft LAN Manager for OS/2 to use NetBIOS to print to your IBM network printers.

3.1 Requirements

Verify the existence of the following software requirements:

LAN Server Requirements:

OS/2:

On the LAN Server, you need **one** of the following versions of OS/2:

- OS/2 Version 2.11 or higher **and** LAN Server Version 3.0 or 4.0
- OS/2 Warp Version 3.0 or higher **and** LAN Server Version 3.0 or 4.0
- OS/2 Warp Connect Version 3.0 (including OS/2 TCP/IP Version 3.0), which includes LAN Server Version 4.0
- OS/2 Warp Server Version 4.0 (including OS/2 TCP/IP Version 3.0), which includes LAN Server 5.0

Submitter:

On each submitter (client) workstation, you need **one** of the following:

- PC DOS Version 6.0 or higher with IBM DOS LAN Requester
- OS/2 Version 2.1 or higher with OS/2 LAN Requester 3.0 or higher
- OS/2 Warp Connect Version 3.0 with LAN Requester installed

LAN Manager Requirements:

LAN Manager Server requirements are

- OS/2 Version 1.3 or higher
- Microsoft LAN Manager Version 2.1 or higher

LAN Manager Submitter Requirements are the same as those for LAN Server.

3.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on NetBIOS require **administrative** authority.

Required Steps:

- 1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.

- ___ **2** If you do **not** have a DHCP server anywhere on your network, go to step 3 on page 28. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP" on page 181 and determine what you should do by reading:
- a. 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181
 - b. 18.2, "Options for Configuring NICs for DHCP and BOOTP" on page 183
 - c. 18.3, "Setting Dynamic IP Addresses with DHCP" on page 187

- ___ **3** If you want to change the NIC's MAC address, but did not do so using the printer operator panel (see step 11 on page 4), you can change the MAC address on Token Ring cards only by using one of the following procedures:
- **Command Line:**
 - a. Login to the NIC using the appropriate procedure:
 - 25.1, "Logging into a NIC using NetWare IPX" on page 229
 - 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230
 - b. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
 - **NPM:**

Refer to the NPM OS/2 help system to determine how to do this.

- ___ **4** You need the following data to configure the NIC:

<i>Table 7. NetBIOS Configuration Data</i>		
Parameter	Description	Your Value
Printer queue name	A valid user-defined OS/2 queue name.	
NIC name	Print server name. On the NIC configuration page, this is the Node Name . (On the NIC configuration page, this is the Node Name . For information about the configuration page, refer to 1.6, "The NIC Configuration Page" on page 8.) The default NIC name is NCT or NCE plus the last six digits of the MAC address, for example NCT9a1234.	
Printer service name	The Printer Service name should be something like NCX9a1234_1 if the NIC defaults have not been changed. If the NIC service names have been changed with NPM or the command line, print a NIC configuration page (see 1.6, "The NIC Configuration Page" on page 8) and check for a service that lists NetBIOS as a supported protocol. The service name is used to send print jobs to the printer.	

- ___ **5** Install the driver for OS/2 using the procedure in 3.3, "Installing the Printer Driver for OS/2" on page 29.
- ___ **6** Install the LAN Manager or LAN Server printer utility using the procedure in 3.4, "Installing OS/2 Utilities" on page 30.
- ___ **7** Perform the procedure described in 3.5, "Installing the Printer on OS/2 using NetBIOS" on page 30.
- ___ **8** Create a printer alias using the procedure in 3.6, "Sharing the Printer by Creating the Printer Alias" on page 32 as a model.

- ___ **9** Configure print requesters by doing the procedure in 3.7, "Configuring Print Requesters on OS/2" on page 34.
- ___ **10** Verify the configuration. Use the procedure in 3.8, "Verifying the NetBIOS Configuration" on page 37 to print from NetBIOS.
- ___ **11** If you have problems, refer to 3.9, "Handling NetBIOS Problems" on page 37.

Optional Steps:

- ___ **12** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.
- ___ **13** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.
- ___ **14** If you want to monitor your NetBIOS printers, you should consult 21.4, "Monitoring with NetView for OS/2" on page 210 and Table 18 on page 215 in 22.1, "What is Network Printer Manager (NPM)?" on page 215.

3.3 Installing the Printer Driver for OS/2

You need to install the OS/2 printer driver at this point because the IBM Utility (LAN Server Printer Utility or LAN Manager Printer Utility) will not install it.

Drivers and Utilities on the WWW

To obtain the most current version of the OS/2 printer driver, access the PSC home page:

<http://www.can.ibm.com/ibmprinters>

and follow the directions.

Install the IBM printer driver(s) for OS/2 for your IBM network printer by doing the following steps. These steps will create a temporary queue, install the drivers, then delete the temporary queue.

1. Obtain the diskette or CD-ROM with printer drivers for OS/2.
2. Read the READ.ME file contained on the medium for installation directions.
3. Install the printer driver(s) using a temporary name such as TEMP, for the queue.
4. Select the temporary printer queue icon.
5. Delete the temporary icon.

- **If you were installing under NetBIOS:**

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 28. GO TO STEP 7 ON PAGE 28 BY PERFORMING THE PROCEDURE IN 3.5, "INSTALLING THE PRINTER ON OS/2 USING NETBIOS" ON PAGE 30.

- **If you were installing under TCP/IP:**

YOU HAVE NOW COMPLETED STEP 5A ON PAGE 144. GO TO STEP 5C ON PAGE 144 BY PERFORMING THE PROCEDURE IN 13.3, "INSTALLING THE PRINTER FOR OS/2 USING IBM UTILITIES" ON PAGE 145.

3.4 Installing OS/2 Utilities

This section describes how to install the LAN Manager Printer Utility or LAN Server Printer Utility on the server system.

Drivers and Utilities on the WWW

To obtain the most current version of the OS/2 utilities, access the PSC home page:

<http://www.can.ibm.com/ibmprinters>

and follow the directions.

1. Place the diskette or CD-ROM with the LAN Server Printer Utility or LAN Manager Printer Utility into the appropriate drive.
2. Enter:
`d:\name\install`
where *name* is either LANMAN or LANSRV.
3. Click the **OK** button.
4. The default source directory is `a:\direct` where *direct* is either LANMAN or LANSRV and the default target directory is `c:\target` where *target* is either APMLMUTL or APMLSUTL. Click the **Install** button if no changes are required.
5. The LAN Manager Printer Utility or LAN Server Printer Utility creates a LAN Manager Printer Utility or LAN Server Printer Utility folder and adds a line like `pathname\NPMST.EXE pathname` to the STARTUP.CMD file.
6. You see a pop-up window when the installation is complete. Click the **OK** button to exit the installation program.

- **If you were installing under NetBIOS:**

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 28. GO TO STEP 5 ON PAGE 28 BY PERFORMING THE PROCEDURE IN 3.3, "INSTALLING THE PRINTER DRIVER FOR OS/2" ON PAGE 29.

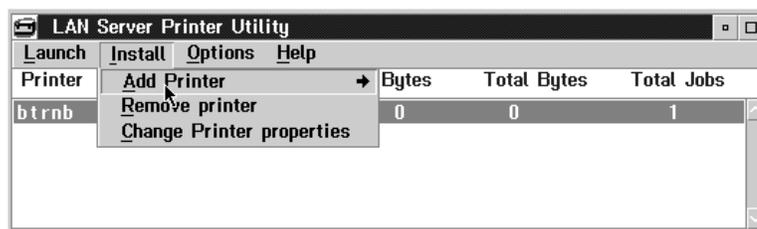
- **If you were installing under TCP/IP:**

YOU HAVE NOW COMPLETED STEP 5B ON PAGE 144. GO TO STEP 5A ON PAGE 144 BY PERFORMING THE PROCEDURE IN 3.3, "INSTALLING THE PRINTER DRIVER FOR OS/2" ON PAGE 29.

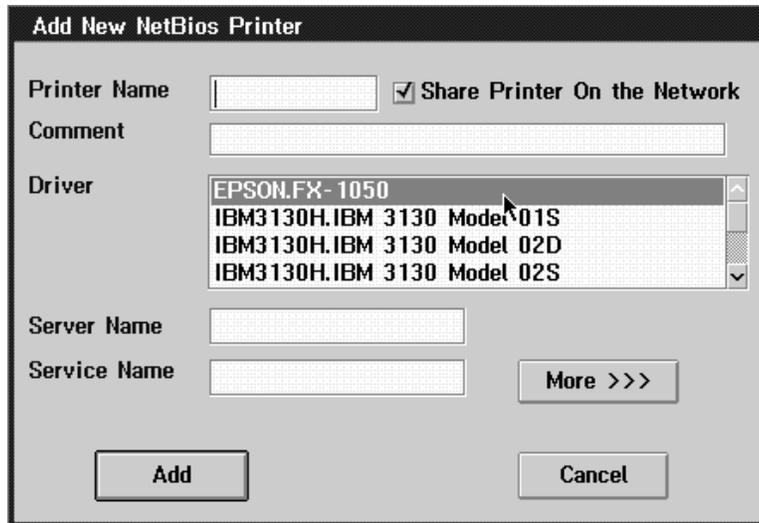
3.5 Installing the Printer on OS/2 using NetBIOS

To install an IBM network printer on your system:

1. Open the LAN Server Printer Utility or LAN Manager Printer Utility folder.
2. Open the LAN Server Printer Utility or LAN Manager Printer Utility.
3. Select **Install** from the menu bar.
4. Select the **Add Printer** option:



5. Select the NetBIOS option.
6. You see the **Add New Printer** window for NetBIOS:



7. Fill in the fields with the following information:

Printer Name

Enter the name you want to use for the printer queue name.

Share Printer On the Network

If the LAN Server Printer Utility or LAN Manager Printer Utility (Version 1.01 or higher) is installed on an additional server, then LAN Server or LAN Manager commands should be used to share the printer. This option is only left checked on domain controllers.

Comment This field is optional and is used to further identify a printer.

Driver Select the printer driver for the printer being installed.

Server Name

Name of the NIC. Refer to Table 7 on page 28. (In the Network Information section of the NIC configuration page, this is called the Node Name.) For example: NCT0000DA.

Service Name

The name of the NetBIOS printer service on the IBM NIC. Refer to Table 7 on page 28. Use the default service name of the printer for example, NCT0000DA_1. Once the initial configuration is completed, you may change this name using the guidelines provided in 20.0, "Customizing the NIC" on page 203.

8. Click the **Add** button. A printer queue is created on the OS/2 desktop with the name given as the printer queue name in step 7.
9. Right click the printer object icon, then select **Settings** then **Queue Options** to verify that **PM Print** is selected.
10. Move the printer queue icon that you have just created to the printer queue folder, if desired.

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 28. GO TO STEP 8 ON PAGE 28 BY PERFORMING THE PROCEDURE IN 3.6, "SHARING THE PRINTER BY CREATING THE PRINTER ALIAS" ON PAGE 32.

3.6 Sharing the Printer by Creating the Printer Alias

Note: The printer alias can be created in different ways and with different tools. The following example uses LAN Server Version 4.0.

Do this step if you are using standard OS/2 to configure the printer.

Note: This procedure is performed automatically by the LAN Server Printer Utility or LAN Manager Printer Utility, as described in 13.3, "Installing the Printer for OS/2 using IBM Utilities" on page 145. Only under certain conditions would an LAN Server Printer Utility or LAN Manager Printer Utility user be required to create aliases manually. (Refer to step 5d on page 144.)

3.6.1 Data Requirements

Parameter	Description	Your Value
Domain name	Domain in which the printer alias is to be created, for example HQ.	
Alias name	User-assigned name.	
Server name	Name of the LAN Server.	
Spooler queue name	The name of the printer service or object assigned earlier in 13.4, "Installing the Printer using Standard OS/2 TCP/IP" on page 147 in step 6 on page 149	

3.6.2 Configuration Procedure

A Printer alias is required if you want to share the printer.

Summary of Configuration Procedure:

- ▶ Access Resource definitions.
- ▶ Specify a queue name.
- ▶ Specify sharing conditions.
- ▶ Specify general parameters.
- ▶ Create access control profile.
- ▶ Specify auditing parameters.
- ▶ Verify.

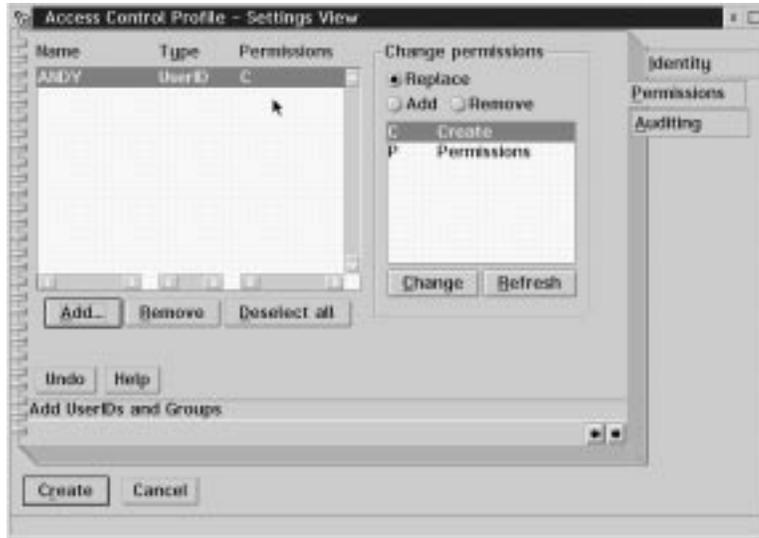
Detailed Configuration Procedure:

1. Open the **LAN Services** folder from the OS/2 desktop.
2. Open the **LAN Server Administration** object.
3. Open the domain object in which you want to create the alias. If you do not know your domain name, check with your Network Administrator.
4. Open **Resource Definitions**.³
5. Drag and drop the **Printer Template** to a convenient location in the Resource Definitions window. The **Printer Alias - Create** window opens.

³ If this option is not visible, you did not logon as administrator.



6. Type an alias name in the **Alias** field. This name must be unique to your domain.
7. If you wish, type a description in the **Description** field.
8. In the **Server Name** field, enter (or select) the name of the OS/2 server. This is the name of the OS/2 server where you created the IBM network printer object.
9. Select or type a queue name in the **Spooler queue name** field. This is the name of your IBM Network printer object created in step 5 on page 144.
10. Determine when you want this printer resource to be shared on the network:
 - **At server startup** automatically shares your printer each time the server is started.
 - **By administrator action** requires your network administrator to manually issue a start sharing command.
11. If you wish to limit the maximum concurrent connections to the printer resource, enter that number in the **Number of connections** field.
12. Select the **General** tab to continue configuring your printer alias.
13. Type in the name of your alias in the **Title** section.
14. Select **Create** to save your settings and install your alias in the **Resource Definitions** folder.
15. If an **Access Control Profile** was not created previously, you are prompted to create one now. Select **OK** and the **Access Control Profile - Settings View** window opens.
16. Select the **Permissions** tab to define access permissions for your users and groups.



17. Click the **Add...** button to select the names of the userids and groups that have access to your printer. Give each user or group **Create** authority.
18. After you have completed the permissions section, click the **Auditing** tab to open the Audit settings view.
19. Decide which level of auditing you wish to have on this printer resource.
20. Click the **Create** button to create the access control profile for your printer resource.
21. Verify that your printer resource is shared by issuing the following command in an OS/2 command line window:

```
net share
```

- **If you are configuring under TCP/IP:**

YOU HAVE NOW COMPLETED STEP 5B ON PAGE 144. GO TO STEP 6 ON PAGE 144 BY PERFORMING THE PROCEDURE IN 3.7, "CONFIGURING PRINT REQUESTERS ON OS/2."

- **If you are configuring under NetBIOS:**

YOU HAVE NOW COMPLETED STEP 8 ON PAGE 28. GO TO STEP 9 ON PAGE 29 BY PERFORMING THE PROCEDURE IN 3.7, "CONFIGURING PRINT REQUESTERS ON OS/2."

3.7 Configuring Print Requesters on OS/2

This section describes:

- 3.7.1, "Setting up a Shared Printer on an OS/2 Requester"
- 3.7.2, "Setting up a Shared Printer on a DOS Requester" on page 36
- 3.7.3, "Setting up a Shared Printer on a WIN-OS/2 Requester" on page 36

3.7.1 Setting up a Shared Printer on an OS/2 Requester

The following steps are required to set up a network printer object on an OS/2 requester:

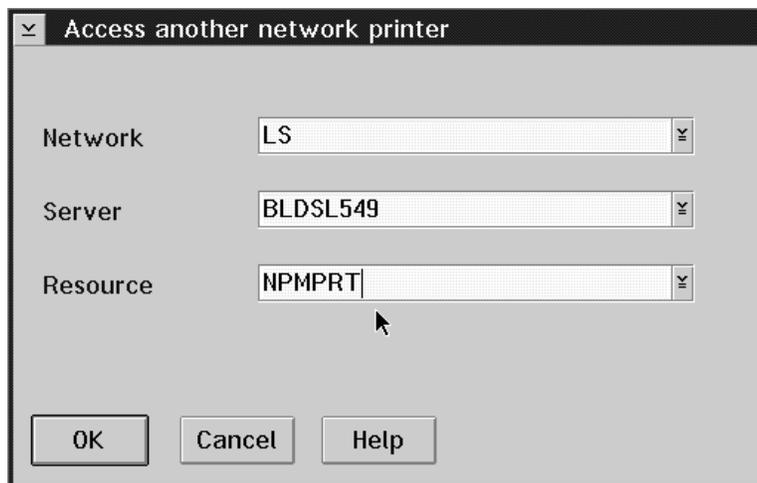
- Set up a shared printer directory on the server.
- Set up a shared printer on a requester or copy the printer driver for each IBM network printer to each user's workstation.

3.7.1.1 Setting Up a Shared Printer Driver Directory on the Server: The following optional steps show the network administrator an example of setting up a shared printer driver directory on the server:

1. Install the printer driver for OS/2 using the directions in the README file on the diskette or CD-ROM.
2. Create a directory named C:\DRIVERS on the server. Copy the just-installed driver into this directory. This directory may be used for other OS/2 print drivers that you want to have shared.
3. Create a directory alias named NPMDRV for the C:\DRIVERS directory. See 3.6, "Sharing the Printer by Creating the Printer Alias" on page 32 for information on setting up an alias (or refer to the LAN Server or LAN Manager Administration Guide).
4. Create an access control profile for this alias and give users Read access.

3.7.1.2 Setting Up a Shared Printer on an OS/2 Requester: A LAN Server or LAN Manager user can now do the following steps:

1. Find the **Templates** icon on the OS/2 requester workstation desktop. Double-click (or right mouse button click and select **Open** from the pop-up menu) on the icon to open the **Templates - Icon View** window.
2. Using the right mouse button, drag and drop the **Network Printer** template icon to a folder on the desktop or right mouse click the icon and select **Install** from the pop-up menu. The **Access Another Network Printer** window opens.



3. The **Network** field is used to specify the network type where the shared printer is located. LS denotes OS/2 LAN Server. LM denotes OS/2 LAN Manager.
4. Complete the **Server** field by selecting the down arrow and choosing a LAN Server or by typing in the name of the LAN Server where your IBM Network Printer is installed. If the requester is not logged onto the LAN, the **LAN Logon** window appears and must be completed.
5. Complete the **Resource** field by selecting the down arrow and choosing a valid queue or by typing in the name of the queue (or printer object) where your IBM Network Printer is installed.
6. If the IBM Network Printer driver has not been installed on your workstation, a message box tells you that you need one.
7. Either install the printer driver for OS/2 using the directions included on the README file on the printer drivers for OS/2 diskette or CD-ROM or point to a shared directory on the server.
8. When the driver installation is complete, a network printer object is added to the desktop, and you may begin printing.
9. Verify the configuration. Refer to 13.5, "Verifying the LAN Server Configuration" on page 150.

3.7.2 Setting up a Shared Printer on a DOS Requester

To set up a shared printer on a DOS requester:

1. Start the network requester.
2. Redirect printing by associating a network print queue to a local port (such as LPT1, 2, or 3) with the command:

```
net use lpt2 alias
```

where *alias* is the name of the just created printer alias.

Note: If you are using a DOS application that requires an application-specific DOS driver, which is not provided by IBM, use a standard HP/PCL or generic PostScript driver.

3. Test the connection to the printer with the following:

```
C:\copy filename lpt2
```

Problems?

If you have problems printing, refer to 19.0, "Handling TCP/IP Problems" on page 197 or 3.9, "Handling NetBIOS Problems" on page 37.

3.7.3 Setting up a Shared Printer on a WIN-OS/2 Requester

Use this section if you want to set up OS/2 so users can print from Windows applications running under WIN-OS/2.

Two steps are required to set up a WIN-OS2 requester:

1. Set up the OS/2 connection.
2. Set up WIN-OS2 as a requester.

3.7.3.1 Setting Up the OS/2 Connection

1. Install the Windows 3.1x driver using the **Printers** applet under **Control Panel** in WIN-OS/2. Connect this printer to the parallel port, LPTx.OS2. If you intend to use multiple network-attached printers, connect each of them to a different LPTx.OS2 port.
2. From the OS/2 desktop, open an OS/2 command prompt window and enter:

```
net use lpt2 alias
```

where *alias* is the shared resource name.

If desired, this redirector can be made automatic by entering the above command in your STARTUP.CMD file.

3.7.3.1.1 Setting up Win OS/2 as a Requester: Test the configuration by accessing a WIN-OS/2 application and sending a print job to the printer. Send the print job to LPT2.OS2 or LPT3.OS2, whichever one you specified earlier.

To send a print job to the printer from the OS/2 command line, enter a command like:

```
copy filename lpt2
```

Problems?

If you have problems printing, refer to 19.0, "Handling TCP/IP Problems" on page 197 or 3.9, "Handling NetBIOS Problems" on page 37.

- **If you are configuring under TCP/IP:**

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 144. GO TO STEP 7 ON PAGE 144 BY PERFORMING THE PROCEDURE IN 13.5, "VERIFYING THE LAN SERVER CONFIGURATION" ON PAGE 150.

- **If you are configuring under NetBIOS:**

YOU HAVE NOW COMPLETED STEP 9 ON PAGE 29. GO TO STEP 10 ON PAGE 29 BY PERFORMING THE PROCEDURE IN 3.8, "VERIFYING THE NETBIOS CONFIGURATION."

3.8 Verifying the NetBIOS Configuration

Using Warp Server?

If you are using OS/2 Warp Server, you must ensure that the spooler is enabled and that the PMPRINT queue driver is being used. **The queue processor should NOT be PMAPRINT.**

1. To print from a server, logon to either LAN Server or LAN Manager as administrator.
2. Start either the LAN Server Printer Utility or LAN Manager Printer Utility depending on which server you started in step 1.
3. Logon to the LAN Server or LAN Manager domain as any user.
4. Verify that the network printer is available with the commands:

```
net alias
```
5. Enable the printer for use on the network with the command:

```
net use lpt2 alias
```
6. If you are using OS/2 Warp Server, enable the spooler.
Note: If the spooler is disabled on OS/2 Warp Server, you may lose data from print jobs.
7. Submit a test print job with the command:

```
copy config.sys lpt2
```


Note: If you get a "Port not accessible" message and nothing prints, see 3.9.2, "NetBIOS Connectivity Problems."
8. When finished, delete the net use LPT assignment from the spooler with the command:

```
net use lpt2 alias /d
```

YOU HAVE NOW COMPLETED STEP 10 ON PAGE 29. GO TO THE OPTIONAL STEP 12 ON PAGE 29.

3.9 Handling NetBIOS Problems

Use this section to resolve NetBIOS problems.

3.9.1 Network Setup

Before doing anything else to try to resolve problems, you should verify that NetBIOS is enabled on the NIC. To do that, obtain a NIC configuration page (refer to 1.6, "The NIC Configuration Page" on page 8).

If NetBIOS is enabled on the NIC, the next thing is to verify that the correct data was entered during the configuration process. Make sure the printer service name ends with an "_1."

3.9.2 NetBIOS Connectivity Problems

To print with NetBIOS, you must be logged onto either LAN Server or LAN Manager and the LAN Server Printer Utility or LAN Manager Printer Utility, respectively, must be running. If the printer utility is not running, you will not be able to print.

You must also be logged into the LAN Server or LAN Manager domain, or else you will see a “Port not accessible” error in the LAN Server Printer Utility (or LAN Manager Printer Utility) window when you send a job to the printer.

Part 4 - NetWare Configuration

N E T W A R E

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4.0 NetWare 3.X

NPM-NT or **NPM-95**

Use this chapter to configure the IBM NIC under NetWare 3.X as a print server or remote printer using the NetWare command line. The IBM Network Printer Manager (NPM) can perform the command line procedures described here with a minimum of input from you. Refer to 22.8, "Monitoring with NPM in a NetWare IPX Environment" on page 218.

4.1 Requirements

Verify that you have the required software:

- The NetWare file server needs NetWare 3.11 or higher.
- Requesters need NetWare Shell Version 3.26 or higher.

Note: The file server and any workstation that submits print jobs to the printer must support the IPX/SPX protocol (Novell NetWare Shell Version 3.26 and above).

4.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on NetWare 3.x require **Supervisor** authority.

Required Steps:

- 1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- 2** If you have a network with multiple servers, perform the procedure in 4.3, "Configuring NetWare on a Large Network" on page 42. Otherwise, go to step 3.
- 3** If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 11 on page 4), you can change the MAC address on Token Ring cards only by using one of the following procedures:
 - **Command Line:**
 - a. Login to the NIC using the procedure in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
 - b. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
 - **NPM:**

Refer to the NPM NT or 95 help system to determine how to do this.
- 4** Read 4.4, "Choosing Print Server or Remote Printer" on page 42 to determine which of the two ways of using the NIC, as a print server or a remote printer, you want to use when configuring the printer in step 5.
- 5** To configure your printer, select one of the following two tools:

- **NPM:** If you are using NPM for Windows NT or 95, go to page 216.
- **PConsole:** If you are using PConsole, go to one of the following:
 - 4.5, “Configuring under NetWare 3 as a Print Server using PConsole” on page 43.
 - 4.6, “Configuring under NetWare 3 as a Remote Printer using PConsole” on page 45.

___ **6** Verify the configuration by doing the procedure in 4.7, “Verifying the NetWare Configuration” on page 47.

___ **7** If you encounter problems, refer to 5.9, “Handling NetWare/IPX Problems” on page 65.

Optional Steps:

___ **8** If you have a large network, consult the suggestions provided in 5.8, “Improving Network Traffic on Large Networks” on page 64.

___ **9** If you want to customize your NIC, refer to 20.0, “Customizing the NIC” on page 203.

___ **10** If you want to monitor your printer, refer to:

- 21.3, “Monitoring Network Printers on NetWare” on page 209
- Table 18 on page 215 and 22.8, “Monitoring with NPM in a NetWare IPX Environment” on page 218.

4.3 Configuring NetWare on a Large Network

This section describes several steps that you may perform at your option if yours is a large network.

1. Logon to the NIC using the procedure in 25.1, “Logging into a NIC using NetWare IPX” on page 229.
2. Set the preferred server by using the procedure in 20.7.4, “Specifying a Preferred NetWare Server” on page 206.
3. Set the frame type default using the command described in 27.7, “Frame” on page 239.
4. Set the required server using the procedure in 20.7.5, “Specifying a Required NetWare Server” on page 206.
5. Refer to 5.8, “Improving Network Traffic on Large Networks” on page 64 for other considerations related to large networks.

YOU HAVE COMPLETED THE OPTIONAL PROCEDURES FOR A WAN. RETURN TO STEP 3 ON PAGE 41.

4.4 Choosing Print Server or Remote Printer

NetWare versions 3 and 4 may be configured to use the IBM NIC as a Print Server, Remote Printer, or both:

- The IBM NIC’s Print Server program can directly service NetWare print queues.
- The NIC can function as a remote printer under versions 3.x and 4.x operating under the control of a NetWare Print Server (EXE or NLM).

A principal reason for using Remote Printer instead of Print Server in the NetWare environment is to reduce the number of licensed connections the card uses on the file servers:

- If **Print Server** mode is used, the NIC takes up one licensed connection by itself.
- If **Remote Printer** mode is used, the NIC will not take up a licensed connection by itself, but a NetWare PServer running on a workstation (EXE or NLM) will take up one licensed connection.

Note: Refer to 5.8.3, “Determining NetWare File Server Licenses” on page 65 for additional considerations concerning the number of licenses needed.

Additional reasons for choosing Print Server or Remote Printer are described in the following sections.

4.4.1 Print Server

Using the IBM NIC to act as a print server by itself:

- Replaces the need for an additional NetWare Print Server (NLM or EXE)
- Provides faster throughput than using the NIC's Remote Printer facility
- Supports encrypted or unencrypted passwords

4.4.2 Remote Printer

Using the IBM NIC as a NetWare Remote Printer (RPrinter):

- Requires a NetWare Print Server (NLM or EXE) module running on the network
- Provides slower throughput than using the NIC as a Print Server
- Uses the NetWare Print Server module to handle passwords

Choose the best configuration to meet your needs. For related considerations, refer to:

- 5.8.2.2, "Disabling Remote Printer if You Are Using only Print Server" on page 64
- 5.8.2.3, "Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode" on page 65
- 5.8.2.4, "Disabling Print Server Mode if You Are Using only Remote Printer" on page 65

RETURN TO STEP 5 ON PAGE 41, IF YOU WERE CONFIGURING NETWARE 3.X. RETURN TO STEP 5 ON PAGE 52, IF YOU WERE CONFIGURING NETWARE 4.X.

4.5 Configuring under NetWare 3 as a Print Server using PConsole

Use this section to configure the NIC under NetWare 3 as a print server.

4.5.1 Data Requirements

Parameter	Description	Your Value
File server name	The name of the Novell file server, for example Novell31. Obtain this name from the network administrator.	
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
NIC name (print server)	The default or user-assigned name of the NIC. The default is NCT or NCE plus the last six digits of the card's MAC address (the MAC address is printed on the card's faceplate). On the NIC configuration page, the NIC name is called the Node Name in the "Network Information" section.	
Printer service name	The name for the printer service, for example NCE9A1234_1. The default printer service name is obtained by adding an "_1" to the NIC name (see above). Use the default name for the initial configuration. You can change the name later on by referring to 20.0, "Customizing the NIC" on page 203.	

4.5.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Login to the NetWare file server.
- ▶ Create the print queue.
- ▶ Add the NIC as a print server.
- ▶ Add the default NetWare-enabled service (a printer).
- ▶ Map the print queue to the printer.
- ▶ Restart the NIC.
- ▶ Test the configuration with a print job.

Detailed Configuration Procedure:

1. Turn the printer on (if it is off).
2. Login to the NetWare file server as supervisor, for example:
`LOGIN fileserver/SUPERVISOR`
3. Enter:
`PCONSOLE`
4. From the **Available Options** menu, select **Print Queue Information**.
5. Press **Insert**.
6. Enter any new print queue name.
7. Press **Esc** until the **Available Options** menu appears.
8. From the **Available Options** menu, select **Print Server Information**.
9. Press **Insert**.
10. Enter the IBM NIC name as the new print server name.
11. Select the newly defined print server name (NIC name).
12. Select **Print Server Configuration**.
13. Select **Printer Configuration**.
14. Select one of the "not installed" printers from the list.
15. Enter the IBM printer service name. Use the **default** printer service name (for example, NCTxxxxx_1) the first time you configure the card. Make sure the name ends with an "_1."
16. Leave the Type as "Defined Elsewhere."
17. Press **Esc**.
18. Select **Yes** to confirm the save.
19. Press **Esc** until the **Print Server Configuration** menu appears.
20. From the **Print Server Configuration** menu, select **Queues Serviced by Printer**.
21. Select the printer service name. Use the **default** printer service name (for example, NCTxxxxx_1), and make sure the name ends with an "_1."
22. Press **Insert** to display the list of available queues.
23. Select the queue to be serviced by the printer.
24. Enter a priority level. The default is one, which is the highest priority.
25. Press **Esc** until the **Print Server Information** menu appears.

The following procedure allows the NIC to read the new configuration in the file server's bindery.

Important. When configuring a NIC in print server mode, the NIC acts as its own print server and PSERVER.NLM must not be loaded on the file server with the same name as the NIC.

26. From the **Print Server Information** menu, select **Print Server Status/Control**.

Notes:

- a. This option appears only if the NIC is powered up and connected to the network and the configuration was successful.
- b. If the procedure was not successful, return to step 8 and make sure the correct names were entered at each step.
- c. If that does not work, recycle power on the printer, wait about three minutes, then try step 26 again.

- 27. Select **Server Info**.
- 28. Scroll to **Current Server Status**.
- 29. Select **Running**.
- 30. Select **Down** or **Going Down After Current Jobs**.

Note: The NIC's print server function goes down, but the NIC brings it back up again automatically. (The NIC's print server function is **not** a NetWare print server NLM or EXE.)

- 31. Press **Esc** until the message **Exit PConsole** appears.
- 32. Select **Yes** to exit PConsole.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 41. GO TO STEP 6 ON PAGE 42 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION" ON PAGE 47.

4.6 Configuring under NetWare 3 as a Remote Printer using PConsole

Use this section to configure the NIC under NetWare 3 as a remote printer.

4.6.1 Data Requirements

Parameter	Description	Your Value
File server name	The name of the Novell file server, for example Novell31. Obtain this name from the network administrator.	
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
NIC name (print server)	The default of user-assigned name of the NIC. The default is NCT or NCE plus the last six digits of the card's MAC address (the MAC address is printed on the card's faceplate). On the NIC configuration page, the NIC name is called the Node Name on the "Network Information" section.	
NetWare Print Server (NLM or EXE) name	For example, Novell31PS. This is the name of the Print Server (NLM or EXE) that runs either on the NetWare file server or client. The name is used when running the NIC as a remote printer.	
Printer service name	The name for the printer service, for example NCE9A1234_1. The default printer service name is obtained by adding an "_1" to the NIC name (see above). Use the default name for the initial configuration. You can change the name later on by referring to 20.0, "Customizing the NIC" on page 203.	

4.6.2 Configuration Procedure

Is Remote Printer Disabled?

Some versions of the NIC microcode disable remote printer by default. Before doing this remote printer configuration, obtain a NIC configuration page (refer to 1.6, "The NIC Configuration Page" on page 8) to see if remote printer is disabled. Look for "RPrinter:..." under the "NetWare Information" section. If RPrinter is enabled, you will see the word "enabled." If RPrinter is disabled, you will see the word "disabled." If remote printer is disabled, login to the NIC (refer to 25.1, "Logging into a NIC using NetWare IPX" on page 229), then enter the command:

```
define server netware rprinter enable
```

Reboot the NIC with the command:

```
init delay 0
```

Summary of Configuration Procedure:

- ▶ Login to the NetWare file server.
- ▶ Create a print queue.
- ▶ Add the NIC as a remote printer.
- ▶ Map the print queue to the printer.
- ▶ Restart the print server.
- ▶ Test the configuration with a print job.

Detailed Configuration Procedure:

1. Turn the printer on (if it is off).
2. Login to the NetWare file server as supervisor, for example:

```
LOGIN fileserver/SUPERVISOR
```
3. Enter:

```
PCONSOLE
```
4. From the **Available Options** menu, select **Print Queue Information**.
5. Press **Insert**.
6. Enter any new print queue name and record the name on the data requirements table.
7. Press **Esc** until the **Available Options** menu appears.
8. From the **Available Options** menu, select **Print Server Information**.
9. Select an existing NetWare print server (NLM or EXE).
10. Select **Print Server Configuration**.
11. Select **Printer Configuration**.
12. Select one of the not-installed printers.
13. Enter the IBM printer service name. Use the **default** printer service name (for example, NCTxxxxx_1) for the initial configuration of the card and make sure the name ends with an "_1."
14. Select the **Type** field.
15. Select **Remote Other/Unknown**.
16. Press **Esc**.
17. Select **Yes** to confirm the save.
18. Press **Esc** until the **Print Server Configuration** menu appears.
19. From the **Print Server Configuration** menu, select **Queues Serviced by Printer**.
20. Select the printer service name. Use the **default** printer service name (for example, NCTxxxxx_1) for the initial configuration of the card and make sure the name ends with an "_1."
21. Press **Insert**.
22. Select the queue to be serviced by the printer.

23. Enter a priority level. The default is one, which is the highest priority level.
24. Press **Esc** until the **Exit PConsole** window appears.
25. Exit PConsole.
26. If the print server (NLM or EXE) is already running, stop then restart it to enable the new configuration. Use one of the following procedures:

- **For NetWare 3 Non-Dedicated Print Servers (NLM)**, at the file server console, enter:

```
UNLOAD pserver
LOAD pserver pserver_name
```

where: *pserver_name* is the existing NetWare print server name.

Note: It may take up to ten minutes for the NIC to attach to the print server.

- **For NetWare 3 Dedicated Print Server (EXE)**, login from any NetWare client other than where the print server is running:

```
LOGIN fileserver/SUPERVISOR
```

where: *fileserver* is the existing NetWare print server name.

- a. Run PConsole.
- b. Select **Print Server Information**.
- c. Select the NetWare print server to shut down.
- d. Select **Print Server Status and Control**.
- e. Select **Server Info**.
- f. Select **Running**.
- g. Select **Down** to perform an immediate shutdown. This step logs the print server user off.
- h. At the workstation where print server was running, log back into the file server with Read and File Scan access to the SYS:\PUBLIC directory.
- i. From the print server workstation, enter:

```
pserver pserver_name
```

where:

pserver_name The existing NetWare print server name.

Note: It may take up to ten minutes for the NIC to attach to the print server.

27. Optionally, define the print server NLM to the NIC. Refer to 5.8.2.3, "Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode" on page 65.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 41. GO TO STEP 6 ON PAGE 42 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION."

4.7 Verifying the NetWare Configuration

The final step in the configuration process is to set up a NetWare client so print jobs can be sent to the network printer. You can use the command line for NetWare 3 and earlier or the graphical interface provided with NetWare 4 user tools.

Guide to NetWare Printing

In the following sections, we provide you with some examples of printing under Novell's NetWare. For additional examples, consult J.D. Marymee and Sandy Stevens, *Novell's Guide to NetWare Printing*, San Jose: Novell Press, 1996.

4.7.1 Installing Printer Drivers

Before sending a test print job, install the IBM network printer drivers on each workstation that submits print jobs to the printer. The README file on the printer driver diskette has the installation instructions. You may want to open the Notepad program on Windows systems to display the README online while you work.

4.7.2 Using the Command Line

1. From a NetWare client, enter the following command at the DOS prompt:

```
capture L=n q=queue_name [other options]
```

n The number of the port you want to capture. This parameter defaults to 1.

queue_name The name of the queue that services the printer. Obtain this name from the data requirements table.

other options Consult the NetWare documentation for other options.

Note: You may want to put the capture statement in the login script for each printer user.

2. Send a print job to the printer with the command:

```
copy file_name LPTn
```

where *n* is the port number. "1" is the standard port.

3. If the file does not print within three minutes, turn the printer off, count to ten, then turn the printer on.

Problems?

If you have problems, refer to 5.9, "Handling NetWare/IPX Problems" on page 65.

4.7.3 Using the NetWare Tools GUI

The port capture function can be set up on any NetWare 3 or 4 client with the NetWare tools GUI. The online help gives step-by-step instructions about how to capture a port.

4.7.3.1 Windows 3.1X

4.7.3.1.1 Setting Up the Printer

1. Open the **NetWare Tools** group.
2. Select **NetWare User Tools**.
3. Select the printer icon on the toolbar.
4. Select the just-created queue from the **Resources** list.
5. Select the port.
6. Click the **Capture** button.
7. Set the desired capture options by clicking the **LPT setting** button.

4.7.3.1.2 Printing a File:

Send a print job to the printer:

- From the DOS command line:

```
copy file_name LPTn
```

where *n* is the port number.

- From a Windows application, use the **Print Setup** menu item to choose and print to the captured LPT port.

4.7.3.2 Windows 95 using Novell NetWare Client 32

4.7.3.2.1 Setting Up the Printer:

1. Open **Network Neighborhood**.
2. Select the desired server (Bindery) or tree/context (NDS).
3. Select the desired NetWare print queue.
4. Answer "Yes" to the message offering to set up the printer. Follow the instructions in the **Add Printer** wizard.
5. Print from DOS programs? Enter Y or N.
6. Select the driver.
7. Use as a default printer? Enter Y or N.
8. Print a test page? Enter Y or N.

An object now exists in the "Printers" folder that points to the desired NetWare queue.

4.7.3.2.2 Printing a File::

Send a print job to the print queue with the command:

```
copy file_name LPTn
```

where *n* is the port number.

4.7.3.3 OS/2

4.7.3.3.1 Setting Up the Printer

1. Open the Novell folder.
2. Open NetWare Tools.
3. Select the **Tools** menu.
4. Select the **Printer Ports** menu item.
5. Double-click the LPT*n* port to capture.
6. From the **Capture LPT*n*** window, click the **Help** button and follow the help window directions.
7. When finished with the **Capture LPT*n*** window, click the **Capture** button to complete the port capture.

4.7.3.3.2 Printing a File:

Send a print job to the print queue with the command:

```
copy file_name LPTn
```

where *n* is the port number.

Problems?

If you have problems, refer to 5.9, "Handling NetWare/IPX Problems" on page 65.

YOU HAVE NOW VERIFIED YOUR NETWARE CONFIGURATION. GO TO STEP 8 ON PAGE 42 OR STEP 8 ON PAGE 52 BY PERFORMING THE PROCEDURE IN 5.8, "IMPROVING NETWORK TRAFFIC ON LARGE NETWORKS" ON PAGE 64.

5.0 NetWare 4.X

NPM-NT or **NPM-95**

Use this chapter to configure NetWare 4.X using the NetWare command line. The IBM Network Printer Manager (NPM) can perform the command line procedures described here with a minimum of input from you. Refer to 22.8, "Monitoring with NPM in a NetWare IPX Environment" on page 218.

5.1 Requirements

Verify that you have the required software:

- The NetWare file server needs NetWare 4.0 or higher (for NDS mode)
- Requesters need NetWare Shell Version 3.26 or higher for bindery-mode logins, and the VLM requester for NDS-mode logins.

Note: The effects of NDS are that:

- Printer objects must be in the same context as the PServer object that references the printer objects.
- Only one PServer object can be defined for each IBM NIC.
- The [Public] trustee—created by default during NetWare 4 installation—must exist on the root of the NDS tree.
- Spaces and trailers in the NDS treename are converted to underscores to form a 32-byte field length.
- For the **network**, the requirements are:
 - The IPX/SPX protocol (NetWare File server version 4 or higher with NetWare requester VLM).
 - An IBM NIC.
 - The file server containing the NDS partition where the IBM NIC configuration resides needs either:
 - A NIC no more than two hops away from the file server
 - A NIC no more than two hops away from a replica
 - If a NIC is more than two hops away from the file server, you must specify a preferred file server for it. See 5.8.2.1, "Assigning a NetWare File Server Name" on page 64 for how to do this.

5.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on NetWare 4.x require **Supervisor** authority.

Required Steps:

- 1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- 2** If you have a network with multiple servers, perform the procedure in 4.3, "Configuring NetWare on a Large Network" on page 42. Otherwise, go to step 3.
- 3** If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 11 on page 4), you can change the MAC address on Token Ring cards only by using one of the following procedures:
 - **Command Line:**

- a. Login to the NIC using the procedure in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
- b. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
- **NPM:**
Refer to the NPM NT or 95 help system to determine how to do this.

___ **4** Read 4.4, "Choosing Print Server or Remote Printer" on page 42 to determine which of the two ways of using the NIC, as a print server or a remote printer, you prefer.

___ **5** Select one of the following two tools to do the configuration:

- If you are using NPM for NT or 95, go to 22.5, "Configuring for NetWare 4 using IBM NPM for Windows NT or 95" on page 217.
- If you are using standard NetWare tools, go to one of the following:
 - 5.3, "Configuring as a Print Server in NDS Mode using PConsole"
 - 5.4, "Configuring as a Print Server in Bindery Mode using PConsole" on page 54
 - 5.5, "Configuring as a Remote Printer in NDS Mode Using PConsole" on page 56
 - 5.6, "Configuring as a Print Server using NWAdmin 4.X in NDS Mode" on page 58
 - 5.7, "Configuring as a Remote Printer using NWAdmin 4.X in NDS Mode" on page 61

___ **6** Verify the configuration by doing the procedure in 4.7, "Verifying the NetWare Configuration" on page 47.

___ **7** If you encounter problems, refer to 5.9, "Handling NetWare/IPX Problems" on page 65.

Optional Steps:

___ **8** If you have a large network, consult the suggestions provided in 5.8, "Improving Network Traffic on Large Networks" on page 64.

___ **9** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.

___ **10** If you want to monitor your printer, refer to:

- 21.3, "Monitoring Network Printers on NetWare" on page 209
- Table 18 on page 215 and 22.8, "Monitoring with NPM in a NetWare IPX Environment" on page 218.

5.3 Configuring as a Print Server in NDS Mode using PConsole

On NetWare 4, resource information can be stored in one of two ways:

- NetWare Directory Services (NDS)
- Bindery Emulation

You can configure your IBM network printer and NIC in either mode. The following instructions show you how to complete the NDS configuration using PConsole in DOS. For NDS mode, you can use either PConsole in DOS or NetWare Administrator in Windows.

5.3.1 Data Requirements

Parameter	Description	Your Value
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
Queue volume	A name like Novell41_SYS obtained from your network administrator.	
NIC name	The default or user-assigned name of the NIC. The default is NCT or NCE plus the last six digits of the card's MAC address (the MAC address is printed on the card's faceplate). On the NIC configuration page, the NIC name is called the Node Name in the "Network Information" section.	
Printer service name	The name for the printer service, for example NCE9A1234_1. The default printer service name is obtained by adding an "_1" to the NIC name (see above). Use the default name for the initial configuration. You can change the name later on by referring to 20.0, "Customizing the NIC" on page 203.	

5.3.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Login to the desired context on the NDS tree.
- ▶ Establish the context.
- ▶ Create a print queue.
- ▶ Add the NIC as a print server.
- ▶ Add the printer.
- ▶ Map the print queue to the printer.
- ▶ Link the NIC to the printer.
- ▶ Restart the NIC.

Detailed Configuration Procedure:

1. Turn the printer on.
2. Go to the requester machine and login to the NetWare NDS tree in the desired context and with the appropriate privilege, usually as Admin; for example:

```
LOGIN cn=admin
```

Note: This command could fail if it is issued from the wrong context. The command works where user "admin" is in the current context.
3. At the DOS or NetWare prompt, enter:

```
PCONSOLE
```
4. Check the current context on the **Title Bar**. If it is correct, go to step 7.
5. From the **Available Options** menu, select **Change Context**.
6. Press **Insert** to go to the desired context.
7. Select **Print Queues**.
8. Press **Insert**.
9. Enter any new queue name.
10. Press **Insert** to locate the volume where the queue is to be located.
11. Select the volume.
12. From the **Available Options** menu, select **Printers**.
13. Press **Insert**.

14. Enter the IBM printer service name from the data requirements table. Use the **default** printer service name (for example, NCTxxxxx_1) for your initial configuration of the card. Make sure the name ends with an “_1.”
15. Select the newly defined printer.
16. From the **Printer “printer name” Configuration** menu, select **Printer Type**.
17. Select **Other/Unknown**.
18. Select **Print Queues Assigned**.
19. Press **Insert** to display a list of available print queues.
20. Select the print queue, created in step 9 on page 53.
21. Press **Esc** until the “Save Changes” message appears.
22. Select **Yes** to confirm the save.
23. Press **Esc** until you return to the **Available Options** menu.
24. Select **Print Servers**.
25. Press **Insert**.
26. Enter the IBM NIC name as the new print server name.
27. From the **Available Options** menu, select **Print Servers**.
28. Select the new NIC to link.
29. Select **Printers**.

Note: Press **Enter** on the **Bindery Services** warning window if it displays.

30. Press **Insert**.
31. Select the printer service name to link to the NIC. Use the **default** service name (for example, NCTxxxxx_1) when you configure the card for the first time. Make sure the name ends with an “_1.”
32. Press **Esc** until the **Print Server Information** menu appears.

The following procedure allows the NIC to read the new configuration in the NDS database.

Important. When configuring a NIC in print server mode, the NIC acts as its own print server and must not be loaded as a print server NLM on the file server.

- a. From the **Print Server Information** menu, select **Information and Status**.
- b. Make sure that the **Advertising name** is the same as the print server’s name.
- c. Verify that the NIC is **Running**.

Notes:

- 1) This option appears only if the NIC is powered up and connected to the network and the configuration was successful.
- 2) If the procedure was not successful, return to step 9 on page 53 and make sure the correct names were entered at each step.
- 3) If that does not work, recycle power on the printer, wait about three minutes, then try step 32 again.
- d. Select the **Current Server Status**.
- e. Select **Down**.

Note: The NIC’s print server function goes down, but the NIC brings it back up again automatically. The NIC’s print server function is **not** a NetWare print server NLM or EXE.

- f. Press **Esc** until the **Exit PConsole** window appears.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 52. GO TO STEP 6 ON PAGE 52 BY PERFORMING THE PROCEDURE IN 4.7, “VERIFYING THE NETWARE CONFIGURATION” ON PAGE 47.

5.4 Configuring as a Print Server in Bindery Mode using PConsole

In bindery mode, if multiple file servers are to be configured to use the NIC, it must be defined consistently on each of the file servers. A bindery context must be set on the file server, and the file server object must be located in this context.

5.4.1 Data Requirements

Parameter	Description	Your Value
File server name	The name of the Novell file server, for example Novell41. Obtain this name from the network administrator.	
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
NIC name	The default of user-assigned name of the NIC. The default is NCT or NCE plus the last six digits of the card's MAC address (the MAC address is printed on the card's faceplate). On the NIC configuration page, the NIC name is called the Node Name in the "Network Information" section.	
Printer service name	The name for the printer service, for example NCE9A1234_1. The default printer service name is obtained by adding an "_1" to the NIC name (see above). Use the default name for the initial configuration. You can change the name later on by referring to 20.0, "Customizing the NIC" on page 203.	

5.4.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Login to the file server.
- ▶ Create a print queue.
- ▶ Add the NIC.
- ▶ Add the printer.
- ▶ Map the print queue to the printer.
- ▶ Restart the NIC.

Detailed Configuration Procedure:

1. Turn the printer on.
2. Login to the NetWare file server with supervisory authority, in bindery mode, for example:

```
LOGIN fileserver/SUPERVISOR /b
```
3. At a DOS prompt, enter:

```
PCONSOLE
```
4. From the **Available Options** menu, select **Print Queues**.
5. Press **Insert**.
6. Enter any new queue name. Record the queue name on the data requirements table.
7. Press **Esc** until the **Available Options** menu appears.
8. From the **Available Options** menu, select **Print Servers**.
Note: If a warning message tells you that you are not in NDS mode, ignore the message and continue.
9. Press **Insert**.
10. Enter the IBM NIC name.
11. Press **Enter**.
12. Select the newly defined print server, then press **Enter**.
13. From the **Print Server Information** menu, select **Printers**.
Note: If a warning message that you are not running in NDS mode is displayed, ignore the message and go on.
14. Press **Insert**.

15. Enter the IBM default printer service name. Use the **default** printer service name (for example, NCTxxxxxx_1) when configuring the card for the first time. Make sure the name ends with an "_1."
16. Select the newly defined printer service.
17. Press **Enter**.
18. From the **Printer "printer name" Configuration** menu, select **Printer Type**.
19. Select **Other/Unknown**.
20. Select **Print Queues Assigned**.
21. Press **Insert**.
22. Select the print queue.
23. Enter a **priority** level. The default is one, which is the highest priority.
24. Press **Esc**.
25. Press **F10** to save the changes.
26. Press **Esc** until the **Print Server Information** menu appears.

The following procedure allows the NIC to read the new configuration in the file server's bindery.

Important. When configuring a NIC in print server mode, the NIC acts as its own print server and must not be loaded as a Print Server.NLM on the file server.

- a. From the **Print Server Information** menu, select **Information and Status**.
- b. Verify that the NIC is **Running**.

Notes:

- 1) This option appears only if the printer server is powered up and connected to the network and the configuration was successful.
 - 2) If the procedure was not successful, return to step 13 on page 55 and make sure the correct names were entered at the correct steps.
 - 3) If that does not work, recycle power on the printer, wait about three minutes, then try step 26 again.
- c. Select **Current Server Status**.
 - d. Select **Down**.

Note: The NIC's print server function goes down, but the NIC brings it back up again automatically. The NIC's print server function is **not** a NetWare print server NLM or EXE.

- e. Press **Esc**.
- f. Press **ALT+F10** to exit PConsole.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 52. GO TO STEP 6 ON PAGE 52 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION" ON PAGE 47.

5.5 Configuring as a Remote Printer in NDS Mode Using PConsole

Use this section to configure the NIC under NetWare 4 as a remote printer in NDS mode using PConsole.

5.5.1 Data Requirements

Parameter	Description	Your Value
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
Queue volume	A name like Novell41_SYS obtained from your network administrator.	
Printer service name	The name for the printer service, for example NCE9A1234_1. The default printer service name is obtained by adding an "_1" to the NIC name (see above). Use the default name for the initial configuration. You can change the name later on by referring to 20.0, "Customizing the NIC" on page 203.	

Parameter	Description	Your Value
NetWare Print Server (NLM) name	For example, Novell41PS. This is the name of the Print Server (NLM) that runs on the NetWare file server. The name is used when running the NIC as a remote printer.	

5.5.2 Configuration Procedure

Is Remote Printer Disabled?

Some versions of the NIC microcode disable remote printer by default. Before doing this remote printer configuration, obtain a NIC configuration page (refer to 1.6, "The NIC Configuration Page" on page 8) to see if remote printer is disabled. Look for "RPrinter:..." under the "NetWare Information" section. If RPrinter is enabled, you will see the word "enabled." If RPrinter is disabled, you will see the word "disabled." If remote printer is disabled, login to the NIC (refer to 25.1, "Logging into a NIC using NetWare IPX" on page 229), then enter the command:

```
define server netware rprinter enable
```

Reboot the NIC with the command:

```
init delay 0
```

Summary of Configuration Procedure:

- ▶ Login.
- ▶ Create a print queue.
- ▶ Add the printer.
- ▶ Select the Print Server.
- ▶ Associate the printer with the print server.
- ▶ Map the print queue to the printer.
- ▶ Restart the print server.

Detailed Configuration Procedure:

1. Turn the printer on.
2. Go to the requester machine and login to the NetWare NDS tree in the desired context and with the appropriate privilege, usually as Admin; for example:

```
LOGIN fileserver or treename/cn=admin
```

Note: This command could fail if it is issued from the wrong context. The command works where user "admin" is in the current context.
3. At a DOS prompt, enter:

```
PCONSOLE
```
4. Go to the context you want.
5. From the **Available Options** menu, select **Print Queues**.
6. From the Print Queues menu, press **Insert**.
7. Enter any new queue name.
8. From the **Print Queues Volume** prompt, press **Insert** to get a list of volumes.
9. Select the volume where the print queue is to be created.
10. At the **Print Queues** menu, press **Esc** to return to the **Available Options** menu.
11. From the **Available Options** menu, select **Printers**.
12. Press **Insert** to add a printer name.
13. Enter the printer service name. Use the **default** printer service name (for example, NCTxxxxx_1) when configuring the printer for the first time. Make sure the name ends with an "_1."

14. Press **Esc** to return to the **Available Options** menu.
15. From the **Available Options** menu, select **Print Servers**.
16. From the **Printer Servers** menu, select the name of the existing NetWare Print Server (NLM or EXE).
17. From the **Print Server Information** menu, select **Printers**.
18. At the **Serviced Printers** menu, press **Insert** to choose a printer to be added to this print server's list.
19. Select the printer service name. Use the **default** printer service name (for example, NCTxxxxx_1) when configuring the printer for the first time. Make sure the name ends with an "_1." (See step 13 on page 57.)
20. The selected printer appears in the **Serviced Printers** menu.
21. Select the printer.
22. From the **Printer "printer name" Configuration** menu, select **Printer Type**.
23. From the **Printer Type** menu, select **Other/Unknown**.
24. Select **Print Queues Assigned**.
25. Press **Insert** to choose the print queues to be added to the printer's queue list.
26. Select the name of the print queue you just created.
27. Press **Esc**.
28. Select **Yes** to save the changes.
29. Press **Alt+F10** to exit PConsole.
30. Select **Yes** at the Exit Confirmation box.
31. At the file server console, enter:

```
UNLOAD PSERVER
LOAD PSERVER pserver_name
```

pserver_name The existing NetWare print server name.

Note: It may take up to ten minutes for the NIC to attach to the print server.

32. Optionally, define the print server NLM to the NIC. Refer to 5.8.2.3, "Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode" on page 65.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 52. GO TO STEP 6 ON PAGE 52 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION" ON PAGE 47.

5.6 Configuring as a Print Server using NWAdmin 4.X in NDS Mode

Use this section to configure the NIC under NetWare 4.1 as a Print Server in NDS mode using NWAdmin.

5.6.1 Data Requirements

Parameter	Description	Your Value
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
Queue volume	A name like Novell41_SYS obtained from your network administrator.	
NIC name	The default of user-assigned name of the NIC. The default is NCT or NCE plus the last six digits of the card's MAC address (the MAC address is printed on the card's faceplate). On the NIC configuration page, the NIC name is called the Node Name in the "Network Information" section.	
Printer service name	The name for the printer service, for example NCE9A1234_1. The default printer service name is obtained by adding an "_1" to the NIC name (see above). Use the default name for the initial configuration. You can change the name later on by referring to 20.0, "Customizing the NIC" on page 203.	

5.6.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Login to the desired context on the NDS tree.
- ▶ Establish the context.
- ▶ Create a print queue.
- ▶ Add the NIC.
- ▶ Add the printer.
- ▶ Map the print queue to the printer.
- ▶ Link the NIC to the printer.
- ▶ Restart the NIC.

Detailed Configuration Procedure:

1. Turn the printer on.
2. Go to the requester machine and login to the NetWare NDS tree in the desired context and with the appropriate privilege, usually as Admin; for example:

LOGIN *fileserv* or *treename/cn=admin*

Note: This command could fail if it is issued from the wrong context. The command works where user "admin" is in the current context.

3. At the DOS prompt, enter:

WIN

4. Select the NetWare Tools icon from Windows Program Manager.

Note: If you are running under Windows 95, use **Network Neighborhood** to find NWAdmin in the SYS:\PUBLIC directory of the file server.

5. Select NWAdmin.



6. Check the current context on the Title bar. If it is correct, go to step 9 on page 60.

7. Select the appropriate context from the window display or by selecting the **View** menu, then the **Set Context** menu item.
8. Using the right mouse button, click the container object in which the queue is to be created.
9. Select **Create** from the displayed menu.
10. Select **Print Queue**.
11. At the **Create Print Queue** window, enter the queue name in the **Print Queue Name** field.
12. Select the volume from the **Print Queue Volume** pull down list on the **Select Object** window.
13. Click **OK**.
14. Click the **Create** button on the **Create Print Queue** window.
15. Using the right mouse button, click the container object in which the printer is to be added.
16. Select **Create** from the displayed menu.
17. Select **Printer** object.
18. Enter the printer service name. Use the **default** printer service name (for example, NCTxxxxx_1) when configuring the printer for the first time. Make sure the name ends with an “_1.”
19. Click the **Create** button.
20. Double-click the **Printer** icon for printer you just created.
21. Click the **Assignments** button.
22. Click the **Add...** button.
23. Select the Queue name, then click **OK**.
24. Click the **Configuration** button. Choose **Other/Unknown** for the **Printer Type**.
25. Click **OK**.
26. Using the right mouse button, click the container object to which the NIC is to be added as a print server.
27. Select **Create** from the displayed menu.
28. Select **Print Server**.
29. Type in the NIC name.
30. Click the **Create** button.
31. At the main NWAdmin screen, double-click the **Print Server** icon that has the NIC name.



32. Make sure the **Advertising name** is the same as the print server's name.
33. From the **Print Server** window, click the **Assignments** button.
34. Select **Add**.
35. Select the previously created printer object (with the printer service name).
36. Select **OK**.

37. Select **OK** at the **Print Server** window.

- a. Go to a DOS prompt.
- b. Access PCONSOLE.

The following procedure allows the NIC to read the new configuration in the NDS database.

Important. When configuring a NIC in print server mode, the NIC acts as its own print server and must not be loaded as a print server NLM on the file server.

- 1) From **Available Options**, select **Print Servers**.
- 2) Select the print server you just created.
- 3) From the **Print Server Information** menu, select **Information and Status**.
- 4) Verify that the NIC is **Running**.

Notes:

- a) This option appears only if the printer server is powered up and connected to the network and the configuration was successful.
 - b) If the procedure was not successful, return to step 14 on page 60 and make sure the correct names were entered at the correct steps.
 - c) If that does not work, recycle power on the printer, wait about three minutes, then try step 37 again.
- 5) Select the **Current Server Status**.
 - 6) Select **Down**.

Note: The NIC's print server function goes down, but the NIC brings it back up again automatically. The NIC's print server function is **not** a NetWare print server NLM or EXE.

- 7) Press **Esc** until the **Exit PConsole** window appears.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 52. GO TO STEP 6 ON PAGE 52 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION" ON PAGE 47.

5.7 Configuring as a Remote Printer using NWAdmin 4.X in NDS Mode

Use this section to configure the NIC under NetWare 4.1 as a remote printer using NWAdmin in NDS mode.

5.7.1 Data Requirements

Parameter	Description	Your Value
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
Queue volume	A name like Novell41_SYS obtained from your network administrator.	
NetWare network address	This address is a combination of the "Network Number" (shown under the "NetWare Information" section of the NIC configuration page) and the MAC address. The Network Number is a number like 00-00-00-02. The MAC address is printed on the NIC faceplate and is a number like 00-04-AC-33-64-08.	
Printer service name	The name for the printer service, for example NCE9A1234_1. The default printer service name is obtained by adding an "_1" to the NIC name (see above). Use the default name for the initial configuration. You can change the name later on by referring to 20.0, "Customizing the NIC" on page 203.	
NetWare Print Server (NLM) name	For example, Novell41PS. This is the name of the Print Server (NLM) that runs on the NetWare file server. The name is used when running the NIC as a remote printer.	

5.7.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Login to the desired context on the NDS tree.
- ▶ Establish the context.
- ▶ Create a print queue.
- ▶ Add the printer.
- ▶ Map the print queue to the printer.
- ▶ Link the NIC to the printer.

Detailed Configuration Procedure:

1. Turn the printer on.
2. Go to the requester machine and login to the NetWare NDS tree in the desired context and with the appropriate privilege, usually as Admin; for example:

LOGIN *fileserv* or *treename/cn=admin*

Note: This command could fail if it is issued from the wrong context. The command works where user "admin" is in the current context.

3. At the DOS prompt, enter:

WIN

4. Select the **NetWare Tools** icon from Windows **Program Manager**.
5. Select NWAdmin.



6. Check the current context on the Title Bar. If it is correct, go to step 9.
7. Select **View**, then **Set Context** to select the context.
8. Using the right mouse button, click the container object in which the queue is to be created.
9. Select **Create** from the displayed menu.
10. Select **Print Queue**.
11. At the **Create Print Queue** window, enter the queue name in the **Print Queue Name** field.

12. Select the volume from the **Print Queue Volume** pull down list on the **Select Object** window.
 13. Click **OK**.
 14. Click the **Create** button on the **Create Print Queue** window.
 15. Using the right mouse button, click the container object to which the printer is to be added.
 16. Select **Create** from the displayed menu.
 17. Select **Printer** object.
 18. Enter the printer service name. Use the **default** printer service name (for example, NCTxxxxx_1) when configuring the printer for the first time. Make sure the name ends with an “_1.”
 19. Click the **Create** button.
 20. Double-click the **Printer** icon for the printer you just created.
 21. Click the **Configuration** button.
 22. At the **Printer Type** item, select **Other/Unknown**.
 23. Optionally, set the IPX/SPX network address, which is the NetWare network address of the NIC.
 24. Click the **Assignments** button.
 25. Click the **Add...** button.
 26. Select the Queue name. This name becomes the selected object.
- Note:** The selected printer is automatically set as the default.
27. Click **OK**.
 28. Click **OK**.
 29. At the main NWAdmin window, double-click the NetWare native print server that exists in the context.
- Note:** The print server must already exist. If not, create one.
30. From the **Print Server** window, click the **Assignments** button.



31. Select **Add**.
32. Select the previously created printer object (with the printer service name).
33. Select **OK**.
34. Select **OK** at the Print Server window.
35. Select **Yes** at the Exit Confirmation box.
36. At the file server console, enter:

```
UNLOAD PSERVER
LOAD PSERVER pserver_name
```

pserver_name The existing NetWare print server name.

Note: It may take up to ten minutes for the NIC to attach to the print server.

37. Optionally, define the print server NLM to the NIC. Refer to 5.8.2.3, "Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode" on page 65.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 52. GO TO STEP 6 ON PAGE 52 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION" ON PAGE 47.

5.8 Improving Network Traffic on Large Networks

Use this section to improve network traffic on large networks.

5.8.1 Network Traffic Inefficiencies

The IBM network printer was designed to be installed on the network with as little configuration as possible. Each time it starts up, the NIC automatically consults with each NetWare file server on the network until it finds the one (or ones) that have been configured to print to it. This has the added benefit that configuration changes are also detected automatically once they are made on the NetWare file server.

The cost of this easy installation is some additional network traffic at startup and periodically thereafter. Because a newly installed NIC has no information about how you have organized your network, it consults with **all** of your file servers until it finds the one(s) that you have configured to print to it. This is not particularly burdensome in small and medium networks (up to 20 to 30 file servers), but in large networks, it can cause noticeable delays and network loads.

Inefficiencies like these can be eliminated by giving the NIC a few hints on navigating your network to find its clients.

5.8.2 Reducing Network Inefficiencies

Following are some steps you can take to reduce your network inefficiencies.

5.8.2.1 Assigning a NetWare File Server Name: If you do **not** disable NetWare, configure the NIC with the name of a file server to use as its nearest file server by:

1. Logging into the NIC using one of the procedures described in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
2. Entering the command:

```
define node node_name nfserver
```

where *node_name* is the name of the name of the NetWare print server (NLM or EXE) that runs on a file server or client. This eliminates one of the two major autodiscovery searches.

Note: The configured nearest file server need not be physically closest, but you will save a file server license if the nearest file server is one of the file servers configured to print to the printer.

3. Reboot the NIC with the command:

```
init delay 0
```

5.8.2.2 Disabling Remote Printer if You Are Using only Print Server: If you are configuring your NIC only as a Print Server (usually the best way), disable RPrinter mode on the NIC by:

1. Logging into the NIC using one of the procedures described in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
2. Entering the command:

```
define server netware rprinter disable
```

3. Reboot the NIC with the command:

```
init delay 0
```

This can be a big savings because in RPrinter mode, the NIC periodically repeats its autodiscovery, whereas in Print Server mode the NIC engages in autodiscovery only at startup.

5.8.2.3 Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter)

Mode: If you are using RPrinter mode for your NIC (regardless of whether you are using Print Server as well), configure a specific NetWare Print Server for your NIC by:

1. Logging into the NIC using one of the procedures described in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
2. Entering the command:

```
define node node_name npserver
```

where *node_name* is the name of the NetWare print server (NLM or EXE) that runs on a file server or a client.

3. Reboot the NIC with the command:

```
init delay 0
```

This is almost as good as disabling RPrinter mode because it saves an expensive and repetitive autodiscovery search.

5.8.2.4 Disabling Print Server Mode if You Are Using only Remote Printer: If you are using only Remote Printer mode, disable Print Server on the NIC by:

1. Logging into the NIC using one of the procedures described in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
2. Entering the command:

```
define server netware pserver disable
```

3. Reboot the NIC with the command:

```
init delay 0
```

5.8.3 Determining NetWare File Server Licenses

Another characteristic of large networks is that you may configure many different file servers to use your NIC. This can often be an advantage, but it does require that a user license be available on each file server. The number of licenses can be estimated as follows:

- One on each file server that has a Print Server definition for an IBM NIC operating in Print Server mode
- One on the workstation where the NetWare print server (EXE) is running that is driving an IBM NIC in Remote Printer mode
- One on the nearest file server, if it is not one of the above.

5.9 Handling NetWare/IPX Problems

Use this section as a guide for finding and resolving network printer and NIC printing problems on NetWare.

The following types of problems are described here:

- Network setup
- Hardware
- Connectivity
- Page formatting

- Printing

5.9.1 Network Setup

5.9.1.1 Verify the Network Configuration: Before doing anything else to try to resolve problems, you should verify that:

- You have entered the correct configuration data. For instance, make sure the default printer service name ends with an “_1.”
- For NDS print server objects, verify that the “Advertising name” is the same as the print server’s name. See, for example, step 32 on page 60.

5.9.1.2 Moving the Printer from one Network to Another: If you move a printer from one NetWare network to another, you may be unable to print if the printer was configured to discover an NDS tree on one network that is not on the other network.

To resolve such a problem, perform the following procedure:

1. Logon to the NIC using the procedure in 25.1, “Logging into a NIC using NetWare IPX” on page 229.
2. Enter the following command to null out the tree name (that existed on the previous, but not current, network):

```
define server netware nds "treeName"
```

where *treeName* is either null (" " with no intervening space) or the new NDS tree name on the current network. Note that the name must be enclosed in quotes.

5.9.2 Hardware Problems

When printing problems occur, the first task is to check the physical condition of the printer and related hardware.

The hardware includes the following elements:

- The printer itself
- The physical connection of the hardware to the network (10BASE2, 10BASE-T)
- The cabling system (Ethernet or Token Ring)
- The NIC

To determine whether a problem is a hardware problem or not, check the following:

1. Verify that power is going to the printer by checking the printer’s operator panel.
2. Verify that the printer is Ready.
3. Verify that the NIC is installed in the printer by performing one or the other of the procedures described in 1.5.1, “Obtaining a Printer Configuration Page” on page 6 or 1.6, “The NIC Configuration Page” on page 8.
4. Verify that the NIC is connected to the network. Refer to 1.9, “Physically Connecting a NIC to a LAN” on page 12.

Note: If the printer’s operator panel displays the message “41 Network Option Error” or “42 Network Option Error” contact IBM Support.

5.9.3 Connectivity Problems

The network/transport level of a network provides the capability of routing packets from one device to another device on the network or to a different network on an internetwork system.

To troubleshoot connectivity problems:

- Verify that the required protocol is enabled on the NIC by printing a NIC configuration page (see 1.6, "The NIC Configuration Page" on page 8).
- Verify that the required protocol is enabled on the system from which a print job is being sent.

From the NetWare client workstation, enter the following command:

```
nprint filename q=print_queue
```

filename Name of the file to print.

print_queue Name of the printer's queue.

5.9.4 Formatting Problems

If signals are getting through from a network printing device to other nodes on the network but printing problems still occur, there may be a problem with the way a print file is formatted.

One possible problem is the format of the data for the network printer. A printer may be set up to handle PCL, but is sent PostScript data. To verify that the printer is set up to receive the correct data, print a test page from the printer's operator panel menus and check for the proper settings.

5.9.5 Printing Problems

Many printing problems occur on the application level. To verify the operation of the printer, test the printing function with the following two steps:

1. Print a printer test page to verify that the printer has been installed correctly.
2. Send a text file to the printer.

The NetWare Capture utility redirects print jobs from the workstation port to a network printer, as follows:

1. Capture a port with the command:

```
capture L=n s=server_name q=queue_name
```

n The port number to which the print job is to be sent. The default is 1.

queue_name Name of the NetWare queue to which to send the print file.

server_name Name of the file server where the queue is located.

2. Print an ASCII file with the command:

```
copy file_name LPTn
```

n was assigned in step 1.

5.9.6 Example of a NetWare Printing Problem

Assume that a user sends a print job to the printer, but the job does not print. The user can begin to diagnose the problem by asking the following questions:

- Did the job get on the network?
- Did the job get to the NetWare file server?
- Did the print server get the print job?

- Is the printer picking up the job?

Following is a description of how to get answers to these questions. If the questions can be answered in the affirmative, then NIC (print server) or printer hardware problems may exist.

5.9.6.1 Did the Job get to the Network?: To find out if a print job got onto the network, do the following:

1. Go to the MSDOS prompt.
2. Enter the command:
capture show
3. Use the capture show command to see if the local LPT port has been redirected to a NetWare queue. If the local LPT port has been redirected to a NetWare queue, then the print job is sent through the network to the queue on the NetWare file server. If the local LPT port has not been redirected, complete step 4.
4. If the local LPT port has not been redirected to a NetWare queue, issue the command:
capture q=queuename l=n
to redirect the LPTn port to the specified queuename.

```
C:\WINDOWS          9:21 Thu 01-01-97

C:\WINDOWS>capture q=test1
Device LPT1 has been re-routed to print queue test1.

C:\WINDOWS>capture sh

LPT1 Capturing data to print queue test1.WG
Notify:      Disabled
Automatic end:  Enabled
Timeout count: Disabled
```

If there is an LPT port associated with the queue, then print jobs sent to the LPT port will be redirected to the queue through the network.

5.9.6.2 Did the Job get to the Queue on the File Server?: If the print job got to the network, the next task is to determine if the print job got to the NetWare file server.

1. Run PCONSOLE.
2. Select **Print Queues**.
3. Highlight the desired queue, press **Enter**, then press **Enter** on the job entries item.
4. If the job is on the queue's job list, the status should be "Ready" or "Active."

5.9.6.3 Did the Job get to the Print Server?: If the job got to the file server, the next question to answer is, did the print server get the job?

1. At the NetWare file server console, switch to the Monitor.NLM screen or type "load monitor" if it is not yet loaded.
2. Press **Enter** on the **Connection Information** item.
3. The **Active Connections** screen should show if the print server name (NIC name) is on the list of active connections.
 - If the print server name (NIC name) is not shown, verify the configuration you did.

- If the print server name (NIC name) is shown, highlight it and press **Enter** to see if jobs appear in the list of files as they are sent to the printer. If the jobs do not appear, verify the configuration you did. If the configuration is correct, turn the printer off, then on to do a reset, then try to print a job again.

5.9.6.4 Is the Printer Picking Up the Job?: Check that the printer is "Ready."

If the printer does not print, something may be wrong with the NIC. Check the printer or NIC configuration pages to make sure all services are accounted for in the card and on the printer.

6.0 Windows NT using NetWare Services

NPM-NT or **NPM-95**

Use this chapter to configure Windows NT 3.51 or 4.0 to use NetWare services to print to your IBM network printer.

Table 9 describes the different NetWare services supported by the following procedures.

Provider	Windows NT 3.51—Workstation	Windows NT 3.51—Server	Windows NT 4.0—Workstation	Windows NT 4.0—Server
Microsoft	Client Service for NetWare (Single server, Bindery mode only)	Gateway Service for NetWare (Bindery mode only)	Client Service for NetWare (NDS and Bindery)	Gateway Service for NetWare (NDS and Bindery)
Novell (Required for NPM)	Novell NetWare Client Service (NDS and Bindery)	Same as Workstation 3.51	Novell NetWare Client for Windows NT (NDS and Bindery)	Same as Workstation 4.0

6.1 Requirements

Verify that you have the following software on the NT workstation or server:

- IBM printer driver for NT
- **Note:** See the readme file that comes with the driver files.
- NWLink IPX/SPX Transport
- Either the Microsoft or Novell provided NetWare service for NT

Note: Refer to the Microsoft or Novell documentation for installation instructions.

Windows 95

The following procedures can be adapted for Windows 95.

6.2 Detailed Configuration Checklist

Authority Level Required

Some of the following configuration steps carried out on Windows NT may require **administrative** authority to be able to use NetWare services.

Required Steps:

- 1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- 2** If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 11 on page 4), you can change the MAC address on Token Ring cards only by using one of the following procedures:
 - **Command Line:**

- a. Login to the NIC using the procedure in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
- b. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
- **NPM:**
Refer to the NPM NT or 95 help system to determine how to do this.

___ **3** Configure the printer on your NetWare system. Refer to the appropriate one of the following two chapters:

- 4.0, "NetWare 3.X" on page 41
- 5.0, "NetWare 4.X" on page 51

___ **4** Authenticate to the NetWare network so that the user has sufficient rights to use the desired NetWare printing services. Refer to the Microsoft or Novell NT documentation.

___ **5** Perform one of the following procedures:

- 6.3, "Configuring Windows NT 3.51 using a NetWare Service"
- 6.4, "Configuring Windows NT 4.0 using a NetWare Service" on page 74

___ **6** Verify the configuration by doing the procedure in 6.5, "Verifying the NetWare Service Configuration" on page 76.

Optional Steps:

___ **7** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.

___ **8** If you want to monitor your printer, refer to 21.0, "Monitoring Network Printers" on page 207.

6.3 Configuring Windows NT 3.51 using a NetWare Service

Use this section to configure Windows NT 3.51 using a NetWare service for NT.

6.3.1 Data Requirements

Parameter	Description	Your Value
NetWare queue name	User-assigned name for the queue servicing the printer. This name was assigned when you configured the printer under NetWare 3 or 4 in step 3.	
printer driver name	Name of the IBM printer driver for NT. The default name is IBM Network Printer <i>nn</i> .	

6.3.2 Configuration Procedure

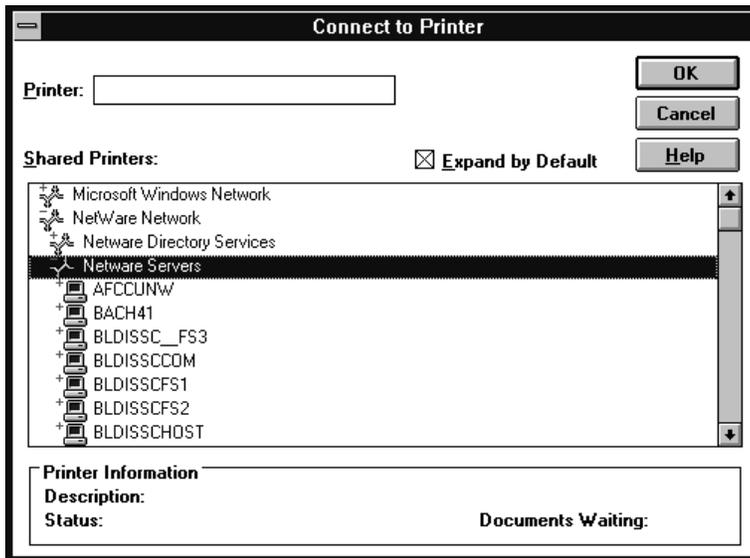
Summary of Configuration Procedure:

- ▶ Connect to printer.
- ▶ Associate printer to queue.

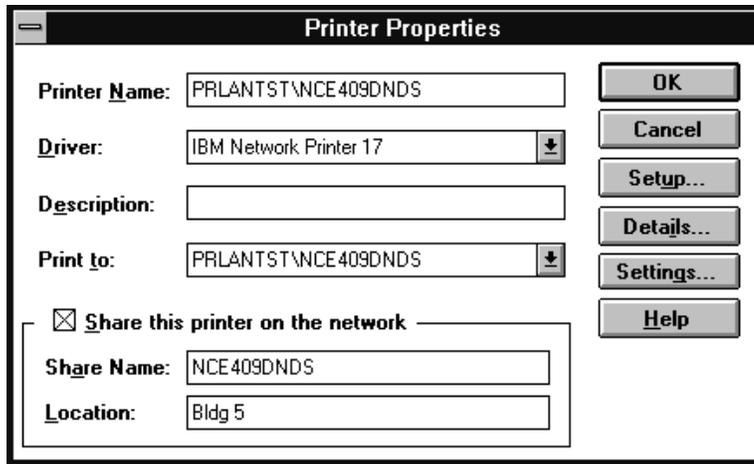
- Specify printer driver.

Detailed Configuration Procedure:

1. Logon to the NT server as administrator.
2. Verify that a NetWare Printing service is installed by checking the network icon in **Control Panel**.
3. Open **Print Manager** from the **Main** program group.
4. Select the **Printer** menu, then select **Connect to Printer**.
5. Double-click the NetWare network item, then navigate through the next level until you find the NetWare queue to attach to.



6. Double-click the desired queue name. This name was defined earlier when you configured the printer for NetWare. (See step 3 on page 72.)
7. Click **OK** on the driver question dialog box.
8. From the driver pull-down list, choose the appropriate printer driver, then click **OK**. The driver name will be something like "IBM Network Printer 17."
9. When the **Printer Setup** window displays, select the options to use, then click **OK**.
10. To share the printer on the NT network:
 - a. Select the **Printer** menu, then click **Properties**.
 - b. Click the **Share this printer on the network** button.
 - c. Enter a name (of your selection) for the shared printer.
 - d. Enter a location description.
 - e. Click **OK**.



YOU HAVE NOW COMPLETED STEP 5 ON PAGE 72. GO TO STEP 6 ON PAGE 72 BY PERFORMING THE PROCEDURE IN 6.5, "VERIFYING THE NETWARE SERVICE CONFIGURATION" ON PAGE 76.

6.4 Configuring Windows NT 4.0 using a NetWare Service

Use this section to configure Windows NT 4.x using a NetWare service for NT.

6.4.1 Data Requirements

Parameter	Description	Your Value
NetWare queue name	User-assigned name for the queue servicing the printer. This name was assigned when you configured the printer under NetWare 3 or 4 in step 3 on page 72.	
Printer driver name	Name of the IBM printer driver for NT. The default name is IBM Network Printer <i>nn</i> .	

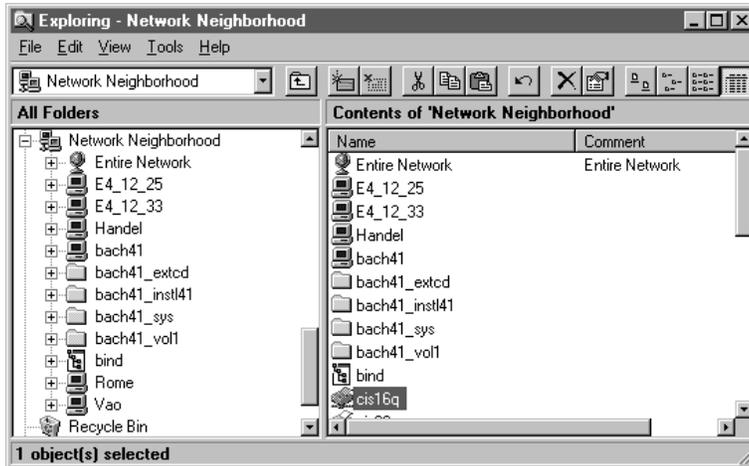
6.4.2 Configuration Procedure

Summary of Configuration Procedure:

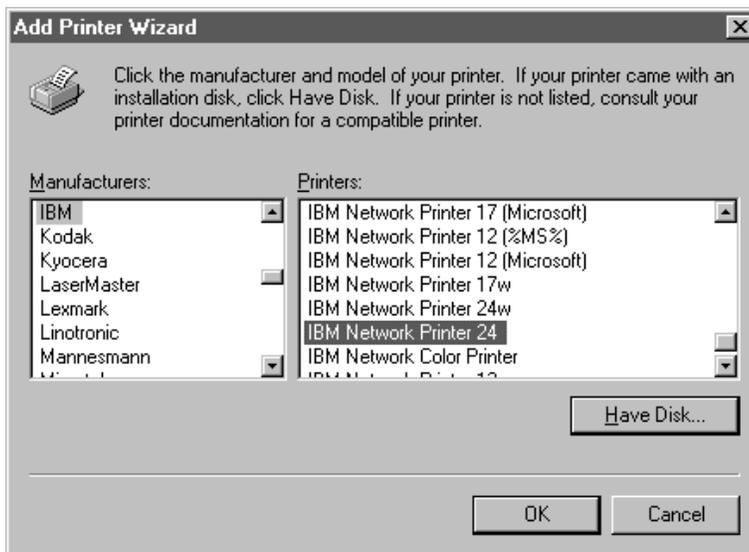
- ▶ Associate printer to queue.
- ▶ Select appropriate driver.

Detailed Configuration Procedure:

1. Logon to the NT 4.0 server as administrator.
2. At the main NT window, select **Start**, then **Programs**, then **Windows NT Explorer**.
3. Select **Network Neighborhood**, then navigate until you find the NetWare queue to attach to.

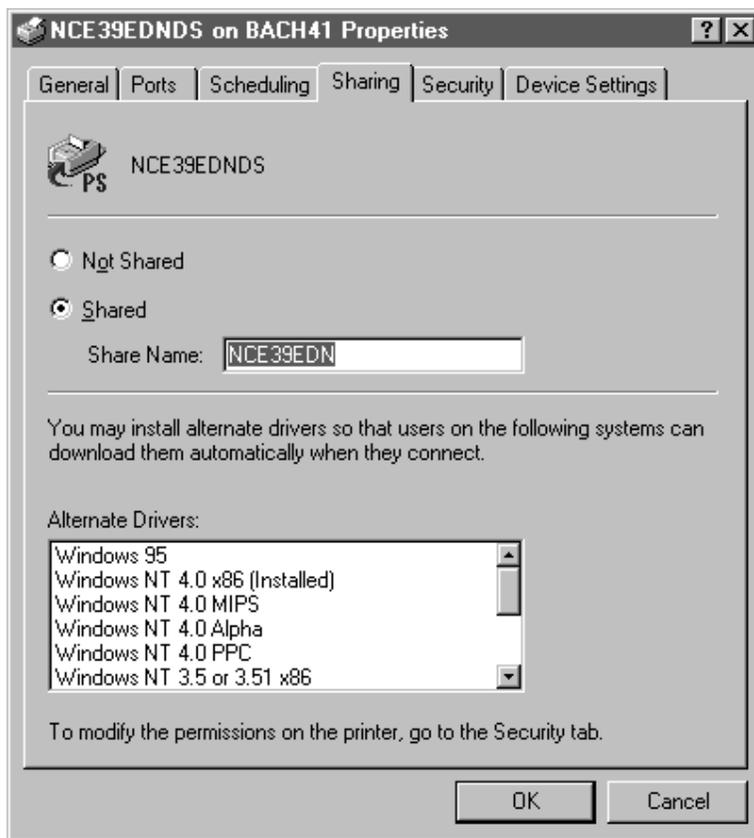


4. Double-click the queue, then click **Yes** to continue.
5. Click **OK** on the window about installing the printer driver.
6. If you have not yet installed the IBM NT 4.0 printer driver, click the **Have disk** button and follow the installation instructions. If you have already installed the printer driver, go to step 7.
7. Click **IBM** in the **Manufacturers** list, then click the printer driver for the printer you are configuring.
8. Click **OK**. The NT to NetWare print queue is created, and can now be used by Windows applications.



9. If you want to share the printer on the network:
 - a. Back at the main NT window, select **Start**, then **Programs**, then **Windows NT Explorer**.
 - b. From the **Printers** folder, right-click the printer you want to share, then select **Properties**.
 - c. Click the **Sharing** tab.
 - d. Click the **Shared** radio button.

- e. Optionally, change the printer's **Share name**.
- f. Optionally, click the Other OS Support in the **Alternate Drivers** list.
- g. Click **OK**.
- h. Respond to additional instructions.



YOU HAVE NOW COMPLETED STEP 5 ON PAGE 72. GO TO STEP 6 ON PAGE 72 BY PERFORMING THE PROCEDURE IN 6.5, "VERIFYING THE NETWARE SERVICE CONFIGURATION."

6.5 Verifying the NetWare Service Configuration

From within an application, select the **Print Setup** menu to select the printer, then use the **Print** menu item to print a job.

Part 5 - TCP/IP Configuration

T C P / I P

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7.0 AIX to Format and Print PCL and PostScript Files

Use this chapter to configure AIX 3.2.5, 4.1.x, and 4.2.x to format PCL or PostScript files before printing them on your IBM network printer.

- If you want to configure AIX to print already-formatted files, use the procedure in 8.0, "AIX to Print Formatted PCL and PostScript Files" on page 87.
- If you want to print IPDS files on your printer, use the procedure in 9.0, "AIX to Print IPDS Files" on page 93.

7.1 Requirements

You need:

AIX 3.2.5	AIX 4.1.X	AIX 4.2.X
APAR IX56644 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server

To obtain the PTFs associated with these APARs, contact the IBM Support Center (see "Product Support" on page vi).

Note: The APARS are needed to create a virtual printer. Without them, you will not be able to create queues.

You also need TCP/IP with Telnet on clients or submitters.

7.2 Configuration Checklist for AIX 3.2.5, 4.1.X, and 4.2.X

Authority Level Required

All of the following configuration steps carried out on the AIX server, require **root** authority.

Required Steps:

- 1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- 2** If you do **not** have a DHCP server anywhere on your network, go to step 3. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP" on page 181 and determine what you should do by reading:
 - a. 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181
 - b. 18.2, "Options for Configuring NICs for DHCP and BOOTP" on page 183
 - c. 18.3, "Setting Dynamic IP Addresses with DHCP" on page 187
- 3** If you want to change the MAC address to the LAA address and you did not do so in step 11 on page 4, then use the following procedure:
 - a. Make sure an IP address has been assigned to the NIC. Refer to step 4 on page 80.
 - b. Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
 - c. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.

- **4** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC. You can **either** assign the address(es) while you are doing the print queue configuration **or** make the assignments now before doing the configuration.
- To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, “Setting TCP/IP Addresses from the Printer Operator Panel” on page 173.
 - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, “Setting an IP Address on a Local Segment with ARP” on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, “Setting Subnet Mask and Gateway Addresses with NPM” on page 217 or 17.8, “Setting Subnet Mask and Gateway Addresses from the Command Line” on page 175 to set subnet mask and gateway addresses.
 - 17.9, “Setting TCP/IP Addresses with BOOTP” on page 176 to set IP and other addresses if the printers are on a WAN.
 - Optionally use 17.10, “Setting a Symbolic Name for an IP Address” on page 180.
- **5** Install the printer drivers and utilities for network printers by doing the procedure in 7.3, “Installing AIX Printer Driver and Utilities.”
- **6** Configure your printer by doing one of these procedures:
- 7.4, “Configuring AIX 3.2.5 to Format and Print Files” on page 82
 - 7.5, “Configuring AIX 4.1.X or 4.2.X to Format and Print Files” on page 83
- **7** Verify the configuration by doing the procedure in 7.6, “Verifying an AIX Configuration” on page 86.
- **8** If you have problems, refer to 19.0, “Handling TCP/IP Problems” on page 197.

Optional Steps:

- **9** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, “Disable NetWare if You’re Not Using It” on page 203.
- **10** If you want to customize your NIC, refer to 20.0, “Customizing the NIC” on page 203.
- **11** If you want to monitor your printer, refer to the following:
- 21.2, “Monitoring with AIX NetView/6000” on page 209
 - 21.5, “Monitoring Network Printers on TCP/IP Networks” on page 211
 - 21.6, “Configuring AIX/UNIX for Syslog Support” on page 212

7.3 Installing AIX Printer Driver and Utilities

Drivers and Utilities on the WWW

To obtain the most current version of the AIX printer driver or utilities, access the PSC home page:
<http://www.can.ibm.com/ibmprinters>
and follow the directions.

1. Logon to an AIX machine as root.

2. Place the diskette or CD-ROM with the AIX printer driver and utilities into the appropriate drive.
3. Change to the directory where you want the files to be copied. IBM suggests that you change to the /tmp directory and create a directory under that, for example:

```
/tmp/npdriv
```

4. Select the appropriate DOS or TAR-formatted command below:

For a DOS-formatted file:

Enter the two commands (readme and license) corresponding to your language:

Command to Enter	Description
dosread -a readmee.txt readmee.txt	English Readme file
dosread -a licensee.txt licensee.txt	English License file
dosread -a readmef.txt readmef.txt	French Readme file
dosread -a licensef.txt licensef.txt	French License file
dosread -a readmeg.txt readmeg.txt	German Readme file
dosread -a licensseg.txt licensseg.txt	German License file
dosread -a readmei.txt readmei.txt	Italian Readme file
dosread -a licensei.txt licensei.txt	Italian License file
dosread -a readmes.txt readmes.txt	Spanish Readme file
dosread -a licenses.txt licenses.txt	Spanish License file
dosread -a readmeb.txt readmeb.txt	Brazilian Portuguese Readme file
dosread -a licenseb.txt licenseb.txt	Brazilian Portuguese License file

From the next two commands, select the one that is appropriate for your version of AIX and enter it:

Command to Enter	Description
dosread aix325.tar aix325.tar	AIX 3.2.5 Printer files
dosread aix41.tar aix41.tar	AIX 4.1+ Printer files

For a TAR-formatted file:

Enter the following command:

```
tar -xf device
```

where *device* is the name of the device file used for the appropriate drive. It might be /dev/fd0 on your system.

5. Select the appropriate readme file to finish the installation procedures. The readme file gives you up to date instructions on new features, hints, tips, and so forth about the printer drivers.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 80. GO TO STEP 6 ON PAGE 80 BY PERFORMING ONE OF THE PROCEDURES REFERENCED THERE.

7.4 Configuring AIX 3.2.5 to Format and Print Files

This section describes the procedure for configuring AIX 3.2.5 to format print files before printing them.

7.4.1 Data Requirements

You need the following data for AIX 3.2.5 to configure the NIC:

Parameter	Description	Your Value
MAC Address	On the NIC faceplate. Called "Ether Addr" or "Token Addr" on the NIC configuration page. It may be changed to the LAA, so check with your network administrator.	
Hostname (or IP)	Either the NIC hostname or IP address.	
Gateway	Needed only if there is a gateway address.	
Subnet Mask	Needed only if there is a subnet mask.	

7.4.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Identify the printer.
- ▶ Specify address(es).
- ▶ Set up print queue.

Detailed Configuration Procedure:

1. Enter the following on the command line and press **Enter**:
smitty mkvirprt
2. A **Printer Attachment** window is displayed.
3. Select **IBM Network Printer**.
4. Enter the printer hostname (or IP address), for example FIN004, and press **Enter**.
5. The **BOOTP/TFTP** window is displayed:
 - Select 1, if you have not already set up BOOTP. See 17.9.2, "Starting the BOOTP Daemon on AIX Systems" on page 178.
 - If you select 2, skip to step 11.
6. Enter the MAC (hardware) address of the NIC, for example 0004AC9AC087, and press **Enter**.
7. Enter the hardware type, then press **Enter**:
 - Enter **ether** for Ethernet.
 - Enter **tr** for Token Ring.
8. Enter the gateway IP address, for example 9.99.176.254, then press **Enter** or just press **Enter** for none.
9. Enter the subnet mask address, for example 255.255.255.0, then press **Enter** or just press **Enter** for none.
10. Turn the printer off, count to ten, then on.

Beware of Beaconing on Token Rings

When you turn the printer off, count to ten before turning it back on. A quick off-on may cause a Token Ring card to start beaconing.

Note: Make sure the BOOTP daemon is currently running. See 17.9.2, "Starting the BOOTP Daemon on AIX Systems" on page 178.

11. The **Select a Printer** window is displayed.

12. From the displayed list, select the **IBM Network Printer***nn*.
13. Select header pages:
 - Enter **a** if you want header pages for each print file.
 - Enter **n** if you do not want header pages for any file.
 - Enter **g** if you want header pages for each print job.
14. Select trailer pages:
 - Enter **a** if you want trailer pages for each print file.
 - Enter **n** if you do not want trailer pages for any file.
 - Enter **g** if you want trailer pages for each print job.

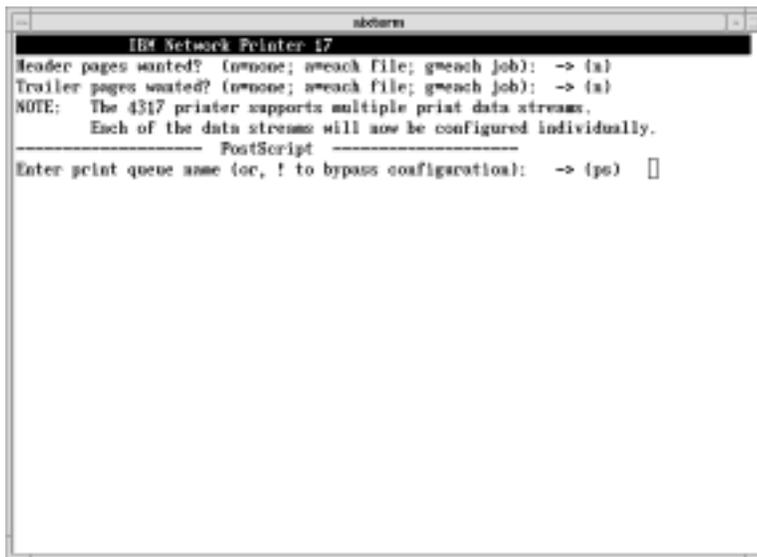


Figure 9. Default Queue for AIX 3.2.5

15. Enter the print queue name (PS or PCL) or “!” to bypass the configuration:
 - Press **Enter** to select the default queue name.
 - Select a different name by typing in the name, then pressing the **Enter** key.
 - Elect not to have a PS or PCL queue by pressing the “!” key, then the **Enter** key.
16. Enter **Y** if you want one of the queues (PS or PCL) to be the default queue. Otherwise, enter **N**.
17. Exit smitty.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 80. GO TO STEP 7 ON PAGE 80 BY PERFORMING THE PROCEDURE IN 7.6, “VERIFYING AN AIX CONFIGURATION” ON PAGE 86.

7.5 Configuring AIX 4.1.X or 4.2.X to Format and Print Files

Use the following procedure to configure your printer to format and then print files from AIX 4.1.X or 4.2.X.

7.5.1 Data Requirements

You need the following data to configure AIX 4.1.X or 4.2.X for the NIC:

Parameter	Description	Your Value
MAC Address	On the NIC faceplate. Called "Ether Addr" or "Token Addr" on the NIC configuration page. It may be changed to the LAA, so check with your network administrator.	
Hostname (or IP)	Either the NIC hostname or IP address.	
Gateway	Needed only if there is a gateway address.	
Subnet Mask	Needed only if there is a subnet mask.	

7.5.2 Configuration Procedure

Summary of Configuration Procedure:

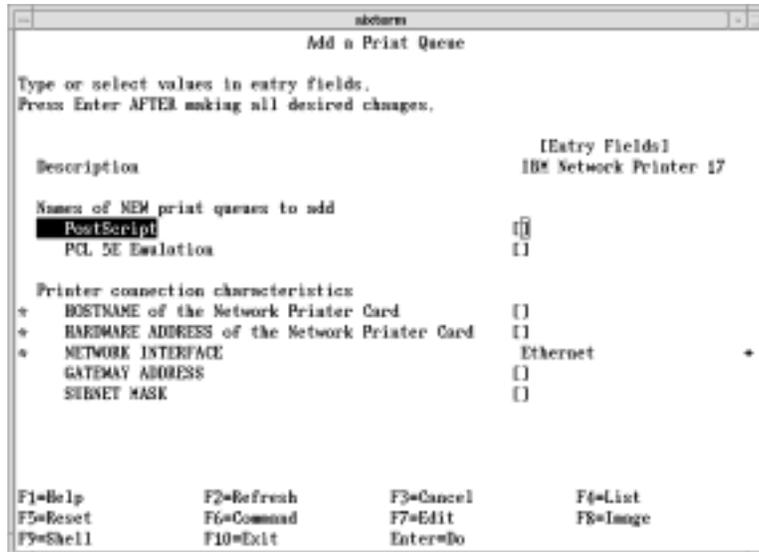
- ▶ Add a print queue.
- ▶ Set up address(es).
- ▶ Reboot the NIC.

Detailed Configuration Procedure:

1. Enter the following on the command line and press **Enter**:
`smitty mkvirprt`
2. The **Add a Print Queue** window is displayed.
3. Select **ibmNetPrinter** (IBM Network Printer) and press **Enter**.
4. From the **Printer Type** window, select **IBM**.
5. Again, from the refreshed **Printer Type** window, select **ibm43nn**, where *nn* is the IBM network printer type number, for example 17.
6. The **BOOTP/FTP Server** window is displayed:
 - Select 1, if you have not already run BOOTP. Skip to 7.5.2.1, "Using BOOTP" step 1.
 - If you select 2 (non-BOOTP), skip to 7.5.2.2, "The Non-BOOTP Way" step 1 on page 85.

7.5.2.1 Using BOOTP

1. The **Add a Print Queue** window is displayed.



2. Optionally, enter print queue names for PostScript and PCL.
3. Enter values for the required fields.
4. Enter the printer hostname (or IP address), for example ABC123, then press **Enter**.
5. Enter the MAC (hardware) address of the NIC, for example 0004AC9A1234, and press **Enter**.
6. Use the TAB key to toggle between the two network interface types, then press **Enter**. The two network interface types are:
 - **ether** for Ethernet.
 - **tr** for Token Ring.
7. Enter the gateway IP address, for example 9.99.176.254, then press **Enter** or just press **Enter** for none.
8. Enter the subnet mask, for example 255.255.255.0, then press **Enter** or just press **Enter** for none.
9. Turn the printer off, count to ten, then on.

Beware of Beaconing on Token Ring

When you turn the printer off, count to ten before turning it back on. A quick off-on may cause a Token Ring card to start beaoning.

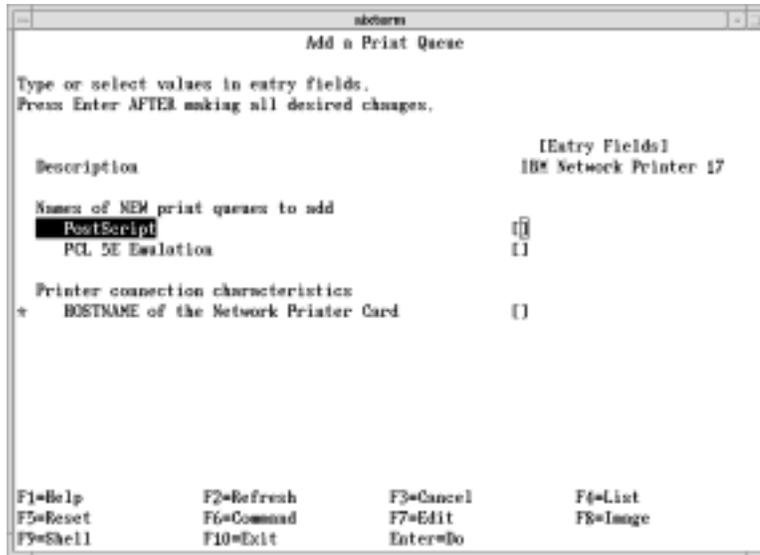
Note: Make sure the BOOTP daemon is currently running. See 7.5.2.1, "Using BOOTP" on page 84.

10. Exit smitty.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 80 GO TO STEP 7 ON PAGE 80 BY PERFORMING THE PROCEDURE IN 7.6, "VERIFYING AN AIX CONFIGURATION" ON PAGE 86.

7.5.2.2 The Non-BOOTP Way

1. If you selected the non-BOOTP way of doing this configuration, the following window is displayed:



2. Enter the print queue name (PS or PCL) or “!” to bypass the configuration:
 - Press **Enter** to select the default queue name.
 - Select a different name by typing in the name, then pressing the **Enter** key.
 - Elect not to have a PS or PCL queue by pressing the “!” and then pressing the **Enter** key.
3. Enter **Y** if you want one of the queues (PS or PCL) to be the default queue. Otherwise, enter **N**.
4. If you entered an IP address for the hostname, you are prompted for the print queue device name. Enter a queue name, for example, Fred. If you used a hostname for hostname, there is no prompt.
5. Exit smitty.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 80. GO TO STEP 7 ON PAGE 80 BY PERFORMING THE PROCEDURE IN 7.6, “VERIFYING AN AIX CONFIGURATION.”

7.6 Verifying an AIX Configuration

To send a print job to the printer, use one of the following commands:

```
qprt -P queueName file
```

```
lp -d queueName file
```

```
lpr -P queueName file
```

```
enq -P queueName file
```

queueName For PostScript, PCL, and other files, this is the name of the queue assigned to the printer

file Name of the print file.

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 80. GO TO STEP 9 ON PAGE 80 BY PERFORMING THE OPTIONAL PROCEDURE IN 20.1, “DISABLE NETWORK IF YOU’RE NOT USING IT” ON PAGE 203.

8.0 AIX to Print Formatted PCL and PostScript Files

Use this chapter to configure AIX 3.2.5 and AIX 4.1.x or 4.2.x to print already formatted PS or PCL print files.

- If you want to configure AIX to format and then print your files, use the procedure in 7.0, “AIX to Format and Print PCL and PostScript Files” on page 79.
- If you want to print IPDS files on your printer, use the procedure in 9.0, “AIX to Print IPDS Files” on page 93.

8.1 Requirements

You need:

AIX 3.2.5	AIX 4.1.x	AIX 4.2.x
APAR IX56644 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server

To obtain the PTFs associated with these APARs, contact the IBM Support Center (see “Product Support” on page vi).

Note: The APARS are needed to create a virtual printer. Without them, you will not be able to create queues.

You also need TCP/IP with Telnet on clients or submitters.

8.2 Configuration Checklist for AIX 3.2.5, 4.1.X, and 4.2.X

Authority Level Required

All of the following configuration steps, carried out on the AIX server, require **root** authority.

Required Steps:

- ___ **1** If you have not already done so, set up the printer and install the NIC as described in 1.0, “Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ **2** If you do **not** have a DHCP server anywhere on your network, go to the next step in the overall sequence. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, “Dynamic Host Configuration Protocol (DHCP) and BOOTP” on page 181 and determine what you should do by reading:
 - a. 18.1, “Industry Standards for Setting TCP/IP Addresses” on page 181
 - b. 18.2, “Options for Configuring NICs for DHCP and BOOTP” on page 183
 - c. 18.3, “Setting Dynamic IP Addresses with DHCP” on page 187
- ___ **3** If you want to change the MAC address to the LAA address and you did not do so in step 11 on page 4, then use the following procedure:
 - a. Make sure an IP address has been assigned to the NIC. Refer to step 4 on page 88.
 - b. Login to the NIC using the procedure in 25.2, “Logging into a NIC using TCP/IP Telnet” on page 230.
 - c. Set the MAC to the LAA using the procedure in 17.4, “Setting the LAA from the Command Line” on page 171.

- ___ **4** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC. You can **either** assign the address(es) while you are doing the print queue configuration **or** make the assignments now before doing the configuration.
- To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, “Setting TCP/IP Addresses from the Printer Operator Panel” on page 173.
 - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, “Setting an IP Address on a Local Segment with ARP” on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, “Setting Subnet Mask and Gateway Addresses with NPM” on page 217 or 17.8, “Setting Subnet Mask and Gateway Addresses from the Command Line” on page 175 to set subnet mask and gateway addresses.
 - 17.9, “Setting TCP/IP Addresses with BOOTP” on page 176 to set IP and other addresses if the printers are on a WAN.
 - Optionally use 17.10, “Setting a Symbolic Name for an IP Address” on page 180.
- ___ **5** Configure your printer with one of these procedures
- 8.3, “Configure AIX 3.2.5 to Print Formatted Files”
 - 8.4, “Configure AIX 4.1.X or 4.2.X to Print Formatted Files” on page 90
- ___ **6** Verify the configuration by doing the procedure in 8.5, “Verifying an AIX Configuration” on page 91.
- ___ **7** If you have problems, refer to 19.0, “Handling TCP/IP Problems” on page 197.

Optional Steps:

- ___ **8** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, “Disable NetWare if You’re Not Using It” on page 203.
- ___ **9** If you want to customize your NIC, refer to 20.0, “Customizing the NIC” on page 203.
- ___ **10** If you want to monitor your printer, refer to the following:
- 21.2, “Monitoring with AIX NetView/6000” on page 209
 - 21.5, “Monitoring Network Printers on TCP/IP Networks” on page 211
 - 21.6, “Configuring AIX/UNIX for Syslog Support” on page 212

8.3 Configure AIX 3.2.5 to Print Formatted Files

8.3.1 Data Requirements

You need the following data for AIX 3.2.5 to configure the NIC:

Parameter	Description	Your Value
Your name for the printer queue	The name of the queue you want the printer to have.	
Queue name on the remote printer	Name of the remote queue on the NIC. 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 host	IP address or hostname of the NIC.	

8.3.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Add a remote queue.
- ▶ Associate printer with queue.

Detailed Configuration Procedure:

1. Enter the following on the command line and press **Enter**:
smitty mkque
2. The **Add a Queue** window is displayed.
3. Select **Add a Remote Queue**.
4. The **Add a Remote Queue** window is displayed.



Figure 10. The Remote Queue Screen

5. Enter the values for all required fields. Here are examples:

Field	Sample Value	Source
NAME of queue to add	fred	Record this queue name on the data requirements table. The name can be anything you want.
DESTINATION HOST for remote jobs	NETONE	If you enter an optional hostname, this is the destination hostname from the data requirements table. Otherwise, the hostname is the IP address.
Pathname...SHORT FORM FILTER	/usr/lpd/bsdshort	Enter exactly as shown or press F4 and select from the list.
Pathname...LONG FORM FILTER	/usr/lpd/bsdlong	Enter exactly as shown or press F4 and select from the list.
Name of queue on remote printer	PASS	Obtain this value from the data requirements table.
NAME of device to add	drem	This value can be anything you want.
BACKEND PROGRAM pathname	/usr/lpd/rembak	Enter exactly as shown, or press F4 and select from the list.

6. If the correct values were entered, the **Command Status** window displays indicating that the transaction worked.
7. Exit smitty.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 88. GO TO STEP 6 ON PAGE 88 BY PERFORMING THE PROCEDURE IN 8.5, "VERIFYING AN AIX CONFIGURATION" ON PAGE 91.

8.4 Configure AIX 4.1.X or 4.2.X to Print Formatted Files

8.4.1 Data Requirements

You need the following data for AIX 4.1.X or 4.2.X to configure the NIC:

Parameter	Description	Your Value
Name of the printer queue	Your name for the queue assigned to the printer.	
Hostname	Hostname or IP address of the NIC.	
Queue name of the remote printer	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.)	

8.4.2 Configuration Procedure

Summary of Configuration Procedure:

- Add a remote print queue.

Detailed Configuration Procedure:

1. Enter the following on the command line and press **Enter**:
smitty mkvirprt
2. The **Add a Print Queue** window is displayed.
3. Select **remote (Printer Attached to Remote Host)** and press **Enter**.
4. The **Type of Remote Printing** window is displayed.
5. Select **Standard Processing** and press **Enter**.

6. The **Add a Standard Remote Print Queue** window is displayed.

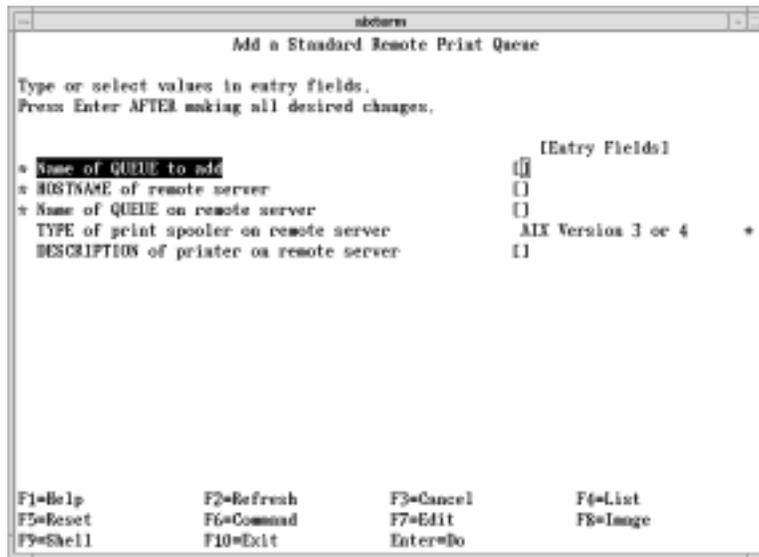


Figure 11. Remote Print Queue Screen

7. Type or select values in the Entry Fields. Here are examples:

Field	Sample Value	Source
Name of QUEUE to Add	Fred	The name can be anything you want.
HOSTNAME of remote server	NETONE	If you enter an optional hostname, enter that name here. Otherwise, use the IP address.
Name of QUEUE on remote server	PASS	Obtain this value from the data requirements table.
TYPE of print spooler on remote queue	BSD	Enter exactly as shown, or press F4 and select from the list.

8. The **Command Status** window displays.

9. Exit smitty.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 88. GO TO STEP 6 ON PAGE 88 BY PERFORMING THE PROCEDURE IN 8.5, "VERIFYING AN AIX CONFIGURATION."

8.5 Verifying an AIX Configuration

To send a print job to the printer, use one of the following commands:

```
qprt -P queueName file
```

```
lp -d queueName file
```

```
lpr -P queueName file
```

```
enq -P queueName file
```

queuename For PostScript, PCL, and other files, this is the name of the queue assigned to the printer
file Name of the print file.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 88. GO TO STEP 8 ON PAGE 88 BY PERFORMING THE OPTIONAL PROCEDURE IN 20.1, "DISABLE NETWARE IF YOU'RE NOT USING IT" ON PAGE 203.

9.0 AIX to Print IPDS Files

Use this chapter to configure PSF for AIX to format and print IPDS files on your IBM network printer.

You need the IPDS option for the printer to print IPDS through PSF for AIX.

9.1 Requirements

You need PSF for AIX 2.1 or higher and the latest service. Supported AIX levels include 3.2.5, 4.1.x, and 4.2.x.

You need:

AIX 3.2.5	AIX 4.1.x	AIX 4.2.x
APAR IX56644 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server

To obtain the latest service for PSF for AIX or for AIX, contact the IBM Support Center (refer to “Product Support” on page vi).

9.2 Configuration Checklist

Authority Level Required

All of the following configuration steps, carried out on the AIX server or PSF for AIX, require **root** authority.

Required Steps:

- 1 If you have not already done so, set up the printer and install the NIC as described in 1.0, “Start Here—Install the Network Interface Card (NIC)” on page 3.
- 2 Using the printer operator panel, set up the printer for IPDS by setting the following parameters and values:

Menu	Item	Setting
ETHERNET or TOKEN RING	PERSONALTY	<ul style="list-style-type: none">AUTO, if you want to use the printer for other than IPDS printingIPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
IPDS	IPDS PORT	TRING, ETHER

- 3 If you do **not** have a DHCP server anywhere on your network, go to the next step in the overall sequence. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, “Dynamic Host Configuration Protocol (DHCP) and BOOTP” on page 181 and determine what you should do by reading:
 - 18.1, “Industry Standards for Setting TCP/IP Addresses” on page 181
 - 18.2, “Options for Configuring NICs for DHCP and BOOTP” on page 183
 - 18.3, “Setting Dynamic IP Addresses with DHCP” on page 187

- ___ **4** If you want to change the MAC address to the LAA address and you did not do so in step 11 on page 4, then use the following procedure:
- a. Make sure an IP address has been assigned to the NIC. Refer to step 5.
 - b. Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
 - c. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
- ___ **5** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.
- To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.
 - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, "Setting Subnet Mask and Gateway Addresses with NPM" on page 217 or 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line" on page 175 to set subnet mask and gateway addresses.
 - 17.9, "Setting TCP/IP Addresses with BOOTP" on page 176 to set IP and other addresses if the printers are on a WAN.
 - Optionally use 17.10, "Setting a Symbolic Name for an IP Address" on page 180.
- ___ **6** Do the procedure in 9.3, "Configuring AIX to Print IPDS Files" on page 95.
- ___ **7** Configure the printer for sharing by doing the procedure in 9.4, "Configuring PSF for AIX for Printer Sharing" on page 96.
- ___ **8** Verify the configuration by sending a print job to the printer using any of the commands in 9.5, "Verifying an AIX Configuration for IPDS" on page 97.
- ___ **9** If you have problems, refer to 19.0, "Handling TCP/IP Problems" on page 197.

Optional Steps:

- ___ **10** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.
- ___ **11** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.
- ___ **12** If you want to monitor your printer, refer to the following:
- 21.2, "Monitoring with AIX NetView/6000" on page 209
 - 21.5, "Monitoring Network Printers on TCP/IP Networks" on page 211
 - 21.6, "Configuring AIX/UNIX for Syslog Support" on page 212

9.3 Configuring AIX to Print IPDS Files

9.3.1 Data Requirements

Parameter	Description	Your Value
IP address	IP address of the NIC.	
Printer queue name	Name of the queue for the printer. User-assigned.	
NIC queue name	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.)	

9.3.2 Configure PSF for AIX to Print IPDS Files

To configure PSF for AIX to print IPDS files:

1. Logon to AIX with root authority.
2. At the command line, enter:
smitty
3. Select **PSF for AIX Printing and Configuration**.
4. Select **Administer PSF for AIX**.
5. Select **Manage a PSF for AIX Printer (such as Add and Remove Printers)**.
6. Select **Add a Printer or PSF Queue**.
7. Select **TCP/IP**.
8. The **Add a TCP/IP Attached Printer** screen should now be displayed:

```

                Add a TCP/IP Attached Printer
Type or select values in entry fields.
Press Enter AFTER making all desired changes.

* Data stream type                [Entry Fields]
* Printer NAME                    IPDS
* Internet address                [ ]
* PORT number                     [ ]
* Number of QUEUE DEVICES        [5001]
* Connection TIMEOUT (seconds)   [ ]
Description                       [30]
:

```

9. Enter values for the following parameters:

Printer NAME

Enter a name for the printer. This is the queue name that will be associated with the NIC's IP address. PSF for AIX uses the name you specify here as the name for the printer, the printer queue name, and the name of the printer profile associated with the printer. The name can be up to eight alphanumeric characters.

Internet Address

Enter the IP address assigned to the NIC. PSF for AIX does not validate this address. If the address does not exist or is invalid, PSF for AIX issues error messages to inform the user that PSF for AIX cannot link to that address when a print job is submitted to the print queue.

PORT number

Accept the default port number of 5001.

Number of QUEUE DEVICES

Enter the number of queue devices. Each queue device processes one spooled file at a time. If you want to process more than one file at a time, you need to specify additional queue devices. The value can range from 1 to 99. The default is 4. Note that the more queue devices you specify, the more memory PSF for AIX uses.

Connection TIMEOUT

Enter the recommended value of 30 seconds for the timeout value. You can adjust this value upwards to suit your environment.

Description Enter a description of the printer, possibly including such information as its location, use, or owner.

Note: Refer to your PSF for AIX documentation for additional details.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 94. GO TO STEP 7 ON PAGE 94 BY PERFORMING THE PROCEDURE IN 9.4, "CONFIGURING PSF FOR AIX FOR PRINTER SHARING."

9.4 Configuring PSF for AIX for Printer Sharing

9.4.1 Port Switching Printer Sharing

IBM network printers provide sharing of the printer through port switching. Port switching is done on the printer with no involvement from the host PSF driver.

Network printers switch automatically among three ports:

- Parallel port (standard)
- Host (twinax or coax) port (optional)
- LAN network port (optional)

The switching is done through the use of several timeout values, which are set on the printer operator panel.⁴ For each port type, there is a menu item and a timeout setting:

- For the parallel menu, it is PORT TMEOUT
- For the Coax and Twinax port, it is the PORT TMEOUT setting on the setup menus
- For the Token Ring or Ethernet menus, it is PORT TMEOUT

The port switching is done according to the rule: **Print the jobs received on a port until no new jobs appear for the timeout value set for a port, then switch to the next port and do the same thing.**

9.4.2 Setting up PSF for AIX for Printer Sharing

9.4.2.1 Printer Sharing on the AIX Server: If you are using PSF for AIX as the spooler, assign a value to the "Job Interval Shutdown Timer" on the server.

Job Interval Shutdown Timer

Each PSF for AIX printer has a tuning option with this name. The parameter is set for the printer being shared. The parameter specifies the amount of time the printer waits for another LAN job before shutting down. The recommended value is 30 seconds. Do **not** use the default value of 9999 (infinite).

⁴ For instructions on how to use the printer operator panel, refer to your printer's *User's Guide* or 17.2, "Printer Operator Panel Actions" on page 169.

1. At the command line, enter:

```
smitty
```
2. Select **Administer PSF for AIX**.
3. Select **Manage a PSF for AIX Printer (such as Add and Remove Printers)**.
4. Select **Show/Change Characteristics of a Printer**.
5. Select **Tuning Options**.
6. Select the printer name.
7. Set a value for the Job Interval Shutdown Timer. We suggest a value of 30.
8. Press **Enter** to save the value.

9.4.2.2 Printer Sharing from PSF Direct: If you are using PSF Direct on AIX, you can share printers by setting a value for the “Inactivity Timer.”

Inactivity Timer

This parameter causes a host receiver to end if it waits for data from the host system for the specified period. This parameter can be used instead of the preferred “Disconnect Interval” on the host, if the latter is not available. Set the value to 30, **not** to the default 9999 (infinite).

1. At the command line, enter:

```
smitty
```
2. Select **Communications Applications and Services**.
3. Select **PSF Direct**.
4. Select **Show or Change Host Receiver Characteristics**.
5. Select the host receiver.
6. Set a value for the Inactivity Timer. We suggest a value of thirty.

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 94. GO TO STEP 8 ON PAGE 94 BY PERFORMING THE PROCEDURE IN 9.5, “VERIFYING AN AIX CONFIGURATION FOR IPDS.”

9.5 Verifying an AIX Configuration for IPDS

1. To send a print job to the printer, use one of the following commands:

```
qprt -P queuename file
```

```
lp -d queuename file
```

```
lpr -P queuename file
```

```
enq -P queuename file
```

queuename For IPDS, this is the printer NAME.

file Name of the print file.

2. If you have problems printing, do the following:
 - Print a NIC configuration page. Refer to 1.6, “The NIC Configuration Page” on page 8.
 - Verify that the IPDS service is enabled.
 - Verify the service name.
 - Verify that port number 5001 is being used.
3. If you are still unable to print IPDS files, contact IBM Support.

YOU HAVE NOW COMPLETED STEP 8 ON PAGE 94. GO TO STEP 10 ON PAGE 94 BY PERFORMING THE OPTIONAL PROCEDURE IN 20.1, “DISABLE NETWARE IF YOU’RE NOT USING IT” ON PAGE 203.

10.0 AS/400 to Print PCL and PostScript Files

Use this chapter to configure AS/400 to print ASCII, PCL, or PostScript files on your Ethernet or Token Ring LAN-attached IBM Network Printer 12, 17, or 24.

If you want to configure AS/400 to print IPDS files, use the procedure in 11.0, "AS/400 to Print IPDS Files" on page 111.

SCS Printing

AS/400 cannot print SCS files over the network to IBM network printers. However, if you use LPD and Host Print Transform (TRANSFORM) is set to *YES (see the TRANSFORM parameter in sections 10.5.3.1, "Using Manual LPR" on page 107 10.5.3.2, "Creating an Automatic Remote Output Queue" on page 108), AS/400 and PSF/400 transforms SCS to PCL and print the result. If you want SCS transformed into IPDS before printing, refer to 11.0, "AS/400 to Print IPDS Files" on page 111. Refer to *IBM Network Printers: IPDS and SCS Technical Reference*, S544-5312.

10.1 Requirements

AS/400 and Related Software Levels

IBM recommends that you (1) apply the latest cumulative fix package for an AS/400 or related software feature, **and** (2) contact the AS/400 Web site and request verification of required software, as follows:

<http://as400service.ibm.com>

Select:

- AS/400 Support Line Knowledge Base
- Print
- Search on AFP to find the latest PTFs for AS/400.

10.1.1 Host Print Transforms

The following list indicates the valid options for the Host Print Transform Manufacturer Type and Model when using specific releases of AS/400:

V3R1	V3R2	V3R6	V3R7
<ul style="list-style-type: none">• *HP4 or• *WSCST	<ul style="list-style-type: none">• *IBM43nn or• *WSCST	<ul style="list-style-type: none">• *HP4 or• *WSCST	<ul style="list-style-type: none">• *IBM43nn or• *WSCST

Host Print Transform transforms non-ASCII spool files into PCL using the Manufacturer Type and model or WSC object. ASCII spool files (for example, *USRASCII) are assumed to contain valid PS or PCL data and are sent directly to the printer without any data stream conversion. A typical source of *USRASCII spool files would be the virtual print function in Client Access/400.

10.1.2 System Requirements

IBM network printers can be LAN attached to the following AS/400 systems:

- V3R1 and above
- V3R6 and above

V3R1 and V3R6 can be configured to print PostScript or PCL data streams to the IBM network printers provided that you are willing to use either a generic printer type like *HP4 or you get a Workstation Customization Object (WSCO) from IBM by accessing the AS/400 Web page at:

<http://as400service.ibm.com>

Support for the IBM network printers is built into V3R2 and V3R7, so there is no need to acquire a WSCO for these releases.

10.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on the AS/400 **may** require “create” or “change” authority.

Required Steps:

- ___ **1** If you have not already done so, set up the printer and install the NIC as described in 1.0, “Start Here—Install the Network Interface Card (NIC)” on page 3. **Optionally**, disconnect the printer from the LAN cable for the time being. We will tell you when to reconnect the printer to the LAN cable.
- ___ **2** If you do **not** have a DHCP server anywhere on your network, go to step 3. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, “Dynamic Host Configuration Protocol (DHCP) and BOOTP” on page 181 and determine what you should do by reading:
 - a. 18.1, “Industry Standards for Setting TCP/IP Addresses” on page 181
 - b. 18.2, “Options for Configuring NICs for DHCP and BOOTP” on page 183
 - c. 18.3, “Setting Dynamic IP Addresses with DHCP” on page 187
- ___ **3** If you want to change the MAC address to the LAA and do not use the printer operator panel, then you must use the following procedure:
 - a. Make sure an IP address has been assigned to the NIC. Refer to step 4.
 - b. Login to the NIC using the procedure in 25.2, “Logging into a NIC using TCP/IP Telnet” on page 230.
 - c. Set the MAC to the LAA using the procedure in 17.4, “Setting the LAA from the Command Line” on page 171.
- ___ **4** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.
 - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, “Setting TCP/IP Addresses from the Printer Operator Panel” on page 173.
 - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, “Setting an IP Address on a Local Segment with ARP” on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, “Setting Subnet Mask and Gateway Addresses with NPM” on page 217 or 17.8, “Setting Subnet Mask and Gateway Addresses from the Command Line” on page 175 to set subnet mask and gateway addresses.
 - 17.9, “Setting TCP/IP Addresses with BOOTP” on page 176 to set IP and other addresses if the printers are on a WAN.
 - Optionally use 17.10, “Setting a Symbolic Name for an IP Address” on page 180.

Note: If you do not use the printer operator panel, you need a DOS, OS/2, or Windows workstation with TCP/IP Telnet capability to set the IP address using 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174.

- ___ **5** If the printer and AS/400 are not on the same LAN segment, verify that there is a route defined in the TCP/IP route list. (Refer to 10.4.2, "Configuring a Router Definition with ADDTCP RTE" on page 105.)
- ___ **6** If you have not yet done so, create a line description for your Ethernet or Token Ring IBM NIC by doing the procedure in 10.3, "Developing Line Descriptions with CRTLINETH or CRTLINTRN."
- ___ **7** Set up AS/400 for TCP/IP using the procedure in 10.4, "Configuring AS/400 for TCP/IP" on page 104.
- ___ **8** Attach the printer to the LAN cable.
- ___ **9** Upload and create a workstation customization object (WSCO) using the CRTWSCST command. You may use either a generic WSCO like *HP4 or the specific WSCO created for network printers. You need the name of this WSCO when you do the next step to configure the printer on AS/400. Refer to 10.1.1, "Host Print Transforms" on page 99 for information about the WSCO to use.
- ___ **10** Configure your printer on the AS/400 by doing the procedure in 10.5, "Configuring AS/400 for Printing" on page 106.
- ___ **11** Verify the configuration by doing the procedure in 10.6, "Verifying PostScript or PCL Printing on AS/400" on page 109.
- ___ **12** If you have problems, refer to 11.12, "Resolving AS/400 Problems" on page 131.

Optional Steps:

- ___ **13** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.
- ___ **14** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.
- ___ **15** If you want to monitor your printer, you can use IBM's Network Printer Manager (NPM) on an OS/2 or Windows NT or 95 system. Refer to Table 18 on page 215.

10.3 Developing Line Descriptions with CRTLINETH or CRTLINTRN

For each LAN adapter on the AS/400, you need to create a line description for Token Ring or Ethernet for Release V3R1, V3R2, V3R6, and V3R7.

If a line description has already been created, make sure that the SSAP list includes options "AA" and "12" (these are default values) and that you know the LAN speed of your AS/400 LAN adapter.

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

10.3.1 Creating an Ethernet Line Description

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

Note: SSAP's of "AA" and "12" are automatically set as default values in the line description when you use "*CALC" when creating new line descriptions. You do not need to set these values unless they have been changed.

2. To create a line description, enter a command in the form:

```
CRTLINETH LIND(TRETH) RSRcname(LIN041)
```

3. Your completed screen should look like the following example:

```
5763SS1 V3R2M0 960517          BLDD60  09/11/96 12:25:46
Line description . . . . . : LIND      ETHLAN
Option . . . . . : OPTION    *ALL
Category of line . . . . . :          *ELAN
Resource name . . . . . : RSRcname  LIN041
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 . . . . . : AUTOCTRL *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 you configure TCP/IP on the AS/400, as described in 10.4, "Configuring AS/400 for TCP/IP" on page 104.

Resource name (RSRCNAME)

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

SSAP

When you use *CALC, the values of "12" and "AA" are entered automatically as defaults. Verify that those SSAP values have not been changed.

10.3.2 Creating a Token Ring Line Description

1. To change an existing line description, use CHGLINTRN for a Token Ring. To create a line description, use CRTLINTRN.

Note: SSAP's of "AA" and "12" are set as default values in the line description.

2. To create a line description, enter a command in the form:

```
CRTLINTRN LIND(TRLAN) RSRNAME(LIN031)
```

3. Your completed screen should look like:

```

Display Line Description                                     Page 1
5763SS1 V3R2M0 960517                                     BLDD60 09/11/96 12:24:07
Line description . . . . . : LIND      TRLAN
Option . . . . . : OPTION      *ALL
Category of line . . . . . :          *TRLAN
Resource name . . . . . : RSRCNAME LIN031
Online at IPL . . . . . : ONLINE    *YES
Vary on wait . . . . . : VRYWAIT   *NOWAIT
Maximum controllers . . . . . : MAXCTL 40
Line speed . . . . . : LINESPEED 16M
Maximum frame size . . . . . : MAXFRAME 4060
TRLAN manager logging level . . . . . : TRNLOGLVL *OFF
Current logging level . . . . . :          *OFF
TRLAN manager mode . . . . . : TRNMGRMODE *OBSERVING
Log configuration changes . . . . . : LOGCFGCHG *LOG
Token-ring inform of beacon . . . . . : TRNINFCBN *YES
Local adapter address . . . . . : ADPTADR *ADPT
Exchange identifier . . . . . : EXCHID 056A1005
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      *MAXFRAME      *SNA      AA       *MAXFRAME      *NONSNA
 12      *MAXFRAME      *NONSNA   C8       *MAXFRAME      *HPR
Link speed . . . . . : LINKSPEED 16M
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
Functional address . . . . . : FCNADR
-----Functional Addresses-----
(No functional addresses found)

```

Specify the following three parameters:

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 you configure TCP/IP on the AS/400, as described in 10.4, "Configuring AS/400 for TCP/IP" on page 104.

Resource name (RSRCNAME)

System-assigned name for the interface (for example, LN031).

SSAP

Make sure the default values of "12" and "AA" have not been reset.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 101. GO TO STEP 7 ON PAGE 101 BY PERFORMING THE PROCEDURE IN 10.4, "CONFIGURING AS/400 FOR TCP/IP."

10.4 Configuring AS/400 for TCP/IP

The next step in configuring AS/400 for the IBM network printers 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 AS/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.

10.4.1 Configuring an AS/400 TCP/IP Interface with ADDTCPIFC

10.4.1.1 Configuring an Interface for Ethernet: ADDTCPIFC is used to add a TCP/IP interface to AS/400. This step configures the AS/400 for attachment to a TCP/IP network.

- At the AS/400 command line, enter a command in the form:
ADDTCPIFC INTNETADR('9.99.15.188') LIND(ETHLAN) SUBNETMASK('255.255.255.0')
- A completed screen should look like the following:

```

System:      BLDD6                                     0
Internet address . . . . . : 9.99.15.188
Subnet mask . . . . . : 255.255.255.0
Line description . . . . . : ETHLAN
Line type . . . . . : *ELAN
Interface status . . . . . : Inactive
Type of service . . . . . : *NORMAL
Maximum transmission unit . . . . . : *LIND
Automatic start . . . . . : *YES

```

- The following parameters, described below, are required:
 - AS/400 Ethernet interface card address
 - Line description name
 - Subnet Mask of the AS/400

Internet Address Internet address of the AS/400 Ethernet LAN adapter.

Note: Do **not** use the IP 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 10.3, "Developing Line Descriptions with CRTLINETH or CRTLINTRN" on page 101. Each AS/400 LAN adapter will have its own line description.

10.4.1.2 Configuring an Interface for Token Ring ADDTCPIFC is used to add a TCP/IP interface to AS/400.

- At the AS/400 command line, enter a command in the form:

```
ADDTCPIFC INTNETADR('9.99.12.188') LIND(TRLAN) SUBNETMASK('255.255.255.0')
```

2. A completed screen should look like the following:

```
                                Display TCP/IP Interface                                DD60
System:  BL
Internet address . . . . . : 9.99.12.188
Subnet mask . . . . . : 255.255.255.0
Line description . . . . . : TRLAN
Line type . . . . . : *TRLAN
Interface status . . . . . : Inactive
Type of service . . . . . : *NORMAL
Maximum transmission unit . . . . . : *LIND
Automatic start . . . . . : *YES
TRLAN bit sequencing . . . . . : *MSB
```

3. The following parameters, described below, are required:

- AS/400 Token Ring interface card address
- Line description name
- Subnet Mask of the AS/400

Internet Address Internet address of the AS/400 Token Ring LAN adapter.

Note: Do **not** use the IP address of the NIC.

Subnet Mask The Subnet Mask for your AS/400 LAN adapter (for example, 255.255.255.0).

Line description The name assigned to the AS/400 line description as described in 10.3, "Developing Line Descriptions with CRTLINETH or CRTLINTRN" on page 101. Each AS/400 network LAN adapter will have its own line description.

10.4.2 Configuring a Router Definition with ADDTCP RTE

If necessary, use the ADDTCP RTE command to create a router definition. You need this if your printer is somewhere other than on a local segment and must cross bridges.

10.4.3 Configuring a Local Domain and Hostname

The AS/400 print commands (described in 10.5.3, "Setting up Printing for PostScript and PCL Files" on page 106) require a local domain name and hostname. If you have already configured LAN-attached TCP/IP printers on your AS/400 system, you will have a local domain name and hostname configured on your system. If you do, do **not** change your setup.

If, however, your local domain name and hostname file is empty, you need to set it up. This control file information is used to determine if a print request comes from an authorized host.

To configure the local domain and hostname, run the:

```
CFGTCP
```

command, then select Option "12" from the menu. Enter a local domain name like *city.company.com*, for example *boston.rsos.com*. Enter a local hostname like *as400-01*. This is the name of your AS/400 system. This name must match the hostname for your system in the host entry table (refer to 10.4.4, "Configuring a TCP/IP Host Table Entry" on page 106).

Printer and AS/400 on same LAN Segment?

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.

10.4.4 Configuring a TCP/IP Host Table Entry

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

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 101. GO TO STEP 10 ON PAGE 101 BY PERFORMING THE PROCEDURE IN 10.5, "CONFIGURING AS/400 FOR PRINTING."

10.5 Configuring AS/400 for Printing

10.5.1 Data Requirements

You need the following data to configure the AS/400 for printing:

Parameter	Description	Your Value
Remote Printer Queue name	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.)	
IP address	IP address of the NIC.	

10.5.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Setup printing capability
- ▶ Verify with a print job

Detailed Configuration Procedure:

To configure AS/400 for TCP/IP to print PostScript and PCL files, do the steps in the following procedures:

- 10.5.3, "Setting up Printing for PostScript and PCL Files"
 - Specify LPR for **manual** submissions.
 - Configure a remote output queue for **automatic** submissions.
- 10.6.1, "Printing PCL Files" on page 109 or 10.6.2, "Printing PostScript Files" on page 110

Note: The procedures described here are performed from the AS/400 command line. You may use the AS/400 menu system, if you prefer.

10.5.3 Setting up Printing for PostScript and PCL Files

The next step in configuring the AS/400 for IBM network printers is to set up the remote printing capability. There are two ways to do this:

- Specify LPR parameters manually each time you send a file to the printer.
- Use Remote Writer and a remote output queue for automatic printing to the printer.

10.5.3.1 Using Manual LPR: 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        > 'PASS'
Job name . . . . . JOB              *
User . . . . .
Number . . . . .
Spooled file number . . . . . SPLNBR  *ONLY
Destination type . . . . . DESTTYP   *OTHER
Transform SCS to ASCII . . . . . TRANSFORM *YES
Manufacturer type and model . . . . . MFRTPMDL > *IBM4317
Internet address . . . . . INTNETADR > '9.99.2.3'
```

4. The following parameter values, described below, are required:

Remote system

Enter the hostname of your printer or *INTNETADR, which then prompts you to specify the IP 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 (DESTTYP)

Specify *OTHER for the DESTTYPE parameter.

Transform (TRANSFORM)

Specify *YES.

Manufacturer Type and Model (MFRTPMDL)

Select a manufacturer type and model. This is the name of the WSCO. Select *IBM4312, *IBM4317, or *IBM4324 if you have AS/400 V3R2 and above or V3R7 and above or select *HP4 (or some other generic printer type) if you have any other AS/400 system.

Note: The WSCO name should also have been specified in step 9 on page 101.

Warning! Envelope Printing

To print envelopes on IBM network printers correctly, you must use Manufacturing Type and Model *IBM4312, *IBM4317, or *IBM4324, or use a WSCO object.

Internet Address (INTNETADR)

IP address of the NIC.

Note: You may specify **either** *INTNETADR (and the NIC IP address) **or** you may specify the hostname for the NIC (if you did add the printer to the host table entry in 10.4.4, "Configuring a TCP/IP Host Table Entry" on page 106).

10.5.3.2 Creating an Automatic Remote Output Queue: The second way of printing to an IBM network printer from an AS/400 is to automate printing by creating a remote output queue.

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

```
CRTOUTQ
```

2. The following example displays a screen showing the parameters you need to specify:

```

                                Create Output Queue (CRTOUTQ)

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 > PASS
Writers to autostart . . . . . AUTOstrwtr 1
Queue for writer messages . . . . MSGQ  QSYSOPR
  Library . . . . .                *LIBL
Connection type . . . . . CNNTYPE   > *IP
Destination type . . . . . DESTTYPE   > *OTHER
Host print transform . . . . . TRANSFORM *YES
Manufacturer type and model . . . . MFRtYPMDL > *IBM4312
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 want. This name is **not** the same as the printer's internal queue name, PASS.

Remote system (RMTSYS)

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

Remote printer queue (RMTprtQ)

Default name of the IBM network printer. 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.)

Writer to Autostart (AUTOstrwtr)

Set the value to "1." This will start Remote Writer when the queue is created, and it 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 (MFRTPMDL)

Specify a manufacturer type and model to be used when printing on a network printer. Select *IBM4312, *IBM4317, or *IBM4324 if you have V3R2. Otherwise, select *HP4 or some other generic printer type. You may also use a Workstation Customizing Object (*WSCST) and specify the object.

Warning! Envelope Printing

To print envelopes on IBM network printers correctly, you must use Manufacturing Type and Model *IBM4312, *IBM4317, or *IBM4324, or use a Workstation Customizing Object (WSCO).

Internet address (INTNETADR)

Specify the IP address of the printer.

YOU HAVE NOW COMPLETED STEP 10 ON PAGE 101. GO TO STEP 11 ON PAGE 101 BY PERFORMING THE PROCEDURE IN 10.6, "VERIFYING POSTSCRIPT OR PCL PRINTING ON AS/400."

10.6 Verifying PostScript or PCL Printing on AS/400

10.6.1 Printing PCL Files

To test PCL printing, do the following:

1. If it is not already started, start TCP/IP 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 described in 10.4.4, "Configuring a TCP/IP Host Table Entry" on page 106).

4. If you are able to ping the printer, go to step 5. If you are unable to ping the printer, refer to 11.12.1, "Printer Cannot be PINGed" on page 131.

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, then enter the parameters. (Refer to 10.5.3.1, "Using Manual LPR" on page 107.)
- Enter the following command on the AS/400 command line:

```
STRRTWTR name
```

where *name* is the name of the AS/400 remote output queue (not the printer's internal queue), as described in 10.5.3.2, "Creating an Automatic Remote Output Queue" on page 108.

Note: To print PCL files, you must have specified PASS in the Remote Printer queue name for CRTOUTQ. Refer to 10.5.3.2, "Creating an Automatic Remote Output Queue" on page 108.

10.6.2 Printing PostScript Files

To test PostScript printing, do the following:

1. If it is not already started, start TCP/IP with the command:

```
STRTCP
```

2. To verify that the printer is connected to AS/400, 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.

3. Use one of the following two methods to send a spooled file to the printer:

- Enter the **LPR** command on the AS/400 command line, then enter the parameters. (Refer to 10.5.3.1, "Using Manual LPR" on page 107).
- Enter the following command on the AS/400 command line:

```
STRPRTWTR name
```

where *name* is the name of the AS/400 output queue (not the printer's internal queue) as described in 10.5.3.2, "Creating an Automatic Remote Output Queue" on page 108.

Note: To print PostScript files, you must have specified PASS on the Remote Printer queue name for CRTOUTQ. Refer to 10.5.3.2, "Creating an Automatic Remote Output Queue" on page 108.

— Trouble Printing? —

If you encounter problems with any of the procedures described in section 10.5, "Configuring AS/400 for Printing" on page 106 refer to 11.12, "Resolving AS/400 Problems" on page 131 for help.

11.0 AS/400 to Print IPDS Files

Use this chapter to configure AS/400 and PSF/400 to print IPDS files on your IBM network printer.

You need the IPDS option for the printer to print IPDS through PSF/400.

If you want to configure AS/400 to format and print ASCII, PCL, or PostScript files, use the procedure in 10.0, "AS/400 to Print PCL and PostScript Files" on page 99.

Printing SCS Files

If you want to configure AS/400 to print SCS files, you can set the IPDSPASTHR parameter to YES (see steps 1 on page 120, 1 on page 122, 1 on page 125, or 1 on page 128) and PSF/400 transforms SCS data into IPDS data before printing. If you want SCS data transformed into PCL, refer to 10.0, "AS/400 to Print PCL and PostScript Files" on page 99. Refer to *IBM Network Printers: IPDS and SCS Technical Reference*, S544-5312, for details.

11.1 Requirements

AS/400 and Related Software Levels

IBM recommends that you (1) apply the latest cumulative fix package for an AS/400 or related software feature, **and** (2) contact the AS/400 Web site and request verification of required software, as follows:

<http://as400service.ibm.com>

Select:

- AS/400 Support Line Knowledge Base
- Print
- Search on AFP to find the latest PTFs for AS/400.

Verify that you have the following software:

Table 12. AS/400 V3R1

Area	Software	Documentation
General	Cumulative tape C6198310 or later	Order only the cover letters for the following PTFs: <ul style="list-style-type: none">• SF35164 (TCP/IP for PSF/400)• SF29961 (WRKAFP2 for PSF/400 configuration)• SF24140 IPDS pass through
Sockets-related	PTF SF30018	
Network Printer Support	PTF SF32911	

Table 13. AS/400 V3R2

General	No PTFs are required.	Standard V3R2 documentation.
Network Printer support	PTF SF33182	

Table 14. AS/400 V3R6		
General	Cumulative tape 37TH360 or later	Order only the cover letters for the following PTFs: <ul style="list-style-type: none"> • SF35164 (TCP/IP for PSF/400) • SF29961 (WRKAFP2 for PSF/400 configuration) • SF24140 IPDS pass through
Sockets-related	PTF SF30508	
Network Printer support	PTF SF33118	

Table 15. AS/400 V3R7		
General	No PTFs are required	Standard V3R7 documentation
Network Printer support	PTF SF33025	

Table 16. AS/400 All Releases		
PSF/400	V3R1, V3R2, V3R6, or V3R7	APAR SA44304

For IPDS printing, you also need to install the IPDS option for the printer.

11.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on the AS/400 **may** require “create” or “change” authority.

Required Steps:

- 1 If you are installing the printer on AS/400 V3R1 or V3R6, you need to install WRKAFP2 for PSF/400 (this is one of the items on the list of software provided at the beginning of this chapter). Make sure WRKAFP2 has been installed before proceeding. Refer to 11.3, “Installing WRKAFP2 for V3R1 or V3R6” on page 114.
- 2 If you have not already done so, set up the printer and install the NIC as described in 1.0, “Start Here—Install the Network Interface Card (NIC)” on page 3.
- 3 Using the printer operator panel, set up the printer for IPDS by setting the following parameters and values:

Menu	Item	Setting
ETHERNET or TOKEN RING	PERSONALTY	<ul style="list-style-type: none"> • AUTO, if you want to use the printer for other than IPDS printing • IPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
Note: FONTSUB must be set to ON, else you may receive an error message when printing IPDS.		
IPDS	IPDS PORT	TRING, ETHER

- 4 If you do **not** have a DHCP server anywhere on your network, go to step 5 on page 113. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, “Dynamic Host Configuration Protocol (DHCP) and BOOTP” on page 181 and determine what you should do by reading:

- a. 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181
- b. 18.2, "Options for Configuring NICs for DHCP and BOOTP" on page 183
- c. 18.3, "Setting Dynamic IP Addresses with DHCP" on page 187

5 If you want to change the MAC address to the LAA and do not use the printer operator panel, then you must use the following procedure:

- a. Make sure an IP address has been assigned to the NIC. Refer to step 6.
- b. Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
- c. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.

6 You need to assign an IP address to the NIC. Obtain an IP address, subnet mask, and hostname (what the printer will be called on the AS/400) from the network administrator. Use the printer operator panel to set the IP address and subnet mask. Refer to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.

If you do not use the printer operator panel to set the addresses, you need a DOS/Windows or OS/2 workstation, with Telnet capability and attached to the LAN, from which you can do a remote login to the printer and set the addresses from the command line. If you are assigning addresses from the command line, refer to the following:

- 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174
- 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line" on page 175

7 If the printer and AS/400 are not on the same LAN segment, verify that there is a route defined in the TCP/IP route list. (Refer to 11.5.2, "Configuring a Router Definition with ADDTCP RTE" on page 118.)

8 You need the following data to configure the NIC:

Parameter	Description	Your Value
Domain or hostname	A local domain name may be something like city.company.com. A hostname may be something like AS400-01.	
IP address	IP address of the NIC in dotted decimal notation.	

9 Create or verify the existence of a line description for either Token Ring or Ethernet. Refer to 11.4, "Developing Line Descriptions with CRTLINETH or CRTLINTRN" on page 114.

10 Create or verify the existence of an AS/400 TCP/IP interface for Token Ring or Ethernet. Refer to 11.5, "Configuring an AS/400 TCP/IP Interface" on page 116.

11 The next step depends on your AS/400 release. Configure your printer with one of these procedures:

- 11.6, "Configuring PSF/400 for IPDS on V3R1" on page 118
- 11.7, "Configuring PSF/400 for IPDS on V3R2" on page 121
- 11.8, "Configuring PSF/400 for IPDS on V3R6" on page 124
- 11.9, "Configuring PSF/400 for IPDS on V3R7" on page 126

12 Vary the printer ON using the VFYCFG command.

- ___ **13** Verify that TCP/IP has been started using the STRTCP command.
- ___ **14** Test your configuration by using 11.10, "Verifying the IPDS Configuration on AS/400" on page 129.
- ___ **15** To share the printer on the network, verify that the necessary parameters have been set correctly by referring to 11.11, "Sharing the AS/400 Printer on the Network" on page 130.
- ___ **16** If you have problems, refer to 11.12, "Resolving AS/400 Problems" on page 131.

Optional Steps:

- ___ **17** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.
- ___ **18** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.
- ___ **19** If you want to monitor your printer, you can do so using IBM's Network Printer Manager (NPM) on OS/2 or Windows NT or 95. Refer to Table 18 on page 215.

11.3 Installing WRKAFP2 for V3R1 or V3R6

To install WRKAFP2 for V3R1 or V3R6, perform the following steps:

1. Obtain the appropriate PTF for WRKAFP2:
 - For V3R1, refer to Table 12 on page 111
 - For V3R6, refer to Table 14 on page 112
2. Extract the cover letter from the PTF medium.
3. Follow the instructions on the WRKAFP2 section of the cover letter to install WRKAFP2.

YOU HAVE NOW COMPLETED STEP 9 ON PAGE 113. GO TO STEP 2 ON PAGE 112 BY PERFORMING THE PROCEDURE IN 1.0, "START HERE—INSTALL THE NETWORK INTERFACE CARD (NIC)" ON PAGE 3.

11.4 Developing Line Descriptions with CRTLINETH or CRTLINTRN

For each LAN adapter on the AS/400, you need to create a line description for Token Ring or Ethernet for Release V3R1, V3R2, V3R6, and V3R7.

If a line description has already been created, make sure that the SSAP list includes options "AA" and "12" (these are default values) and that you know the LAN speed of your AS/400 LAN adapter.

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

11.4.1 Creating an Ethernet Line Description

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

Note: SSAP's of "AA" and "12" are automatically set as default values in the line description when you use

“*CALC” when creating new line descriptions. You do not need to set these values unless they have been changed.

2. To create a line description, enter a command in the form:

```
CRTLINETH LIND(TRETH) RSRNAME(LIN041)
```

3. Your completed screen should look like the following example:

```
5763SS1 V3R2M0 960517          BLDD60 09/11/96 12:25:46
Line description . . . . . : LIND      ETHLAN
Option . . . . . : OPTION      *ALL
Category of line . . . . . :          *ELAN
Resource name . . . . . : RSRNAME   LIN041
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 you configure TCP/IP on the AS/400, as described in 10.4, “Configuring AS/400 for TCP/IP” on page 104.

Resource name (RSRCNAME)

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

SSAP

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

11.4.2 Creating a Token Ring Line Description

1. To change an existing line description, use CHGLINTRN for a Token Ring. To create a line description, use CRTLINTRN.

Note: SSAP’s of “AA” and “12” are set as default values in the line description.

2. To create a line description, enter a command in the form:

```
CRTLINTRN LIND(TRLAN) RSRNAME(LIN031)
```

3. Your completed screen should look like:

```

                    Display Line Description                               Page 1
5763SS1 V3R2M0 960517          BLDD60    09/11/96 12:24:07
Line description . . . . . : LIND      TRLAN
Option . . . . . : OPTION    *ALL
Category of line . . . . . :          *TRLAN
Resource name . . . . . : RSRNAME  LN031
Online at IPL . . . . . : ONLINE   +YES
Vary on wait . . . . . : VRYWAIT  *NOWAIT
Maximum controllers . . . . . : MAXCTL 40
Line speed . . . . . : LINESPEED 16M
Maximum frame size . . . . . : MAXFRAME 4060
TRLAN manager logging level . . . . . : TRNLOGLVL *OFF
Current logging level . . . . . :          *OFF
TRLAN manager mode . . . . . : TRNMGRMODE *OBSERVING
Log configuration changes . . . . . : LOGCFGCHG *LOG
Token-ring inform of beacon . . . . . : TRNINFBGN *YES
Local adapter address . . . . . : ADPTADR *ADPT
Exchange identifier . . . . . : EXCHID 056A1005
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      *MAXFRAME      *SNA      AA      *MAXFRAME      *NONSNA
12      *MAXFRAME      *NONSNA   C8      *MAXFRAME      *HPR
Link speed . . . . . : LINKSPEED 16M
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
Functional address . . . . . :          FCNADR
-----Functional Addresses-----
(No functional addresses found)

```

Specify the following three parameters:

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 you configure TCP/IP on the AS/400, as described in 10.4, "Configuring AS/400 for TCP/IP" on page 104.

Resource name (RSRCNAME)

System-assigned name for the interface (for example, LN031).

SSAP

Make sure the default values of "12" and "AA" have not been reset.

YOU HAVE NOW COMPLETED STEP 9 ON PAGE 113. GO TO STEP 10 ON PAGE 113 BY PERFORMING THE PROCEDURE IN 11.5, "CONFIGURING AN AS/400 TCP/IP INTERFACE."

11.5 Configuring an AS/400 TCP/IP Interface

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

Note: Do not enter the IP address of the NIC. Do **not** set the AS/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.

11.5.1 Configuring the AS/400 Interface with ADDTCPIFC

11.5.1.1 Configuring an Interface for Ethernet: ADDTCPIFC is used to add a TCP/IP interface to AS/400. This step configures the AS/400 for attachment to a TCP/IP network.

1. At the AS/400 command line, enter a command in the form:
ADDTCPIFC INTNETADR('9.99.15.188') LIND(ETHLAN) SUBNETMASK('255.255.255.0')
2. A completed screen should look like the following:

```

System: BLDD60
Internet address . . . . . : 9.99.15.188
Subnet mask . . . . . : 255.255.255.0
Line description . . . . . : ETHLAN
Line type . . . . . : *ELAN
Interface status . . . . . : Inactive
Type of service . . . . . : *NORMAL
Maximum transmission unit . . . . . : *LIND
Automatic start . . . . . : *YES

```

3. The following parameters, described below, are required:
 - AS/400 Ethernet or Token Ring interface card address
 - Line description name
 - Subnet Mask of the AS/400

Internet Address Internet address of the AS/400 Ethernet or Token Ring LAN adapter.
Note: Do **not** enter the IP 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 11.4, "Developing Line Descriptions with CRTLINETH or CRTLINTRN" on page 114. Each AS/400 LAN adapter will have its own line description.

11.5.1.2 Configuring an Interface for Token Ring: ADDTCPIFC is used to add a TCP/IP interface to AS/400.

1. At the AS/400 command line, enter a command in the form:
ADDTCPIFC INTNETADR('9.99.12.188') LIND(TRLAN) SUBNETMASK('255.255.255.0')
2. A completed screen should look like the following:

```

                                Display TCP/IP Interface
System: BLDD60
Internet address . . . . . : 9.99.12.188
Subnet mask . . . . . : 255.255.255.0
Line description . . . . . : TRLAN
Line type . . . . . : *TRLAN
Interface status . . . . . : Inactive
Type of service . . . . . : *NORMAL
Maximum transmission unit . . . . . : *LIND
Automatic start . . . . . : *YES
TRLAN bit sequencing . . . . . : *MSB

```

3. The following parameters, described below, are required:
 - AS/400 Ethernet or Token Ring interface card address
 - Line description name
 - Subnet Mask of the AS/400

Internet Address Internet address of the AS/400 Ethernet or Token Ring LAN adapter.
Note: The AS/400 LAN adapter is not the NIC.

Subnet Mask	The Subnet Mask for this AS/400 LAN adapter (for example, 255.255.255.0).
Line description	The name assigned to the AS/400 line description as described in 11.4, "Developing Line Descriptions with CRTLINETH or CRTLINTRN" on page 114. Each AS/400 network LAN adapter will have its own line description.

11.5.2 Configuring a Router Definition with ADDTCP RTE

If necessary, use the ADDTCP RTE command to create a router definition. You need this if your printer is somewhere other than on a local segment and must cross bridges.

11.5.3 Configuring a TCP/IP Host Table Entry

Optionally, create a TCP/IP host table entry. While optional, IBM recommends that you take this step. Add the AS/400 name and the IP address of the LAN adapter to the "Host Table Entries." Also, add the hostname and IP address of the printer to the list. You can access the host table entries function by using the CFGTCP command, then selecting "10" from the menu.

You should also add entries to your host table for both the hostname **and** the fully qualified network name for your system. The entry should match what you configured for host and domain name. For example, if your hostname is "RCHASM03" and your domain name is "RCHLAND.IBM.COM," your fully qualified network name is "RCHASM03.RCHLAND.IBM.COM." In your host entry table, enter both RCHASM03 and RCHASM03.RCHLAND.IBM.COM.

YOU HAVE NOW COMPLETED STEP 10 ON PAGE 113. GO TO STEP 11 ON PAGE 113 BY PERFORMING ONE OF THE PROCEDURES LISTED THERE.

11.6 Configuring PSF/400 for IPDS on V3R1

To configure IPDS printing on AS/400 V3R1, you must use two commands:

- CRTDEVPRT
- WRKAFP2

WRKAFP2

WRKAFP2 is a tool whose source code is in the cover letter for PTF 29961.

11.6.1 Configuring PSF with CRTDEVPRT on V3R1

This section describes how to create a printer device description.

1. At the AS/400 command line, enter a command in the form:

```
CRTDEVPRT DEVD(P4324) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
AFPATTACH(*APPC) FONT(11) RMTLOCNAME(TCPIP)
TEXT('IBM Network Printer Model 24')
```
2. A completed screen looks like the following example:

```

                    Display Device Description
5763SS1 V3R1M0 940909          BLDSSYS1 09/11/96 11:15:40 Page 1
Device description . . . . . : DEVD      P4324
Option . . . . . : OPTION    *ALL
Category of device . . . . . :          *PRT
Automatically created . . . . . :      NO
Device class . . . . . : DEVCLS  *RMT
Device type . . . . . : TYPE    *IPDS
Device model . . . . . : MODEL   0
Advanced function printing . . . . . : AFP      *YES
AFP attachment . . . . . : AFPATTACH *APPC
Online at IPL . . . . . : ONLINE  *YES
Font . . . . . : FONT
Identifier . . . . . :          011
Point size . . . . . :          *NONE
Form feed . . . . . : FORMFEED *AUTOCUT
Separator drawer . . . . . : SEPDRAWER *FILE
Separator program . . . . . : SEPPGM  *NONE
Library . . . . . :
Printer error message . . . . . : PRTRMSG *INQ
Message queue . . . . . : MSGQ     QSYSOPR
Library . . . . . :          *LIBL
Maximum pending requests . . . . . : MAXPNDRQS 6
Print while converting . . . . . : PRTCVT  *YES
Print request timer . . . . . : PRTRQSTMR *NOMAX
Form definition . . . . . : FORMDF   FIC10110
Library . . . . . :          *LIBL
Character identifier . . . . . : CHRID   *SYSVAL
Remote location . . . . . : RMTLOCNAME TCP/IP
Local location . . . . . : LCLLOCNAME *NETATR
Remote network identifier . . . . . : RMTNETID *NETATR
Mode . . . . . : MODE        QSPWTR

```

3. Values must be entered for the following parameters:

- Device Description (DEVD)**
A description of the device, for example P4324. This value must match the value entered for the "DEVD" parameter in 11.6.2, "Configuring AFP with WRKAFP2 on V3R1."
- Device Class (DEVCLS)**
Enter *RMT.
- Device Type (TYPE)**
Enter *IPDS.
- Device Model (MODEL)**
Enter 0.
- AFP Attachment (AFPATTACH)**
Enter *APPC. The WRKAFP2 command overrides this entry and defers it to TCP/IP.
- Font (FONT)**
A value appropriate for your environment is required.
- Form Feed (FORMFEED)**
Enter *AUTOCUT.
- Remote Location (RMTLOCNAME)**
Enter the remote location name. This required parameter is ignored for TCP/IP configurations.

11.6.2 Configuring AFP with WRKAFP2 on V3R1

WRKAFP2
WRKAFP2 is a tool whose source code is in the cover letter for PTF 29961.

This section describes how to use the WRKAFP2 command to configure the printer's TCP/IP information. This information overrides the APPC configuration information specified in the printer device description.

Note: WRKAFP2 creates a data area in library QGPL. This data area must have the same name as the printer device description.

1. At the AS/400 command line, enter a command in the form:

```
WRKAFP2 DEVD(P4324) IPDSPASTHR(*YES) TCPIP(*YES) RMTSYS('128.9.12.134')
        PORT(5001) INACTTMR(*SEC15)
```

2. A printout should look like the following:

QPOXWAFP	

DEVD	P4324
IPDSPASTHR	*YES
TCPIP	*YES
RMTSYS	128.9.12.134
PORT	5001
ACTTMR	*NOMAX
INACTTMR	*SEC15
SBP	*NO
PSC	*NO
DRF	*NO
DRR	*NO
EDGSNSTV	*NO

3. Set up the following parameters:

Printer device name (DEVD)

The device description or name. This description must be identical to the name entered for the device name in 11.6.1, "Configuring PSF with CRTDEVPRT on V3R1" on page 118.

IPDS pass through (IPDSPASTHR)

Enter *YES. The value specifies that IPDS pass through is done for all files that are eligible for pass through. Otherwise, enter *NO. To print SCS files, specify *YES. PSF/400 transforms SCS into IPDS before printing.

Note: This is the only way SCS printing is supported.

TCP/IP support (TCPIP)

Enter as *YES.

Remote system (RMTSYS)

Enter the IP address or hostname of the printer.

Port (PORT)

Enter 5001.

Activation timer (ACTTMR)

The value specifies the number of seconds that PSF/400 waits for a printer to respond to an activation request. If only one AS/400 will use the printer, use the default value (170 seconds). If more than one AS/400 will share the printer, set the value to *NOMAX, which will cause PSF/400 to wait forever to establish a connection.

Inactivity timer (INACTTMR)

Set this parameter to a value at least equal to the TIMEOUT value on the printer. IBM recommends *SEC15. This value specifies the length of time PSF/400 will maintain a session with the printer while there are no spooled files with a status of RDY.

Note: Make a copy of the values you specify for WRKAFP2 parameters. You can display the values by running WRKAFP2 with the *YES parameter to print the data area. If you change any of these parameters, the command re-initializes the data area and all required values must be re-entered.

YOU HAVE NOW COMPLETED STEP 11 ON PAGE 113. GO TO STEP 14 ON PAGE 114 BY PERFORMING THE PROCEDURE IN 11.10, "VERIFYING THE IPDS CONFIGURATION ON AS/400" ON PAGE 129.

11.7 Configuring PSF/400 for IPDS on V3R2

To configure IPDS on AS/400 V3R2, you use the following commands:

- CRTDEVPRT
- CRTPSFCFG

11.7.1 Configuring PSF with CRTDEVPRT on V3R2

This section describes how to create a printer device description.

1. At the AS/400 command line, enter a command in the form:

```
CRTDEVPRT DEVD(P4317) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
AFPATTACH(*APPC) FONT(11) RMTLOCNAME(TCPIP)
TEXT('IBM Network Printer Model 17')
```

2. A completed screen looks like this:

```

Display Device Description                               Page 1
5763SS1 V3R2M0 960517                                BLDD60 09/11/96 12:01:33
Device description . . . . . : DEVD      P4317
Option . . . . . : OPTION    *ALL
Category of device . . . . . :          *PRT
Automatically created . . . . . :          NO
Device class . . . . . : DEVCLS  *RMT
Device type . . . . . : TYPE    *IPDS
Device model . . . . . : MODEL   0
Advanced function printing . . . . . : AFP    *YES
AFP attachment . . . . . : AFPATTACH *APPC
Online at IPL . . . . . : ONLINE  *YES
Font . . . . . : FONT
Identifier . . . . . :          011
Point size . . . . . :          *NONE
Form Feed . . . . . : FORMFEED *AUTOCUT
Separator drawer . . . . . : SEPDRAWER *FILE
Separator program . . . . . : SEPPGM  *NONE
Library . . . . . :
Printer error message . . . . . : PRTRRMSG *INQ
Message queue . . . . . : MSGQ    QSYSOPR
Library . . . . . :          *LIBL
Maximum pending requests . . . . . : MAXPNDRQS 6
Print while converting . . . . . : PRTCVT  *YES
Print request timer . . . . . : PRTRQSTMR *NOMAX
Form definition . . . . . : FORMDF   FIC10110
Library . . . . . :          *LIBL
Character identifier . . . . . : CHRID   *SYSVAL
Remote location . . . . . : RMTLOCNAME TCPIP
Local location . . . . . : LCLLOCNAME *NETATR
Remote network identifier . . . . . : RMTNETID *NETATR
Mode . . . . . : MODE      QSPWTR
Dependent location name . . . . . : DEPLOCNAME *NONE
Text . . . . . : TEXT      IBM Network Printer 17

```

3. Enter values for the following parameters:

Device Description (DEVD)

The device description or name. This device description or name must be the same value as you will enter for the "DEVD" parameter in 11.7.2, "Configuring AFP with CRTPSFCFG on V3R2" on page 122.

Device Class (DEVCLS)

Enter *RMT.

Device Type (TYPE)

Enter *IPDS.

Device Model (MODEL)

Enter 0.

Advanced Function Printing (AFP)

Enter *YES.

AFP Attachment (AFPATTACH)

Enter *APPC. CRTPSFCFG overwrites this value.

Font (FONT)

Enter a value appropriate for your environment.

Form Feed (FORMFEED)

Enter *AUTOCUT.

Remote Location (RMTLOCNAME)

Enter the remote location name.

11.7.2 Configuring AFP with CRTPSFCFG on V3R2

Optional

New for V3R7 is the ability to specify three TCP/IP-related parameters for PSF in a printer device description: RMTLOCNAME, PORT, and ACTTMR. In V3R1 and V3R6, WRKAFF2 was used to specify these three parameters, along with other parameters, for PSF. In V3R2, CRTPSFCFG (Create PSF Configuration Object), which replaced WRKAFF2, was used to specify these same parameters, along with other parameters. In V3R7, these three parameters, when specified in a PSF configuration object are ignored, since they are specified in a printer device description. However, you may wish to use a PSF configuration object to specify other parameters, such as IPDS passthrough, and so on.

The PSF configuration object created with this command is used by PSF/400 when printing IPDS files. The object is used by AS/400 V3R2 only if the object is in the QGPL library and has the same name as the printer device description. This information overrides the APPC configuration information specified in the printer device description.

To configure AS/400 for IPDS printing on V3R2:

1. At the AS/400 command line, enter a command in the form:


```
CRTPSFCFG PSFCFG(P4317) IPDSPASTHR(*YES) RLSTMR(*SEC15)
TEXT('IBM Network Printer Model 17')
RMTLOCNAME('128.99.12.134') PORT(5001)
```
2. A completed screen looks like this:

```

5763SS1 V3R2M0 960517          BLDD60 09/11/96 12:15:47
PSF configuration: P4317          Library: QGPL
User resource library . . . . . : *JOBLIBL
IPDS pass through . . . . . : *YES
Activate release timer . . . . . : *NORDYF
Release timer . . . . . : *SEC15
Restart timer . . . . . : +IMMED
SNA retry count . . . . . : 2
Delay time between retries . . . . . : 0
Blank page . . . . . : *YES
Page size control . . . . . : *NO
Resident fonts . . . . . : *YES
Resource retention . . . . . : *YES
Edge orient . . . . . : *NO
Remote location:
Name or address . . . . . : 128.99.12.134
TCP/IP port . . . . . : 5001
TCP/IP activation timer . . . . . : 170
PSF defined options:
Text description . . . . . : IBM Network Printer 17
Device resource library list:
                                *DFT

```

3. The following parameters are required:

PSF configuration

The name of the printer device you are configuring.

Library This must be QGPL, the default value.

Note: This is a sub-parameter of PSF configuration.

IPDS pass through (IPDSPASTHR)

Enter *YES. The value specifies that IPDS pass through is done for all files that are eligible for pass through. Otherwise, enter *NO. To print SCS files, specify *YES. PSF/400 transforms SCS into IPDS before printing. This is the only way SCS printing is supported.

Activate release timer

Specifies the point at which the release timer (RLSTMR) is activated. Set to *NORDYF. This means that the release timer is activated when there are no spooled files in the printer's output queue with a status of RDY and the last page of the last spooled file processed has printed. *NORDYF is used so that all files with a status of RDY are printed before releasing the session (which does not terminate the writer, however).

Release timer

Specifies the amount of time to wait before a session or dialog is released without terminating the writer. The ACTRLSTMR parameter specifies when this timer is to be activated. Set the parameter to a value at least equal to the TIMEOUT value on the printer. IBM recommends *SEC15.

Note: In V3R1, this was called the Inactivity timer.

Remote Location name or address (RMTLOCNAME)

Enter the IP address or hostname of the printer.

TCP/IP port Accept the default value for the TCP/IP port (5001).

TCP/IP activation timer

The value specifies the number of seconds that PSF/400 waits for a printer to respond to an activation request. If only one AS/400 will use the printer, use the default value (170 seconds). If more than one AS/400 will share the printer, set the value to *NOMAX, which will cause PSF/400 to wait forever to establish a connection.

YOU HAVE NOW COMPLETED STEP 11 ON PAGE 113. GO TO STEP 14 ON PAGE 114 BY PERFORMING THE PROCEDURE IN 11.10, "VERIFYING THE IPDS CONFIGURATION ON AS/400" ON PAGE 129.

11.8 Configuring PSF/400 for IPDS on V3R6

To configure IPDS printing on AS/400 V3R6, you must use two commands:

- CRTDEVPRT
- WRKAFF2

WRKAFF2

WRKAFF2 is a tool whose source code is in the cover letter for PTF SF31461.

11.8.1 Configuring PSF with CRTDEVPRT on V3R6

This section describes how to create a printer device description.

1. At the AS/400 command line, enter a command in the form:

```
CRTDEVPRT DEVD(P4312) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
AFPATTACH(*APPC) FONT(11) RMTLOCNAME(TCPIP)
TEXT('IBM Network Printer Model 12')
```

2. A completed screen looks like this:

```
Display Device Description                                     Page 1
5716SS1 V3R6M0 950929                                       BLDRB2 09/11/96 12:11:25
Device description . . . . . : DEVD      P4312
Option . . . . . : OPTION    *ALL
Category of device . . . . . :          *PRT
Automatically created . . . . . :          NO
Device class . . . . . : DEVCLS   *RMT
Device type . . . . . : TYPE     *IPDS
Device model . . . . . : MODEL    0
Advanced function printing . . . . . : AFP      *YES
AFP attachment . . . . . : AFPATTACH *APPC
Online at IPL . . . . . : ONLINE   *YES
Font . . . . . : FONT
Identifier . . . . . :          011
Point size . . . . . :          *NONE
Form feed . . . . . : FORMFEED *AUTOCUT
Separator drawer . . . . . : SEPDRAWER *FILE
Separator program . . . . . : SEPPGM   *NONE
Library . . . . . :
Printer error message . . . . . : PRTERMSG *INQ
Shadowing message queue . . . . . : MSGQ   QSYSOPR
Library . . . . . :          *LIBL
Maximum pending requests . . . . . : MAXPNDRQS 6
Print while converting . . . . . : PRTCVT  *YES
Print request timer . . . . . : PRTRQSTMR *NOMAX
Form definition . . . . . : FORMDF    F1C10110
Library . . . . . :          *LIBL
Character identifier . . . . . : CHRID   *SYSVAL
Remote location . . . . . : RMTLOCNAME TCPIP
Local location . . . . . : LCLLOCNAME *NETATR
Remote network identifier . . . . . : RMTNETID *NETATR
Mode . . . . . : MODE      QSPWTR
Text . . . . . : TEXT      IBM Network Printer Model 12
```

3. Enter values for the following parameters:

Device Description (DEVD)

A description of the device, for example P4312. This value must match that used for the DEVD parameter in 11.8.2, "Configuring AFP with WRKAFF2 on V3R6" on page 125.

Device Class (DEVCLS)

Enter *RMT.

Device Type (TYPE)

Enter *IPDS.

Device Model (MODEL)

Enter 0.

Advanced Function Printing (AFP)

Enter *YES.

AFP Attachment (AFPATTACH)

Enter *APPC.

Font (FONT)

A value appropriate for your environment is required.

Form Feed (FORMFEED)

Enter *AUTOCUT.

Remote Location (RMTLOCNAME)

Enter the remote location name. This required parameter is ignored by the TCP/IP configurations.

11.8.2 Configuring AFP with WRKAFP2 on V3R6

WRKAFP2

WRKAFP2 is a tool whose source code is in the cover letter for PTF SF31461.

This section describes how to use the WRKAFP2 command to configure the printer's TCP/IP information. This information overrides the APPC configuration information specified in the printer device description.

Note: WRKAFP2 creates a data area in library QGPL. This data area must have the same name as the printer device description.

1. At the AS/400 command line, enter a command in the form:

```
WRKAFP2 DEVD(P4324) IPDSPASTHR(*YES) TCPIP(*YES) RMTSYS('128.99.12.134')
PORT(5001) RLSTMR(*SEC15)
```

2. A printout looks like this:

```
QPQXWAFP
-----
DEVD                P4324
IPDSPASTHR          *YES
TCPIP                *YES
RMTSYS              128.99.12.134
PORT                5001
ACTTMR              *NOMAX
RLSTMR              *SEC15
SBP                  *NO
PSC                  *NO
DRF                  *NO
DRR                  *NO
EDGSNSTV            *NO
```

3. Set up the following parameters:

Printer device name (DEVD)

The device description or name. This name must be identical to the name entered for the device description in 11.8.2, "Configuring AFP with WRKAFP2 on V3R6."

IPDS pass through (IPDSPASTHR)

Enter *YES. The value specifies that IPDS pass through is done for all files that are eligible for pass through. Otherwise, enter *NO. To print SCS files, specify *YES. PSF/400 will transform SCS into IPDS before printing. This is the only way SCS printing is supported.

TCP/IP support (TCPIP)

Enter as *YES.

Remote system (RMTSYS)

Enter the IP address or hostname of the printer.

Port (PORT)

Enter 5001.

Activation timer (ACTTMR)

This value specifies the number of seconds that PSF/400 waits for a printer to respond to an activation request. If only one AS/400 will use the printer, use the default value (170). If more than one AS/400 will share the printer, set the value to *NOMAX, which will cause PSF/400 to wait forever to establish a connection.

Release timer (RLSTMR)

Specifies the amount of time to wait before a session or dialog is released without terminating the writer. The ACTRLSTMR parameter specifies when this timer is to be activated. Set the parameter to a value at least equal to the TIMEOUT value on the printer. IBM recommends *SEC15.

Note: Make a copy of the values you specify for WRKAFP2 parameters. You can display the values by running WRKAFP2 with the *YES parameter to print the data area. If you change any of these parameters, the program re-initializes the data area and all required values must be re-entered.

YOU HAVE NOW COMPLETED STEP 11 ON PAGE 113. GO TO STEP 14 ON PAGE 114 BY PERFORMING THE PROCEDURE IN 11.10, "VERIFYING THE IPDS CONFIGURATION ON AS/400" ON PAGE 129.

11.9 Configuring PSF/400 for IPDS on V3R7

To configure IPDS on AS/400 V3R7, you use the following commands:

- CRTDEVPRT
- CRTPSFCFG (Optional)

11.9.1 Configuring PSF with CRTDEVPRT on V3R7

This section describes how to set up a device description on AS/400 for an APPC-attached printer:

1. At the AS/400 command line, enter a command in the form:

```
CRTDEVPRT DEVD(P4324) DEVCLS(*LAN) TYPE(*IPDS) MODEL(0) LANATTACH(*IP)
AFP(*YES) PORT(5001) FONT(11) RMTLOCNAME('128.9.12.134')
USRDFNOBJ(AFP/NETWRKPRNT *PSFCFG)
TEXT('IBM Network Printer Model 24')
```

2. A completed screen looks like this:

```

Display Device Description                               Page 1
5716SS1 V3R7M0 961108                                BLDRB1 09/11/96 12:02:59
Device description . . . . . : DEVD      P4324
Option . . . . . : OPTION    *ALL
Category of device . . . . . :          *PRT
Device class . . . . . : DEVCLS  *LAN
Device type . . . . . : TYPE    *IPDS
Device model . . . . . : MODEL   0
LAN attachment . . . . . : LANATTACH *IP
User-defined object . . . . . : USRDFNOBJ NETWORKPRT
Library . . . . . :          AFP
Object type . . . . . :          *PSFCFG
Data transform program . . . . . : USRDATFM *NONE
User-defined driver program . . . . . : USRDRVPGM *NONE
Advanced function printing . . . . . : AFP *YES
Port number . . . . . : PORT    5001
Online at IPL . . . . . : ONLINE *YES
Font . . . . . : FONT
Identifier . . . . . :          011
Point size . . . . . :          *NONE
Form feed . . . . . : FORMFEED *AUTOCUT
Separator drawer . . . . . : SEPDRAWER *FILE
Separator program . . . . . : SEPPGM *NONE
Library . . . . . :
Printer error message . . . . . : PRTERRMSG *INQ
Message queue . . . . . : MSGQ    QSYSOPR
Library . . . . . :          *LIBL
Activation timer . . . . . : ACTTMR  170
Maximum pending requests . . . . . : MAXPNDRQS 6
Print while converting . . . . . : PRTCVT *YES
Print request timer . . . . . : PRTRQSTMR *NOMAX
Form definition . . . . . : FORMDF  F1C10110
Library . . . . . :          *LIBL
Remote location . . . . . : RMTLOCNAME
Name or address . . . . . :          128.9.12.134
Dependent location name . . . . . : DEPLOCNAME *NONE
Text . . . . . : TEXT      IBM Network Printer Model 24
User-defined options . . . . . : USRDFNOPT
-----User-defined options-----

```

3. Enter values for the following parameters:

Device Description (DEVD)

A description of the device, for example P4324. This device description or name must be the same value as you will enter for the "DEVD" parameter in 11.9.2, "Configuring AFP with CRTPSFCFG on V3R7" on page 128.

Device Class (DEVCLS)

Enter *LAN.

Device Type (TYPE)

Enter *IPDS.

Device Model (MODEL)

Enter 0.

Port Number (PORT)

Accept the value of 5001.

Font (FONT)

Enter your value.

Activation timer (ACTTMR)

Set to *SEC15. This value specifies the length of time PSF/400 maintains a session with the printer while there are no spooled files with a status of RDY.

Form Feed (FORMFEED)

Enter *AUTOCUT.

Remote Location (RMTLOCNAME)

Enter the IP address or hostname of the printer.

USRDFNOBJ

To use a PSF configuration object, specify its name here.

11.9.2 Configuring AFP with CRTPSFCFG on V3R7

Optional

New for V3R7 is the ability to specify three TCP/IP-related parameters for PSF in a printer device description: RMTLOCNAME, PORT, and ACTTMR. In V3R1 and V3R6, WRKAFP2 was used to specify these three parameters, along with other parameters, for PSF. In V3R2, CRTPSFCFG (Create PSF Configuration Object), which replaced WRKAFP2, was used to specify these same parameters, along with other parameters. In V3R7, these three parameters, when specified in a PSF configuration object are ignored, since they are specified in a printer device description. However, you may wish to use a PSF configuration object to specify other parameters, such as IPDS passthrough, and so on.

The PSF configuration object created with this command is used by PSF/400 when printing IPDS files only if the object is specified with the USRDFNOBJ parameter in the printer device description.

To configure AS/400 for IPDS printing on V3R7:

1. At the AS/400 command line, enter a command in the form:

```
CRTPSFCFG PSFCFG(AFP/NETWRKPRT) IPDSPASTHR(*YES) RLSTMR(*SEC15)
TEXT('IBM Network Printers')
```

2. A completed screen looks like this:

```
                    PSF Configuration Information          Page 1
5763SS1 V3R2M0 960517PSF          BLDD60 09/11/96 12:18:00
PSF
PSF configuration: NETWRKPRT      Library: AFP
User resource library . . . . . : *JOBLIBL
IPDS pass through . . . . . : *YES
Activate release timer . . . . . : *NORDYF
Release timer . . . . . : *SEC15
Restart timer . . . . . : *IMMED
SNA retry count . . . . . : 2
Delay time between retries . . . . . : 0
Blank page . . . . . : *YES
Page size control . . . . . : *NO
Resident fonts . . . . . : *YES
Resource retention . . . . . : *YES
Edge orient . . . . . : *NO
Remote location:
  Name or address . . . . . : *NONE
TCP/IP port . . . . . : *NONE
TCP/IP activation timer . . . . . : 170
PSF defined options:
  *NONE
Text description . . . . . : IBM Network Printers
Device resource library list: . . . . . : *DFT
```

Note: The lines in **bold** in the above screen are not used by PSF/400. Instead, PSF/400 uses the information entered in the previous screen.

3. The following parameters are required:

PSF configuration

The name used for this PSF configuration object. The name must match the object name (USRDFNOBJ).

Library

This is AFP.

IPDS pass through (IPDSPASTHR)

Enter *YES. The value specifies that IPDS pass through is done for all files that are eligible for pass through. Otherwise, enter *NO. To print SCS files, specify *YES. PSF/400 transforms SCS into IPDS before printing. This is the only way SCS printing is supported.

Activate release timer (ACTTMR)

Specifies the point at which the release timer (RLSTMR) is activated. Set to *NORDYF. This means that the release timer is activated when there are no spooled files in the printer's output queue with a status of RDY and the last page of the last spooled file processed has printed. *NORDYF is used so that all files with a status of RDY.

Release timer (RLSTMR)

Specifies the amount of time to wait before a session or dialog is released without terminating the writer. The ACTRLSTMR parameter specifies when this timer is to be activated. Set the parameter to a value at least equal to the TIMEOUT value on the printer. IBM recommends *SEC15. In V3R1, this is the Inactivity timer.

YOU HAVE NOW COMPLETED STEP 11 ON PAGE 113. GO TO STEP 14 ON PAGE 114 BY PERFORMING THE PROCEDURE IN 11.10, "VERIFYING THE IPDS CONFIGURATION ON AS/400."

11.10 Verifying the IPDS Configuration on AS/400

To test IPDS printing, do the following:

1. Vary on the line description—VRYCFG CFGTYPE(*LIN)— if it is not already on.
2. Start TCP/IP by entering the command:

```
STRTCP
```

3. Verify that the AS/400 TCP/IP interface is active.
4. Turn the printer on and wait until the printer operator panel displays READY.
5. Ping the printer from an AS/400 workstation with the command:

```
PING RMTSYS ('ip_address')
```

where *ip_address* is the Internet address of the remote system printer (the NIC).

6. Also, ping the hostname of the printer.
7. If the pings are not successful, refer to 11.12.1, "Printer Cannot be PINGed" on page 131.
8. If pings are successful, vary on the printer device description with the command:

```
VRYCFG (printer-device) CFGTYPE(*DEV) STATUS(*ON)
```

9. Use the remote writer to send an IPDS file to the printer by entering the following command on the AS/400 command line:

```
STRPRTWTR DEV (printer device)
```

where *printer device* is the name of the printer.

If you have problems printing, do the following:

- Print a NIC configuration page. Refer to 1.6, "The NIC Configuration Page" on page 8.
- Verify that the IPDS service is enabled.
- Verify the service name.
- Verify that port number 5002 is being used.

If you are still unable to print IPDS files, contact IBM Support.

YOU HAVE NOW COMPLETED STEP 14 ON PAGE 114. GO TO STEP 17 ON PAGE 114 AND PERFORM THE OPTIONAL PROCEDURE IN 20.1, "DISABLE NETWARE IF YOU'RE NOT USING IT" ON PAGE 203.

11.11 Sharing the AS/400 Printer on the Network

This section provides a brief review of the parameters that need to be set on AS/400 and on the printer to assure printer sharing.

To share your printer, set the TMEOUT value for IPDS printing to 15 seconds on the printer, then set the following parameters on your AS/400 system.

AS/400 Version	Where Set	Parameter	Recommended Value	Description
V3R1	WRKAFF2	ACTTMR	*NOMAX	The value specifies the number of seconds that PSF/400 waits for a printer to respond to an activation request. If only one AS/400 will use the printer, use the default value (170 seconds). If more than one AS/400 will share the printer, set the value to *NOMAX, which will cause PSF/400 to wait forever to establish a connection.
V3R1	WRKAFF2	INACTTMR	*SEC15	Set this parameter to a value at least equal to the port TIMEOUT value on the printer. IBM recommends *SEC15. This value specifies the length of time PSF/400 maintains a session with the printer while there are no spooled files with a status of RDY.
V3R2	CRTPSFCFG CHGPSFCFG	RLSTMR	*NORDYF	Specifies the point at which the release timer (RLSTMR) is activated. Set to *NORDYF. This means that the release timer is activated when there are no spooled files in the printer's output queue with a status of RDY and the last page of the last spooled file processed has printed. *NORDYF is used so that all files with a status of RDY are printed before releasing the session (which does not terminate the writer, however).
V3R2	CRTPSFCFG CHGPSFCFG	ACTRLSTMR	*SEC15	Specifies the amount of time to wait before a session or dialog is released without terminating the writer. The ACTRLSTMR parameter specifies when this timer is to be activated. Set the parameter to a value at least equal to the TIMEOUT value on the printer. IBM recommends *SEC15.
V3R2	CRTPSFCFG CHGPSFCFG	ACTTMR	*NOMAX	The value specifies the number of seconds that PSF/400 will wait for a printer to respond to an activation request. If only one AS/400 will use the printer, use the default value (170 seconds). If more than one AS/400 will share the printer, set the value to *NOMAX, which will cause PSF/400 to wait forever to establish a connection.
V3R6	WRKAFF2	ACTTMR	*NOMAX	This value specifies the number of seconds that PSF/400 will wait for a printer to respond to an activation request. If only one AS/400 will use the printer, use the default value (170). If more than one AS/400 will share the printer, set the value to *NOMAX, which will cause PSF/400 to wait forever to establish a connection.
V3R6	WRKAFF2	RLSTMR	*SEC15	Set this parameter to a value at least equal to the port TIMEOUT value on the printer. IBM recommends *SEC15. This value specifies the length of time PSF/400 will maintain a session with the printer while there are no spooled files with a status of RDY.
V3R7	CRTPSFCFG CHGPSFCFG	ACTRLSTMR	*NORDYF	Specifies the point at which the release timer (RLSTMR) is activated. Set to *NORDYF. This means that the release timer is activated when there are no spooled files in the printer's output queue with a status of RDY and the last page of the last spooled file processed has printed. *NORDYF is used so that all files with a status of RDY.
V3R7	CRTPSFCFG CHGPSFCFG	RLSTMR	*SEC15	Specifies the amount of time to wait before a session or dialog is released without terminating the writer. The ACTRLSTMR parameter specifies when this timer is to be activated. Set the parameter to a value at least equal to the TIMEOUT value on the printer. IBM recommends *SEC15. In V3R1, this is the Inactivity timer.

AS/400 Version	Where Set	Parameter	Recommended Value	Description
V3R7	CRTDEVPRT CHGDEVPRT	ACTTMR	*NOMAX	The value specifies the number of seconds that PSF/400 will wait for a printer to respond to an activation request. If only one AS/400 will use the printer, use the default value (170 seconds). If more than one AS/400 will share the printer, set the value to *NOMAX, which will cause PSF/400 to wait forever to establish a connection.

11.12 Resolving AS/400 Problems

Use this section to resolve problems configuring AS/400 on TCP/IP networks.

11.12.1 Printer Cannot be PINGed

If you have problems pinging the printer:

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

11.12.2 If PSF/400 Terminates When Initialized

If PSF/400 terminates when you initialize it for IPDS printing and issues message PQT3603, check the error codes for the following possible problems:

- 10 means an incorrect RMTSYS (V3R1 or V3R6) or RMTLOCNAME (V3R2 or V3R7) has been specified for the printer.
- 15 means that PSF/400 timed out waiting for the printer's response. You should check the value you entered for Activation Timer when using WRKAFF2 (V3R1 or V3R6), CRTPSFCFG (V3R2), or CRTDEVPRT (V3R7).
- 20-39 indicate general communications failure.
- 40-59 indicate a logic error between PSF and the printer control unit. Contact IBM support.

11.12.3 Spooled Print File Remains in PND Status

Check the output queue with the command:

```
WRKOUTQ OUTQ (queuename)
```

This typically indicates that PSF/400 is waiting for a response from the printer. This can be verified by displaying the QSPL subsystem, WRKACTJOB SBS(QSPL). If the status of the PDJ job for the printer is SELW, then PSF/400 is waiting for a response from the printer.

11.12.4 Data is Being Clipped

To resolve this problem, you may want to set the PSC (Page Size Control) parameter in WRKAFF2 (V3R1 and V3R6) or CRTPSFCFG (V3R2 or V3R7) to be set to *YES and the IPDSPASTHR parameter to be set to *NO.

12.0 MVS to Print IPDS Files

Use this chapter to configure MVS to print IPDS files on your IBM network printer.

To print IPDS files, you must install the IPDS option on the printer.

12.1 Requirements

Verify that you have the following required software:

PSF/MVS Version 2.2.0 with APAR OW15599 (for TCP/IP support)
MVS Scheduler with APAR OW12236 to support two new PRINTDEV keywords: IPADDR and PORTNO
TCP/IP Version 3 Release 1, or higher, installed and configured on MVS

To obtain the PTFs associated with these APARs, contact the IBM Support Center (see “Product Support” on page vi).

12.2 Configuration Checklist

The following checklist is divided into required and optional steps.

Authority Level Required

All of the following configuration steps carried out on MVS require appropriate **RACF** authority.

Required Steps:

- 1 If you have not already done so, set up the printer and install the NIC as described in 1.0, “Start Here—Install the Network Interface Card (NIC)” on page 3.
- 2 Using the printer operator panel, set up the printer for IPDS by setting the following parameters and values:

Menu	Item	Setting
ETHERNET or TOKEN RING	PERSONALTY	<ul style="list-style-type: none">• AUTO, if you want to use the printer for other than IPDS printing• IPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
IPDS	IPDS PORT	TRING, ETHER

- 3 If you do **not** have a DHCP server anywhere on your network, go to step 5 on page 134. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, “Dynamic Host Configuration Protocol (DHCP) and BOOTP” on page 181 and determine what you should do by reading:
 - a. 18.1, “Industry Standards for Setting TCP/IP Addresses” on page 181
 - b. 18.2, “Options for Configuring NICs for DHCP and BOOTP” on page 183
 - c. 18.3, “Setting Dynamic IP Addresses with DHCP” on page 187

- ___ **4** If you want to change the MAC address to the LAA address and you did not do so in step 11 on page 4, then use the following procedure:
- Make sure an IP address has been assigned to the NIC. Refer to step 5.
 - Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
 - Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
- ___ **5** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC. You have two main options:
- Use the printer operator panel to assign TCP/IP addresses to a **local** printer. Refer to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.
 - If you have **remote** printers to which you want to assign TCP/IP addresses, you need to use either ARP (if the printer is on a local segment) or BOOTP (if the printer is on a WAN):
 - Use 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 to set the IP address, if the printers are all on the same local segment (LAN). To set other TCP/IP addresses, you need to use 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line" on page 175 to set subnet mask and gateway addresses.
 - Use 17.9, "Setting TCP/IP Addresses with BOOTP" on page 176 to set IP and other addresses if the printers are on a WAN.
- ___ **6** Configure the printer by doing the procedure in 12.3, "Configuring PSF for MVS to Print IPDS Files."
- ___ **7** Verify the configuration by doing the procedure in 12.4, "Verifying a TCP/IP-Attached Printer on MVS" on page 139
- ___ **8** If you want to share the printer, do the procedure in 12.5, "Sharing IBM Network Printers on MVS" on page 140.
- ___ **9** If you have problems, refer to 12.6, "Handling MVS Connectivity Problems" on page 142.

Optional Steps:

- ___ **10** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.
- ___ **11** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.

12.3 Configuring PSF for MVS to Print IPDS Files

12.3.1 Data Requirements

You need the IP address of the NIC.

12.3.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Define the MVS communications control unit to MVS.
- ▶ Modify the TCP/IP profile on your MVS system, if necessary.
- ▶ Ping the printer.
- ▶ Define the printer as a writer-controlled printer to JES.
- ▶ Define the printer to PSF/MVS with a PRINTDEV statement, including the IP address.

Notes:

1. This section does not provide all the information you need to install and configure TCP/IP on your MVS system. For more information on installing TCP/IP, refer to *TCP/IP for MVS: Customization and Administration Guide*.
2. The routing of information is determined on the basis of the IP address, and is performed by IP gateways. After the network is configured correctly, the MVS host appears to be communicating directly with the TCP/IP-attached printer.

Detailed Configuration Procedure:

12.3.2.1 Define the Communications Control Unit to MVS: If you have not already done so, define the communications control unit for the MVS host, such as the 3172 or the 3745 control unit, to MVS. Use either an MVS configuration program (MVSCP) or a hardware configuration definition (HCD), depending on the version of your MVS system:

- When using a version earlier than MVS 4.1.0, use an MVSCP.
- When using a version of MVS 4.1.0 or later, use an HCD or an MVSCP.

For more information about using these methods, refer to:

- *MVS/ESA Migration Planning: Dynamic I/O Configuration*
- *MVS/ESA Hardware Configuration: Using the Dialog*

12.3.2.2 Modify the TCP/IP Profile in MVS: The TCP/IP profile contains system configuration statements used to initialize the TCP/IP address space. Of those statements, the following are subject to special considerations when you are printing from PSF/MVS on TCP/IP-attached printers. Samples of these statements are printed in bold in Figure 12.

```
ACBPOLSIZE          1000
ADDRESSTRANSLATIONPOOLSIZ 1500
CCBPOLSIZE          150
DATABUFFERPOOLSIZ  160  32768
ENVELOPEPOOLSIZ    750
IPROUTEPOOLSIZ     300
LARGEENVELOPEPOOLSIZ 50
RCBPOLSIZE         50
SCBPOLSIZE         256
SKCBPOLSIZE        256
SMALLDATABUFFERPOOLSIZ 256
TCBPOLSIZE         512
TINYDATABUFFERPOOLSIZ 256
UCBPOLSIZE         100

KEEPALIVEOPTIONS INTERVAL 10 SENDGARBAGE FALSE ENDKEEPALIVEOPTIONS

GATEWAY
; * Network First hop Linkname Packet size Subnet mask Subnet value
9           =         BPCLAN  2000    0.255.255.0  0.99.12.0
DEFAULTNET 9.99.12.254 BPCLAN  2000    0.255.255.0  0
```

Figure 12. Sample Parameters in the TCP/IP Profile

This section contains information about the statements, the special considerations that apply to them, and the changes they may make necessary. If you change any of the values in the TCP/IP profile, restart TCP/IP to pick up the changes.

For information about the TCP/IP profile and the statements described in this section, refer to:

- *IBM TCP/IP MVS Customization and Administration Guide*
- *IBM TCP/IP Performance and Tuning Guide*

DATABUFFERPOOLSIZ Statement

The DATABUFFERPOOLSIZ statement defines the number and size of the data buffers. For printing on TCP/IP-attached printers, IBM recommends that you specify at least the following:

- 160 data buffers
- 32768 buffer size

SMALLDATABUFFERPOOLSIZ Statement

The SMALLDATABUFFERPOOLSIZ statement defines the number of small data buffers. For printing on TCP/IP-attached printers, IBM recommends that you specify at least 256 small data buffers.

TINYDATABUFFERPOOLSIZ Statement

The TINYDATABUFFERPOOLSIZ statement defines the number of tiny data buffers. For printing on TCP/IP-attached printers, IBM recommends that you specify at least 256 tiny data buffers.

KEEPALIVEOPTIONS Statement

PSF relies on TCP to detect when a connection with a TCP/IP-attached printer is no longer usable. When no data has been exchanged between PSF/MVS and its connection partner, TCP sends keep-alive probes to the connection partner periodically. These periodic probes, called keep-alive transmissions, enable TCP to discover when a connection is no longer usable even if the connection partner is abruptly powered off or is no longer accessible through the network.

The frequency of keep-alive transmissions is controlled by the INTERVAL parameter on the KEEPALIVEOPTIONS statement. The frequency applies to all TCP applications that direct TCP to send keep-alive transmissions. The default frequency is after about two hours of inactivity.

For printing on TCP/IP-attached printers, IBM recommends that you specify a shorter interval than the default, such as 10 minutes, for the interval between keep-alive transmissions.

Also, if any target host requires that the keep-alive packet contain data, specify SENDGARBAGE TRUE. For example:

```
KEEPALIVEOPTIONS INTERVAL 5 SENDGARBAGE TRUE ENDKEEPALIVEOPTIONS
```

GATEWAY Statement

The *Packet_size* parameter of the GATEWAY statement defines the maximum transmission unit (MTU) for the MVS host. For IBM network printers, the MTU size is fixed at 1024 bytes. The value cannot be adjusted.

12.3.2.3 Verify the Printer Connection: To verify that the MVS system can establish a connection with the TCP/IP-attached printer, ping the printer from the MVS system.

From a TSO session, enter the following command:

```
TSO PING ip_address
```

In JES2, enter the following command from the System Display and Search Facility (SDSF) menu 6:

```
ping ip_address
```

ip_address Specifies the IP address of the NIC.

Figure 13 on page 137 shows examples of a successful ping and an unsuccessful ping.

```

Successful ping:
EZA0458I Ping V3R1: Pinging host 9.99.12.33
(Use ATTN to interrupt.)
EZA0463I PING: Ping #1 response took 0.084 seconds.
Successes so far = 1.

Unsuccessful ping:
EZA0458I Ping V3R1: Pinging host 9.99.12.33
(Use ATTN to interrupt.)
EZA0464I PING: Ping #1 timed out

```

Figure 13. Examples of Responses to a ping Command

Note: If you have problems pinging a printer, refer to 12.6, “Handling MVS Connectivity Problems” on page 142.

12.3.2.4 Define the Printer to JES: When a TCP/IP-attached printer is to be used with JES, it must be defined for deferred printing mode with JES.

12.3.2.4.1 JES2 Printer Definitions: Figure 14 shows the JES2 printer definition initialization member, located in the system PARMLIB.

```

FSS(FSS1),PROC=PSFPROC,HASPFSSM=HASPFSSM
PRT1 FSS=FSS1,MODE=FSS,PRMODE=(LINE,PAGE,SOSI1),
CLASS=C,UCS=0,SEP,NOSEPDS,CKPTPAGE=100,
DRAIN,MARK,TRKCELL=YES

```

Figure 14. PSF/MVS JES2 Printer Definition

Notes:

1. The above example is correct for JES2 3.11 and above. For earlier versions of JES2, the statement is named FSSDEF and would be stated as FSSDEF FSSNAME=FSS1.
2. The value you specify for the PROC parameter must match the name on the PSF/MVS Startup procedure.

12.3.2.4.2 JES3 Printer Definitions: Figure 15 shows an example of a JES3 printer definition. This example is not executable, but it is intended to help the JES3 systems programmer define the printer to the MVS host.

```

FSSDEF,TYPE=WTR,FSSNAME=FSS1,PNAME=PSFPROC,SYSTEM=SYS1,TERM=NO
DEVICE,JNAME=PRT1,JUNIT=(,SYS1,,OFF),FSSNAME=FSS1,
MODE=FSS,PM=(LINE,PAGE,SOSI1),CHARS=(YES,GT12),

```

Figure 15. PSF/MVS JES3 Printer Definition

Notes:

1. The value you specify for the JNAME parameter must match the name of the printer on the PSF/MVS Startup procedure.
2. The value you specify for the PNAME parameter must match the name on the PSF/MVS Startup procedure.

12.3.2.5 Define the Printer to PSF/MVS: Each TCP/IP-attached printer must be defined to PSF with a PRINTDEV statement in the PSF/MVS startup procedure. The following keyword is required on the PRINTDEV statement:

IPADDR='ip_address'

ip-address Specifies the IP address for the printer or attachment, in dotted-decimal notation. Enclose the IP address in single quotes. Do **not** specify a hostname in place of the dotted-decimal address.

12.3.3 A Sample PRINTDEV

Figure 16 shows a sample procedure, PSFPROC that you can modify to suit your installation. The PRINTDEV statement shows the required IPADDR keyword.

No network printer-specific writer procedure is currently supplied by IBM. You can, however, copy the APSWPROT sample from the APAR medium and modify it for the network printers. Make sure that you specify 300-pel font libraries.⁵

```
//PSFPROC PROC
//***** IBM NETWORK PRINTERS WRITER PROCEDURE *****
//*
//*01* MODULE-NAME = PSFPROC
//*
//*01* DESCRIPTIVE-NAME = START PROCEDURE FOR PSF:
//*      TCP/IP ATTACHED IBM NETWORK PRINTERS
//*
//*01* NOTES = THE FULL NAME OF THE DEFAULT PAGEDEF IS
//*      P1A06462.
//*      THE FULL NAME OF THE DEFAULT FORMDEF IS
//*      F1A10110.
//*      THE FULL NAMES OF THE DEFAULT FONTS ARE
//*      X0GF10, X0GS10, X0TU10, AND X0GU10.
//*      THE FULL NAME OF THE SEPARATOR PAGE PAGEDEF IS
//*      P1V06483.
//*      THE FULL NAME OF THE SEPARATOR PAGE FONT IS
//*      X0GT15.
//*
//*01* CHANGE-ACTIVITY :
//*
//**** END OF SPECIFICATIONS ****/
//STEP01 EXEC PGM=APSPPIEP,REGION=4096K
//JOBHDR OUTPUT PAGEDEF=V06483, /* JOB SEPARATOR PAGEDEF */
//      FORMDEF=A10110,CHARS=GT15 /* JOB SEPARATOR FORMDEF */
//JOBTLR OUTPUT PAGEDEF=V06483, /* JOB SEPARATOR PAGEDEF */
//      FORMDEF=A10110,CHARS=GT15 /* JOB SEPARATOR FORMDEF */
//DSHDR OUTPUT PAGEDEF=V06483, /* DS SEPARATOR PAGEDEF */
//      FORMDEF=A10110,CHARS=GT15 /* DS SEPARATOR FORMDEF */
//MSGDS OUTPUT PAGEDEF=A06462, /* MESSAGE DATASET PAGEDEF */
//      FORMDEF=A10110 /* MESSAGE DATASET FORMDEF */
//FONT300 DD DSN=SYS1.FONT300, /* SYSTEM FONTS - 300 PEL */
//      DISP=SHR
//PSEG01 DD DSN=SYS1.PSEGLIB, /* SYSTEM PAGE SEGMENTS */
//      DISP=SHR
//OLAY01 DD DSN=SYS1.OVERLIB, /* SYSTEM MEDIUM OVERLAYS */
//      DISP=SHR /* */
//PDEF01 DD DSN=SYS1.PDEFLIB, /* SYSTEM PAGEDEFS */
//      DISP=SHR
//FDEF01 DD DSN=SYS1.FDEFLIB, /* SYSTEM FORMDEFS */
//      DISP=SHR
```

Figure 16 (Part 1 of 2). Sample JCL Startup Procedure for a TCP/IP-Attached Printer

⁵ IBM network printers are 600-pel devices that appear to PSF/MVS as 300-pel devices.

```

/* ***** */
/*          PRINTDEV          */
/* ***** */
//PRT1  CNTL
//PRT1  PRINTDEV FONTDD=*.FONT300,/* 300 PEL FONT LIBRARY DD */
//      OVLYDD=*.OLAY01,        /* OVERLAY LIBRARY DD */
//      PSEGDD=*.PSEG01,        /* SEGMENT LIBRARY DD */
//      PDEFDD=*.PDEF01,        /* PAGEDEF LIBRARY DD */
//      FDEFDD=*.FDEF01,        /* FORMDEF LIBRARY DD */
//      JOBHDR=*.JOBHDR,        /* JOB HEADER SEPARATOR */
//      /*          OUTPUT          */
//      JOBTRLR=*.JOBTLR,       /* JOB TRAILER SEPARATOR */
//      /*          OUTPUT          */
//      DSHDR=*.DSHDR,         /* DATA SET HEADER */
//      /*          SEPARATOR        */
//      MESSAGE=*.MSGDS,       /* MESSAGE DATA SET OUTPUT */
//      BUFNO=5,               /* NUMBER OF WRITE DATA BUFFERS */
//      PAGEDEF=A06462,        /* DEVICE PAGEDEF DEFAULT */
//      FORMDEF=A10110,        /* DEVICE FORMDEF DEFAULT */
//      CHARS=(GF10,          /* DEVICE */
//      GS10,TU10,GU10),      /* DEFAULT FONT SET */
//      PIMSG=YES,            /* ACCUMULATE DATA SET */
//      /*          MESSAGES          */
//      DATABLOCK,           /* REPORT ALL DATA-CHECK */
//      /*          ERRORS          */
//      TRACE=NO,            /* CREATE INTERNAL TRACE */
//      FAILURE=WCONNECT,     /* PSF ACTION ON PRINTER */
//      /*          FAILURE          */
//      TIMEOUT=REDRIVE,     /* PSF ACTION ON TIMEOUT */
//      MGMTMODE=OUTAVAIL,    /* PRINTER MANAGEMENT MODE */
//      DISCINTV=15,         /* DISCONNECT INTERVAL IN */
//      /*          SECONDS          */
//      IPADDR='xxx.xxx.xxx.xxx' /* IP ADDRESS FOR TCP/IP */
//PRT1  ENDCNTL

```

Figure 16 (Part 2 of 2). Sample JCL Startup Procedure for a TCP/IP-Attached Printer

Note: To specify a TCP/IP address space name other than the default, TCPIP, code the following exec statement in the writer procedure:

```
//STEP01 EXEC PGM=APSPPIEP,REGION=4096K,PARM=(,,,tcPIP_name)
```

where *tcPIP_name* is the name of the TCP/IP address space. If this parameter is not coded, PSF/MVS uses the default name, TCPIP.

The IP address is the only required parameter. Other parameters may be set to facilitate printer sharing as described in 12.5, "Sharing IBM Network Printers on MVS" on page 140. For a description of the PRINTDEV statement, which is not given here, see the PSF/MVS *System Programming Guide*.

IPADDR Specifies the IP address for the printer or attachment, in dotted-decimal notation. Do **not** specify a hostname in place of the dotted-decimal address.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 134. GO TO STEP 7 ON PAGE 134 BY PERFORMING THE PROCEDURE IN 12.4, "VERIFYING A TCP/IP-ATTACHED PRINTER ON MVS."

12.4 Verifying a TCP/IP-Attached Printer on MVS

To operate a TCP/IP-attached printer, you use JES operator commands.

12.4.1 Starting a TCP/IP-attached Printer

To start a TCP/IP-attached printer, do the following:

1. Start TCP/IP.
2. Power on the printer.
3. Start the printer FSA.

12.4.2 Stopping a TCP/IP-attached Printer

You can stop a TCP/IP-attached printer in several ways:

- The preferred method is to first stop the PSF FSA for the printer by entering the following command from the MVS console:

JES2:

```
$Pprinter-name
```

JES3:

```
*VARY printer-name,OFF
```

```
*CANCEL printer-name
```

where *printer-name* specifies the name of the printer FSA.

Then you can turn off power to the printer.

- To end the PSF FSA for the printer, use the JES commands. If you are unable to purge or cancel the printer by use of the JES commands, enter the following command:

```
MODIFY FSSname,FORCE,printer-name
```

12.4.3 Resolving IPDS Printing Problems

If you have problems printing, do the following:

- Print a NIC configuration page. Refer to 1.6, "The NIC Configuration Page" on page 8.
- Verify that the IPDS service is enabled.
- Verify the service name.
- Verify that port number 5001 is being used.

If you are still unable to print IPDS files, contact IBM Support.

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 134. GO TO STEP 8 ON PAGE 134 BY PERFORMING THE PROCEDURE IN 12.5, "SHARING IBM NETWORK PRINTERS ON MVS."

12.5 Sharing IBM Network Printers on MVS

IBM network printers can be shared on PSF/MVS in one of two ways:

- By using the MGMTMODE and DISCINTV parameters via the JES spool
- By port switching on the printer

12.5.1 JES Spool Printer Sharing

JES spool printer sharing is valid for TCP/IP attached network printers. A session with the printer is maintained while there is output on the JES spool and the printer is available. When there is no more output on the spool and the disconnect interval expires, PSF/MVS ends the session with the printer. PSF/MVS attempts to restart the session when there is more work on the spool for the printer. After the session is restarted, PSF/MVS must reload the resources required for the print jobs. When using this method of network printer sharing, PSF/MVS cannot determine if another print driver is active.

You can request this method of network printer sharing by specifying the following parameters:

MGMTMODE=OUTAVAIL
FAILURE=WCONNECT
TIMEOUT=REDRIVE
DISCINTV=nn

DISCINTV Specifies the disconnect interval in seconds. The value can range from zero to 86400. IBM suggests you set the value to 15. When no output is available from JES for this time period, PSF/MVS ends the session with the network printer. If the value is set to zero, PSF/MVS does not end the session because of lack of output.

FAILURE Specifies the action PSF/MVS is to take after a printer failure or a TCP/IP network failure. If FAILURE=WCONNECT and the printer is connected to another host when PSF/MVS attempts to establish a connection on TCP/IP, PSF/MVS continuously retries (up to the limit specified by CONNINTV) until the printer becomes available. FAILURE=STOP stops the attempt to connect to the printer.

MGMTMODE

Set this parameter to OUTAVAIL. OUTAVAIL requests that PSF start a communications session with the printer only when output is available on the JES spool.

TIMEOUT Specifies the action that PSF/MVS is to take after a timeout when no output is available on JES. The DISCINTV parameter specifies the timeout interval. TIMEOUT=REDRIVE requests that PSF/MVS redrive the printer FSA using the value of the MGMTMODE parameter. TIMEOUT=STOP requests that PSF/MVS stop the printer FSA, which can then be restarted only by an operator command.

Note: PSF/MVS supports two other methods of printer sharing, which are not applicable to IBM network printers. VTAM RELREQ is available for printer sharing under SNA. Port switching is available for SNA- and TCP/IP-attached printers when a printer can support multiple active ports.

12.5.2 Port Switching Printer Sharing

IBM network printers provide sharing of the printer through port switching. Port switching is done on the printer with no involvement from the host PSF driver.

Network printers switch automatically among three ports:

- Parallel port (standard)
- Host (twinax or coax) port (optional)
- LAN network port (optional)

The switching is done through the use of several timeout values, which are set on the printer operator panel.⁶ For each port type, there is a menu item and a timeout setting:

- For the parallel menu, it is PORT TMEOUT
- For the Coax and Twinax port, it is the PORT TMEOUT setting on the setup menus
- For the Token Ring or Ethernet menus, it is PORT TMEOUT

The port switching is done according to the rule: **Print the jobs received on a port until no new jobs appear for the timeout value set for a port, then switch to the next port and do the same thing.**

YOU HAVE NOW COMPLETED STEP 8 ON PAGE 134. OPTIONALLY, GO TO STEP 10 ON PAGE 134 BY PERFORMING THE PROCEDURE IN 20.1, "DISABLE NETWORK IF YOU'RE NOT USING IT" ON PAGE 203.

⁶ For instructions on how to use the printer operator panel, refer to 17.2, "Printer Operator Panel Actions" on page 169 or to your printer's *User's Guide*.

12.6 Handling MVS Connectivity Problems

If you encounter problems when pinging a network printer from MVS, here is how to resolve them.

12.6.1 Ping Is Not Successful

If the ping is not successful, verify the following:

- The printer is powered on.
- The IP address is unique in the TCP/IP network.
If the IP address of the MVS system is not unique, see your network administrator to resolve the IP address problem.
- The Maximum Transmission Unit (MTU) size of the IP packet for the MVS system is equal to the MTU size of the printer. For information about the values recommended for the MVS system, see 12.3.2.2, "Modify the TCP/IP Profile in MVS" on page 135.
 - To change the MTU size for the MVS system, change the GATEWAY statement in the MVS TCP/IP profile, and restart TCP/IP to pick up the changes.
 - You cannot change the MTU size on an IBM network printer. The MTU size is fixed at 1024 bytes.

If these items are all in order, consult your TCP/IP network administrator about a possible network problem.

12.6.2 Ping Is Successful

A successful ping usually indicates that the MVS system can communicate with the printer; however, you might receive a successful ping even though the IP address of the TCP/IP-attached printer is a duplicate of another IP address.

If PSF is unable to establish a network connection with the TCP/IP-attached printer or if PSF output for this printer prints elsewhere, follow these steps to determine whether the IP address of the printer is unique:

1. Turn the printer off.
2. Wait at least 5 minutes for TCP/IP to clear the Address Resolution Protocol (ARP) tables.⁷
3. Enter the **ping** command again from the MVS system.

Note: If you receive a successful response to the ping command, there is a duplicate IP address. Consult your TCP/IP network administrator.

⁷ If your installation specified a longer interval on the ARPAGE configuration statement in the TCP/IP profile, you may need to wait longer. For information about the ARPAGE statement, refer to *IBM TCP/IP MVS Customization and Administration Guide*.

13.0 OS/2 TCP/IP to Print PCL and PostScript Files

NPM-OS/2

Use this chapter to configure your IBM network printers in a LAN Server/LAN Manager environment to print PCL or PostScript files.

If you want to configure OS/2 to print IPDS files, use the procedure in 14.0, "OS/2 TCP/IP to Print IPDS Files" on page 151.

13.1 Requirements

Verify that you have the required software:

LAN Server:

On the LAN Server, you need **one** of the following versions of OS/2:

- OS/2 Version 2.11 or higher (including OS/2 TCP/IP Version 2.0) **and** OS/2 LAN Server Version 3.0 or 4.0
- OS/2 Warp Version 3.0 or higher (including OS/2 TCP/IP Version 3.0) **and** OS/2 LAN Server Version 3.0 or 4.0
- OS/2 Warp Connect Version 3.0 (including OS/2 TCP/IP Version 3.0), which includes LAN Server Version 4.0
- OS/2 Warp Server Version 4.0 (including OS/2 TCP/IP Version 3.0), which includes LAN Server Version 5.0

Note: For Warp Server Version 4.0, you must obtain APAR IC16137 to support LPRPORTD and TCP/IP Version 3.1.

LAN Manager:

If you are using LAN Manager, you need:

- OS/2 Version 1.3 or higher
- Microsoft LAN Manager Version 2.1 or higher

Submitters:

On each submitter workstation, you need **one** of the following:

- PC DOS Version 6.0 or higher with IBM DOS LAN Requester
- OS/2 Version 2.1 or higher with OS/2 LAN Requester 3.0 or higher
- WIN/OS2 (on top of one of the above OS/2 versions)
- Windows 3.1, or higher, with TCP/IP installed
- Some other operating system with TCP/IP or NetBIOS enabled (for example, a workstation running Windows NT or Windows 95)

13.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on OS/2 may require **administrative** authority.

Required Steps:

- 1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.

- ___ **2** If you do **not** have a DHCP server anywhere on your network, go to step 3 on page 144. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP" on page 181 and determine what you should do by reading:
- 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181
 - 18.2, "Options for Configuring NICs for DHCP and BOOTP" on page 183
 - 18.3, "Setting Dynamic IP Addresses with DHCP" on page 187
- ___ **3** If you want to change the MAC address to the LAA address and you did not do so in step 11 on page 4, then use the following procedure:
- Make sure an IP address has been assigned to the NIC. Refer to step 4 on page 80.
 - Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
 - Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
- ___ **4** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.
- To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.
 - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, "Setting Subnet Mask and Gateway Addresses with NPM" on page 217 or 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line" on page 175 to set subnet mask and gateway addresses.
 - 17.9, "Setting TCP/IP Addresses with BOOTP" on page 176 to set IP and other addresses if the printers are on a WAN.
 - Optionally use 17.10, "Setting a Symbolic Name for an IP Address" on page 180.
- ___ **5** You can use **one** of two different procedures to configure your printer in a server-to-printer environment:
- Using the IBM LAN Server/Manager Printer Utility:**
 - Install the printer driver for OS/2 using the procedure in 3.3, "Installing the Printer Driver for OS/2" on page 29.
 - Install the printer utility (LSPU or LMPU) from IBM using the procedure in 3.4, "Installing OS/2 Utilities" on page 30.
 - Install the printer using 13.3, "Installing the Printer for OS/2 using IBM Utilities" on page 145.
 - You can create aliases for the printers. To do this optional step, refer to 3.6, "Sharing the Printer by Creating the Printer Alias" on page 32.
 - Using Standard OS/2 TCP/IP:**
 - Define a printer object using the procedure in 13.4, "Installing the Printer using Standard OS/2 TCP/IP" on page 147.
 - You can create aliases for the printers. To do this optional step, refer to 3.6, "Sharing the Printer by Creating the Printer Alias" on page 32.
- ___ **6** Configure print requesters by doing the procedure in 3.7, "Configuring Print Requesters on OS/2" on page 34.
- ___ **7** Verify the configuration by doing the procedure in 13.5, "Verifying the LAN Server Configuration" on page 150.

___ **8** If you have problems, refer to 19.0, "Handling TCP/IP Problems" on page 197.

Optional Steps:

___ **9** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.

___ **10** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.

___ **11** If you want to monitor your printers, refer to:

- Table 18 on page 215 in 22.1, "What is Network Printer Manager (NPM)?" on page 215
- 21.5, "Monitoring Network Printers on TCP/IP Networks" on page 211
- 21.4, "Monitoring with NetView for OS/2" on page 210

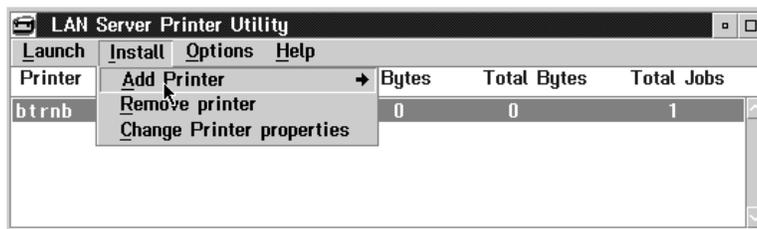
13.3 Installing the Printer for OS/2 using IBM Utilities

Printer Utility procedure

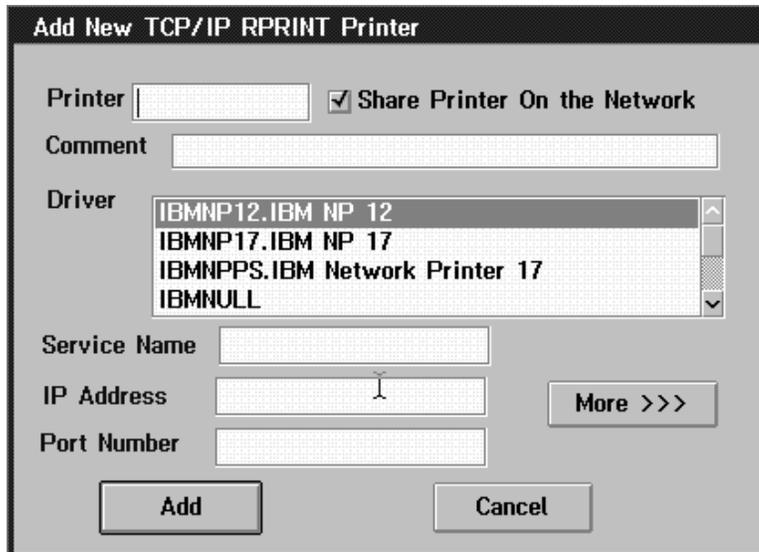
Use this procedure only if you are using the IBM utilities to set up OS/2 TCP/IP. If you want to use OS/2, go to 13.4, "Installing the Printer using Standard OS/2 TCP/IP" on page 147.

To install an IBM network printer using the IBM utilities:

1. Verify that the printer driver for OS/2 is installed on the OS/2 server. If it is not installed, install it using the procedure in 3.3, "Installing the Printer Driver for OS/2" on page 29.
2. Logon to LAN Server as administrator.
3. Open the LAN Server Printer Utility or LAN Manager Printer Utility folder.
4. Open the LAN Server Printer Utility or LAN Manager Printer Utility.
5. Select **Install** from the menu bar.
6. Select the **Add Printer** option:



7. Select the TCP/IP option.
8. You see the **Add New Printer** window for TCP/IP:



9. Fill in the fields with the following information:

Printer Enter the name you want to use for the OS/2 queue name.

Share Printer On the Network

The LAN Server Printer Utility or LAN Manager Printer Utility automatically shares the newly created printer object only if the server is also the domain controller. Otherwise, if the printer utility (Version 1.01 or higher) is installed on an additional server, then LAN Server or LAN Manager commands should be manually entered to share the printer.

Comment This field is optional and is used to further identify a printer.

Driver Select the printer driver for the printer being installed.

Service Name

The name of the TCP/IP printer service on the IBM NIC. Use the default service name of the printer for example, NCT0000DA_1. Once the initial configuration is completed, you may change this name using the procedures in 20.0, "Customizing the NIC" on page 203.

IP address The IP address of the NIC installed in the network printer.

Port number

The TCP/IP port number of the service selected above. The default service name is NCT (or NCE) and the last six digits in the MAC address followed by a "_1." The default TCP port number is 2501.

10. Click the **More>>>** button if you want to make other entries, though this is not necessary.

11. Click the **Add** button. A printer queue is created on the OS/2 desktop with the name given as the printer queue name in step 9.

12. Right-click the printer icon, then select **Settings** then **Queue Options** to verify that **PMPrint** is displayed as the selected queue driver.

13. Move the printer queue icon that you have just created to the printer queue folder, if desired.

YOU HAVE NOW COMPLETED STEP 5C ON PAGE 144. GO TO STEP 7 ON PAGE 144 BY PERFORMING THE PROCEDURE IN 13.5, "VERIFYING THE LAN SERVER CONFIGURATION" ON PAGE 150.

13.4 Installing the Printer using Standard OS/2 TCP/IP

Do this step if you are using standard OS/2 to configure the printer. This procedure is performed automatically by the LAN Server Printer Utility or LAN Manager Printer Utility, as described in 13.3, "Installing the Printer for OS/2 using IBM Utilities" on page 145.

13.4.1 Data Requirements

Parameter	Description	Your Value
Printer object name	User-assigned name for the printer.	
IP address	IP address assigned to the NIC.	
LPD queue name	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.)	

13.4.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Start LAN Server.
- ▶ Install printer driver.
- ▶ Start the LPR port daemon.
- ▶ Create the printer object.
- ▶ Set the default printer driver and output port.
- ▶ Specify LPD settings

Detailed Configuration Procedure:

The following procedure is done from the LAN Server system that processes print jobs from submitters and sends them to the printer.

1. Start the LAN Server by issuing the following command from an OS/2 command line window on the LAN Server system that shares network printers with other systems:

```
net start server
```

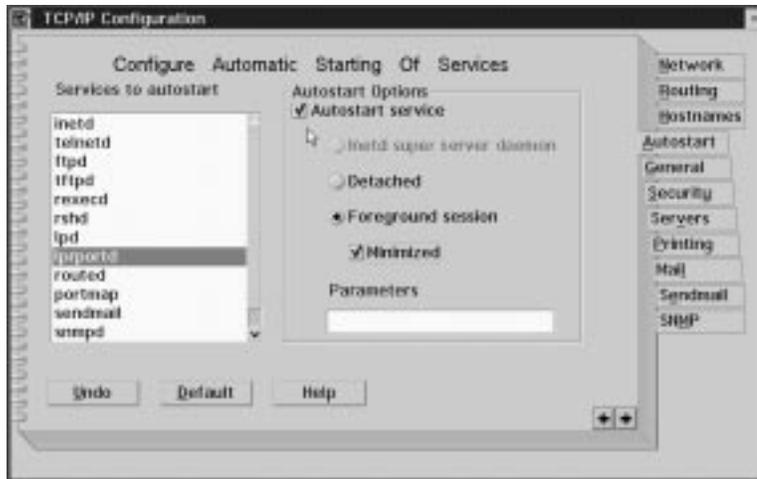
2. Install the OS/2 printer driver.

Note: You may install the printer driver now (as described below) or wait and install it when you do step 7 on page 149.

- a. Logon to the LAN Server (or LAN Manager) with administrative authority.
- b. Obtain the printer driver for OS/2 from diskette or CD-ROM.
- c. Read the README file contained on the diskette or CD-ROM for installation directions.
- d. Install the printer driver.

Note: You must install a printer driver before creating a printer object. You can create multiple printer objects if more than one printer of the same type is to be accessed from the same system(s).

3. The LPR Port Daemon must be started to enable TCP/IP printing. Following are the steps to start the daemon:
 - a. Open the **TCP/IP** folder, which is in the **OS/2 System** folder for Warp 3.0.
 - b. Open **TCP/IP Configuration**.
 - c. Select the **Autostart** tab on the notebook.



- d. In **Services to Autostart**, select **lprpd**.
 - e. Set the check box for **Autostart Service**.
 - f. Select **Foreground Session** and **Minimized**.
 - g. Close the notebook by double-clicking the system icon (in the upper, left corner).
 - h. Select **Save**.
 - i. If prompted, respond **Yes** to save the configuration changes.
 - j. At the OS/2 command prompt, enter:


```
tcpstart
```

 to restart TCP.
4. Find the **Templates** icon on the OS/2 desktop. Double-click the icon (or click the right mouse button and select **Open** from the pop-up menu) to open the **Templates - Icon View** window.
 5. Using the right mouse button, drag and drop the **Printer** template icon to a folder/desktop or right mouse click the icon and select **Install** from the pop-up menu. The **Create a Printer** window opens.



- Type in the name of your printer object in the **Name** field. When the configuration is completed, this printer object is automatically advertised on the network.
- Select the IBM network printer driver that you installed at step 2 on page 147 as the default printer driver for this printer object.

Note: If you did not install the printer driver at step 2 on page 147, click the “Install new printer driver...” tab and install the driver.

- Select an available **LPD port** icon (\PIPE\LPDx, where x is an integer value) from the **Output port** window.

What if no LPD port icons appear on the Workstation?

If no **LPD port** icons appear in the **Output port** window, follow this procedure to add the ports:

- Click the right mouse button on any existing port in the **Output port** window.
- Select **Install** from the pop-up menu.
- Click **OK** when you see a message about ports already installed.
- The **Install New Port** window opens. Select **New port drivers** and type the directory name and drive, for example:
c:\TCPIP\DLL
in the **Directory** field and press **Enter**.
- Select all eight LPD ports that appear in the **Output port** window by dragging a rectangle over them. (The ports have names ranging from \pipe\lpd0 to lpd7.) Click the **Install** button.
- After the installation is complete, you can select one of the LPR ports in the **Create a Printer** window.

- Double-click the icon to open the **LPD Port** icon.



- Complete the **LPD server** section with the IP address of the printer, for example: 9.99.12.185.
- Complete the **LPD printer** section with the default LPD queue name. Set to the capitalized word PASS. You cannot change this name. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word TEXT.)
- Click **OK** to save your settings. You are returned to the **Create a Printer** window.
- Verify your selections, then click the **Create** button. An icon (printer object) appears on your desktop with the name you have chosen.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 144. GO TO STEP 5B ON PAGE 144 BY PERFORMING THE PROCEDURE IN 3.6, "SHARING THE PRINTER BY CREATING THE PRINTER ALIAS" ON PAGE 32.

13.5 Verifying the LAN Server Configuration

Using Warp Server?

If you are using OS/2 Warp Server, you must ensure that the spooler is enabled and that the PMPRINT queue driver is being used. **The queue processor should NOT be PMAPRINT.**

1. Verify that the network printer is available with the commands:

```
net alias
```

```
net use lpt2 \\server_name\printer_name
```

2. Submit a test print job with the command:

```
copy config.sys lpt2
```

3. Delete the file with the command:

```
net use lpt2 /d
```

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 144. GO TO STEP 9 ON PAGE 145 BY PERFORMING THE OPTIONAL PROCEDURE IN 20.1, "DISABLE NETWARE IF YOU'RE NOT USING IT" ON PAGE 203.

14.0 OS/2 TCP/IP to Print IPDS Files

NPM-OS/2

Use this chapter to configure OS/2 to print IPDS files on your IBM network printer.

If you want to configure OS/2 to format and print ASCII, PCL, or PostScript files, use the procedure in 13.0, "OS/2 TCP/IP to Print PCL and PostScript Files" on page 143.

To print IPDS files on the network printers, you must install the IPDS option for the printer.

14.1 Requirements

You need one of the following on your LAN Server:

- OS/2 Warp Server (includes TCP/IP and PSF/2)
- Pre-OS/2 Warp Server:
 - OS/2 Version 2.11 or OS-2 Warp Version 3.0 or higher
 - OS/2 TCP/IP (included in OS/2)
 - PSF/2 Version 2.0 or higher with CSD UR441x applied, where x is a letter indicating the language, for example "e" for English.

You need PSF/2 Client on client workstations.

14.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on PSF/2 require **administrative** authority.

Required Steps:

- **1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- **2** If you do **not** have a DHCP server anywhere on your network, go to the next step in the overall sequence. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP" on page 181 and determine what you should do by reading:
 - a. 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181
 - b. 18.2, "Options for Configuring NICs for DHCP and BOOTP" on page 183
 - c. 18.3, "Setting Dynamic IP Addresses with DHCP" on page 187
- **3** Using the printer operator panel, set up the printer for IPDS by setting the following parameters and values:

Menu	Item	Setting
ETHERNET or TOKEN RING	PERSONALTY	<ul style="list-style-type: none"> AUTO, if you want to use the printer for other than IPDS printing IPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
IPDS	IPDS PORT	TRING, ETHER

— **4** If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 11 on page 4), you can change the MAC address on Token Ring cards only by using one of the following procedures:

- **Command Line:**
 - Make sure an IP address has been assigned to the NIC. Refer to step 5.
 - Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
 - Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
- **NPM:**
Refer to the NPM OS/2 help system to determine how to do this.

— **5** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.

- To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.
- If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, "Setting Subnet Mask and Gateway Addresses with NPM" on page 217 or 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line" on page 175 to set subnet mask and gateway addresses.
 - 17.9, "Setting TCP/IP Addresses with BOOTP" on page 176 to set IP and other addresses if the printers are on a WAN.
- Optionally use 17.10, "Setting a Symbolic Name for an IP Address" on page 180.

— **6** Configure the printer for IPDS by doing the procedure in 14.3, "Configuring PSF/2 to Print IPDS Files" on page 153.

— **7** If you want to, set up printer sharing by doing the procedure in 14.4, "Configuring PSF/2 for Printer Sharing" on page 154.

— **8** Verify the PSF/2 configuration by sending a print job to the printer. Use the instructions in 14.5, "Verifying the PSF/2 Configuration" on page 155.

— **9** If you have problems, refer to 19.0, "Handling TCP/IP Problems" on page 197.

Optional Steps:

— **10** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.

___ **11** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.

___ **12** If you want to monitor your printers, refer to:

- Table 18 on page 215
- 21.5, "Monitoring Network Printers on TCP/IP Networks" on page 211
- 21.4, "Monitoring with NetView for OS/2" on page 210

14.3 Configuring PSF/2 to Print IPDS Files

Use this section to configure IBM network printers for IPDS printing.

14.3.1 Data Requirements

Parameter	Description	Your Value
IP address	IP address of the NIC	
Queue name	Name of the queue to use for IPDS printing	

14.3.2 Configuration Procedure for PSF/2

To print IPDS files on your IBM network printers, you need to take the following steps:

1. Access the PSF/2 Folder on the desktop.
2. Select the PSF/2 Control Panel.
3. Select **Profile**.
4. Select **New**.
 - a. Enter the device name, which can be anything you want.
 - b. Accept the default path `c:\psf2\system` or enter a different path.
 - c. Enter a description.
 - d. Select the device resolution that is used when printing metafile data.
5. Select the attachment type of TCP/IP.

Note: TCP/IP does not show up as an attachment type unless you have:

 - Installed TCP/IP for OS/2.
 - Enabled PSF/2 TCP/IP support.
6. Select **Settings**.
7. Enter the IP address of the printer. This is the same value as you enter in TCP/IP Configuration.
8. Accept the port number value of 5001.
9. Unless you want to change it, leave the default form definition as shown.
10. The default timeout value is 30. Adjust this value if there are many hosts or drivers using PSF/2. Refer to the Job Interval Shutdown Timer parameter in 14.4.2.1, "Printer Sharing on the PSF/2 Server" on page 154.
11. Select **OK**.
12. Select **Create**.
13. Specify the name of the queue for IPDS printing:
 - a. Select **Control Panel**.
 - b. Select **Options**.
 - c. Select **Setup Queues**.
 - d. Enter the OS/2 queue name.
 - e. Enter a description.
 - f. Select the **Device** from the displayed list.
 - g. Select **Setup**.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 152. GO TO STEP 7 ON PAGE 152 BY PERFORMING THE PROCEDURE IN 14.4, "CONFIGURING PSF/2 FOR PRINTER SHARING" ON PAGE 154.

14.4 Configuring PSF/2 for Printer Sharing

14.4.1 Port Switching Printer Sharing

IBM network printers provide sharing of the printer through port switching. Port switching is done on the printer with no involvement from the host PSF driver.

Network printers switch automatically among three ports:

- Parallel port (standard)
- Host (twinax or coax) port (optional)
- LAN network port (optional)

The switching is done through the use of several timeout values, which are set on the printer operator panel.⁸ For each port type, there is a menu item and a timeout setting:

- For the parallel menu, it is PORT TMEOUT
- For the Coax and Twinax port, it is the PORT TMEOUT setting on the setup menus
- For the Token Ring or Ethernet menus, it is PORT TMEOUT

The port switching is done according to the rule: **Print the jobs received on a port until no new jobs appear for the timeout value set for a port, then switch to the next port and do the same thing.**

14.4.2 Setting up PSF/2 for Printer Sharing

14.4.2.1 Printer Sharing on the PSF/2 Server: To set up printer sharing on the PSF/2 server, assign a value to the "Job Interval Shutdown Timer" on the server. Set this parameter if you are printing from DPF or the PSF/2 spooler.

Job Interval Shutdown Timer

Each PSF/2 printer has a tuning option with this name. The parameter is set for the printer being shared. The parameter specifies the amount of time the printer waits for another DPF or LAN job before shutting down. The recommended value is 30 seconds. Do not use the default value of 9999 (infinite).

1. Access the PSF/2 folder on the desktop.
2. Select the PSF/2 Control Panel.
3. Select **Profile**.
4. Select **Change**.
5. Select **Tuning Options**.
6. Enter a value for the Job Interval Shutdown Timer.
7. Select **Change**.

14.4.2.2 Printer Sharing from PSF Direct: If you are using PSF Direct on PSF/2, you can share printers by setting a value for the "Inactivity Timer."

Inactivity Timer

This parameter causes a host receiver to end if it waits for data from the host system for the specified period. This parameter can be used instead of the preferred "Disconnect Interval" on the host, if the latter is not available. Set the value to 30, not to the default 9999 (infinite).

1. Access the PSF/2 folder on the desktop.
2. Select **PSF/2 PSF Direct**.

⁸ For instructions on how to use the printer operator panel, refer to your printer's *User's Guide* or to 17.2, "Printer Operator Panel Actions" on page 169.

3. Select **Receiver**.
4. Select **Change**.
5. Set the value for the Inactivity Timer.
6. Select **Device**.
7. Select **OK**.

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 152. GO TO STEP 8 ON PAGE 152 BY PERFORMING THE PROCEDURE IN 14.5, "VERIFYING THE PSF/2 CONFIGURATION."

14.5 Verifying the PSF/2 Configuration

Use one of the following two methods to send a print file to the printer:

- Use the **APRINT** command with the "*d=device_name*" parameter to send IPDS files to the printer from the command line
- Use the Print Submitter panel to specify the print file name and other parameters.

If you have problems printing, do the following:

- Print a NIC configuration page. Refer to 1.6, "The NIC Configuration Page" on page 8.
- Verify that the IPDS service is enabled.
- Verify the service name.
- Verify that port number 5001 is being used.

If you are still unable to print IPDS files, contact IBM Support.

YOU HAVE NOW COMPLETED STEP 8 ON PAGE 152. GO TO STEP 9 ON PAGE 145 TO OPTIONALLY DISABLE NETWORK.

15.0 SUN Solaris to Format and Print PCL and PostScript Files

Use this chapter to configure an IBM network printer to work in the SUN Solaris environment.

15.1 Requirements

You need SUN Solaris 2.3, 2.4, or 2.5.

Clients or submitters need TCP/IP or Telnet.

15.2 Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on the SUN server require **root** authority.

Required Steps:

- **1** If you have not already done so, setup the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- **2** If you do **not** have a DHCP server anywhere on your network, go to the next step in the overall sequence. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP" on page 181 and determine what you should do by reading:
 - a. 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181
 - b. 18.2, "Options for Configuring NICs for DHCP and BOOTP" on page 183
 - c. 18.3, "Setting Dynamic IP Addresses with DHCP" on page 187
- **3** If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 11 on page 4), you can change the MAC address on Token Ring cards only by using one of the following procedures:
 - **Command Line:**
 - a. Make sure an IP address has been assigned to the NIC. Refer to step 4.
 - b. Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
 - c. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
 - **NPM:**

Refer to the NPM NT or OS/2 help system to determine how to do this.
- **4** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.
 - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.
 - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, "Setting Subnet Mask and Gateway Addresses with NPM" on page 217 or 17.8, "Setting

Subnet Mask and Gateway Addresses from the Command Line" on page 175 to set subnet mask and gateway addresses.

- 17.9, "Setting TCP/IP Addresses with BOOTP" on page 176 to set IP and other addresses if the printers are on a WAN.
- Optionally use 17.10, "Setting a Symbolic Name for an IP Address" on page 180.

- **5** Install the printer driver and utilities for network printers by doing the procedure in 15.3, "Installing the SUN Solaris Printer Driver."
- **6** Configure your printer by doing the procedure in 15.4, "Configuring SUN Solaris" on page 159.
- **7** Verify the configuration by doing the procedure in 15.5, "Verifying a SUN Solaris Configuration" on page 159.
- **8** If you have problems, refer to 19.0, "Handling TCP/IP Problems" on page 197.

Optional Steps:

- **9** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.
- **10** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.
- **11** If you want to monitor your printer, refer to the following:
 - 21.5, "Monitoring Network Printers on TCP/IP Networks" on page 211
 - 21.6, "Configuring AIX/UNIX for Syslog Support" on page 212

15.3 Installing the SUN Solaris Printer Driver

Drivers and Utilities on the WWW

To obtain the most current version of the SUN Solaris printer driver or utilities, access the Printing Systems Company (PSC) home page:

<http://www.can.ibm.com/ibmprinters>

and follow the directions.

1. Logon to an SUN Solaris machine as root.
2. Place the diskette or CD-ROM with the SUN Solaris printer driver into the appropriate drive.
3. Change to the directory where you want the files to be copied. IBM suggests that you change to the /tmp directory and create a directory under that, for example:
`/tmp/npdriv`
4. Extract the SUN Solaris printer driver file from the diskette or CD-ROM by entering this command:
`tar -xf floppydevice`
where *floppydevice* is the name of the device file used for the diskette drive. On your system, *floppydevice* may be /dev/diskette0.
5. Install the files into the appropriate directories by entering the command:

```
pkgadd -d IBMnp
```

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 158. GO TO STEP 6 ON PAGE 158 BY PERFORMING THE PROCEDURE IN 15.4, "CONFIGURING SUN SOLARIS."

15.4 Configuring SUN Solaris

15.4.1 Data Requirements

You need the following data for SUN Solaris to configure the NIC:

Parameter	Description	Your Value
MAC Address	On the NIC faceplate. Called "Ether Addr" or "Token Addr" on the NIC configuration page. It may be changed to the LAA, so check with your network administrator.	
Hostname (or IP)	Either the NIC hostname or IP address.	
Gateway	Needed only if there is a gateway address.	
Subnet Mask	Needed only if there is a subnet mask.	
Queue name	Name of the printer queue. Can be any name you want.	

15.4.2 Configuration Procedure

Summary of Configuration Procedure:

- ▶ Configure IP address
- ▶ Add a printer to the local spooler

Detailed Configuration Procedure:

1. Change directories to:
`/opt/ibmnp/admin`
Note: You could also add this directory to your PATH environment variable.
2. Enter the following command:
`./IBMnpmenu`
3. Follow the menu selections to configure your network printer.

YOU HAVE NOW COMPLETED STEP 6 ON PAGE 158. GO TO STEP 7 ON PAGE 158 BY PERFORMING THE PROCEDURE IN 15.5, "VERIFYING A SUN SOLARIS CONFIGURATION."

15.5 Verifying a SUN Solaris Configuration

Verify a SUN Solaris configuration by sending a print job to the printer using the command:

```
lp -d queuename file
```

where *queuename* is the name specified earlier.

If you have problems printing, refer to 19.0, "Handling TCP/IP Problems" on page 197.

YOU HAVE NOW COMPLETED STEP 7 ON PAGE 158. GO TO STEP 9 ON PAGE 158 BY PERFORMING THE OPTIONAL PROCEDURE IN 20.1, "DISABLE NETWARE IF YOU'RE NOT USING IT" ON PAGE 203.

16.0 Windows NT on TCP/IP Networks

Use this chapter to configure Windows NT 3.51 or 4.0 to print over a TCP/IP network to your IBM network printers.

Note: There are different ways of configuring Windows NT on TCP/IP networks. This chapter provides one example.

16.1 Requirements

Verify that you have the required software on the NT server or workstation:

- IBM printer driver for NT
- TCP/IP protocol
- Microsoft TCP/IP Printing

16.2 Configuration Checklist

Required Steps:

- 1** If you have not already done so, set up the printer and install the NIC as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
- 2** If you do **not** have a DHCP server anywhere on your network, go to the next step in the overall sequence. If you **do** have a **DHCP server** anywhere on the network, go to 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP" on page 181 and determine what you should do by reading:
 - a. 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181
 - b. 18.2, "Options for Configuring NICs for DHCP and BOOTP" on page 183
 - c. 18.3, "Setting Dynamic IP Addresses with DHCP" on page 187
- 3** If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 11 on page 4), you can change the MAC address on Token Ring cards only by using one of the following procedures:
 - **Command Line:**
 - a. Make sure an IP address has been assigned to the NIC. Refer to step 4.
 - b. Login to the NIC using the appropriate procedure:
 - 25.1, "Logging into a NIC using NetWare IPX" on page 229
 - 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230
 - c. Set the MAC to the LAA using the procedure in 17.4, "Setting the LAA from the Command Line" on page 171.
 - **NPM:**

Refer to the NPM NT help system to determine how to do this.
- 4** You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.
 - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.
 - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
 - 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 to set the IP address, if the printers are all on the same local segment (LAN); then you need to use 22.6, "Setting Subnet Mask and Gateway Addresses with NPM" on page 217 or 17.8, "Setting

Subnet Mask and Gateway Addresses from the Command Line" on page 175 to set subnet mask and gateway addresses.

- 17.9, "Setting TCP/IP Addresses with BOOTP" on page 176 to set IP and other addresses if the printers are on a WAN.
- Optionally use 17.10, "Setting a Symbolic Name for an IP Address" on page 180.

___ **5** Select one of the following two procedures:

- 16.3, "Configuring Windows NT 3.51 on TCP/IP Networks"
- 16.4, "Configuring Windows NT 4.0 on TCP/IP Networks" on page 164

___ **6** If you have problems, refer to 19.0, "Handling TCP/IP Problems" on page 197.

Optional Steps:

___ **7** If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in 20.1, "Disable NetWare if You're Not Using It" on page 203.

___ **8** If you want to customize your NIC, refer to 20.0, "Customizing the NIC" on page 203.

___ **9** If you want to monitor your printer, you can use IBM's Network Printer Manager (NPM) on an OS/2 or Windows NT machine. Refer to 22.7, "Monitoring with NPM in TCP/IP Environments" on page 218.

16.3 Configuring Windows NT 3.51 on TCP/IP Networks

16.3.1 Data Requirements

Parameter	Description	Your Value
Printer name	User-assigned name of the printer.	
Printer driver name	Name of the printer driver for NT. The default name of the driver is "IBM Network Printer <i>nn</i> ."	
IP address	IP address of the NIC.	
Name of the printer (lpd queue name)	This is not the same as the printer name. 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.)	

16.3.2 Configuration Procedure

Authority Level Required

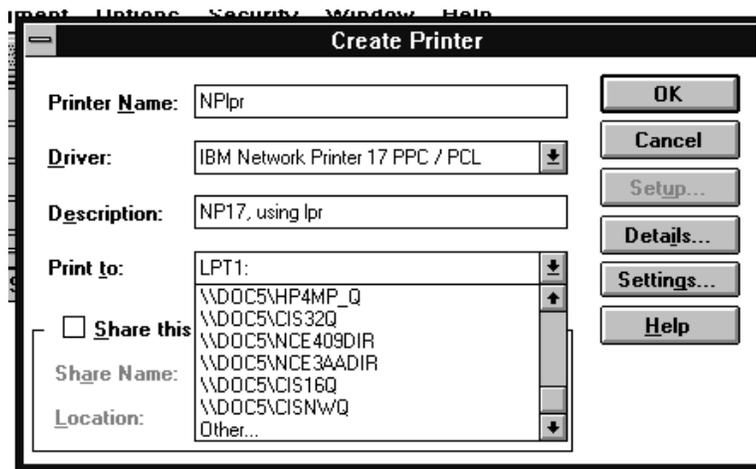
All of the following configuration steps carried out on Windows NT for TCP/IP may require **administrative** authority to be able to login to the NT 3.51 server.

Summary of Configuration Procedure:

- ▶ Setup the NIC as an LPR port
- ▶ Share the printer on the network

Detailed Configuration Procedure:

1. Logon to the NT server as administrator.
2. Verify that a Microsoft TCP/IP Printing service is installed by checking the network icon in **Control Panel**.
3. From the Program Manager window, select **Main**.
4. Select **Print Manager**.
5. Select the **Printer** menu.
6. Select **Create Printer**.



7. Enter the values for the following fields:
 - Printer Name
 - Driver
 - Description
8. Click the pull-down menu for the **Print to** field.
9. Select **Other...**, and the **Print Destinations** window displays.
10. Select **LPR Port**, then click **OK**. Enter the IP address or hostname associated with the NIC in the **Name or address of host providing LPD** field.
11. Enter the capitalized word **PASS** in the **Name of the printer on that machine** field. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word **TEXT**.) The requested value is **not** the same as the name you entered for Printer Name in step 7.
12. To share the printer, check the box **Share this printer on the network**.
 - a. On the **Share the Printer** window, the **Share Name** field displays the name of the printer you entered at step 7. (Optionally, enter a different name of your choice.)
 - b. Optionally, enter a text string for the printer's location.
 - c. Click **OK**, then in the **Printer Setup** window select any desired printer driver options and click **OK**.
 - d. The printer icon/window is then created. It displays the share name for the printer on the NT network.
13. Inform the NT workstations that will be using the printer of the share name (see step 12d) of the printer.

16.3.3 Verifying the Configuration

Test the NT configuration for TCP/IP by sending a print job from the command line or an application:

16.3.3.1 From the Command Line: Send a print job from the command line by entering a command in the form:

```
lpr -S ip_address -P PASS filename
```

where *ip_address* is the IP address of the NIC—not the IP address of the host workstation, and *PASS* is the printer name specified at step 11 on page 163.

Notes:

1. The -S and -P must be in capitals, as shown, and the flags must be separated from the parameters by spaces.
2. If the print queue says the print job is printing but nothing prints, check the timeout value on the printer operator panel. If set too high, the print job may not print right away.

16.3.3.2 From an Application: Test the configuration by sending a print job to the printer from any Windows application:

1. Select **Print Setup** from the **File** menu, then select the printer queue.
2. Click **OK**, then select **Print** from the **File** menu.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 162. GO TO STEP 7 ON PAGE 162 BY PERFORMING THE OPTIONAL PROCEDURE IN 20.1, "DISABLE NETWORK IF YOU'RE NOT USING IT" ON PAGE 203.

16.4 Configuring Windows NT 4.0 on TCP/IP Networks

16.4.1 Data Requirements

Parameter	Description	Your Value
Printer name	User-assigned name of the printer	
Printer driver name	Name of the printer driver for NT. The default name of the driver is "IBM Network Printer <i>nn</i> ."	
IP address	IP address of the NIC.	
Name of the printer (lpd queue name)	This is not the same as the printer name. 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 .)	

16.4.2 Configuration Procedure

Authority Level Required

All of the following configuration steps carried out on Windows NT for TCP/IP may require **administrative** authority to be able to login to the NT 4.0 server.

Summary of Configuration Procedure:

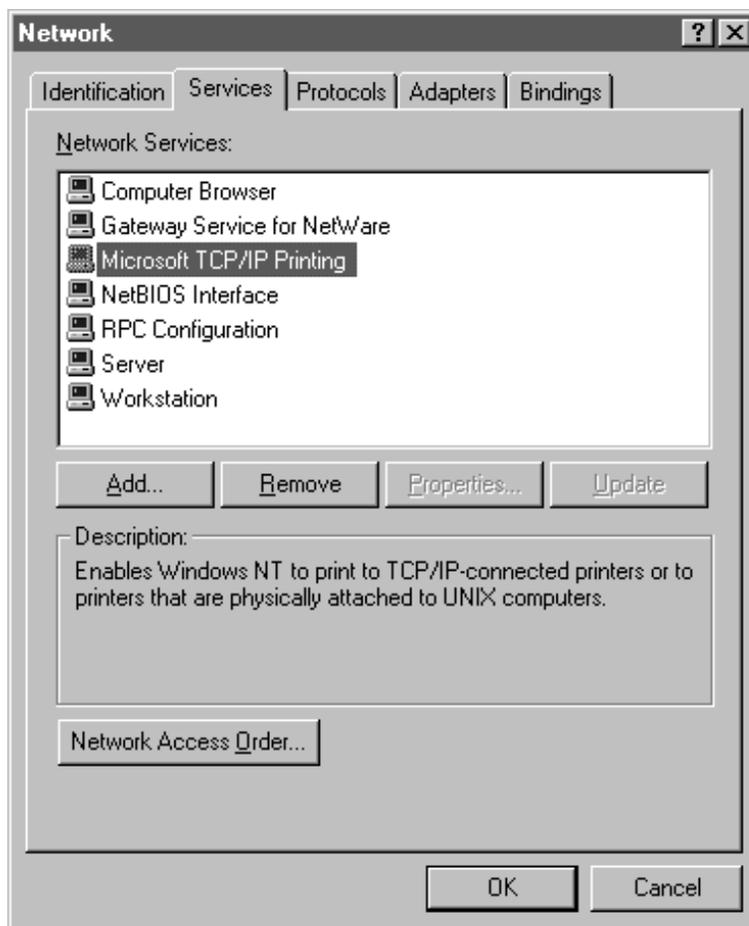
- ▶ Setup the NIC as an LPR port
- ▶ Share the printer on the network

Detailed Configuration Procedure:

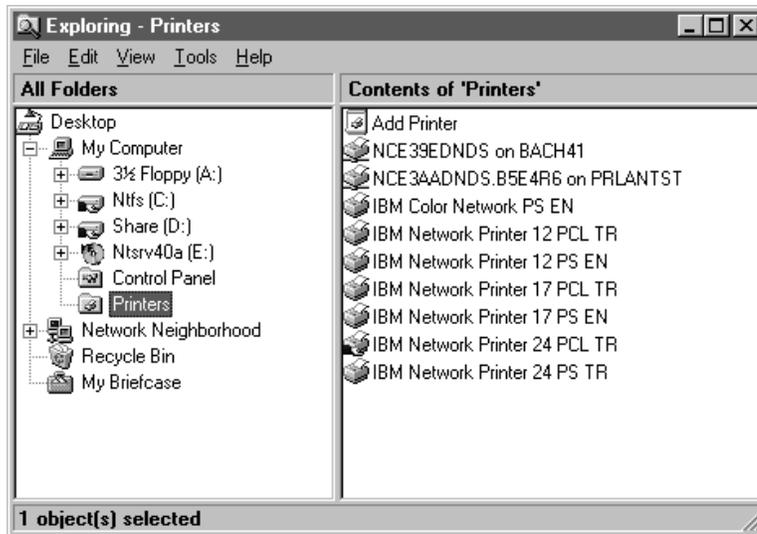
1. Logon to the NT 4.0 server as administrator.
2. Verify that **Microsoft TCP/IP Printing** service has been installed by doing one of the following two procedures:
 - One way:
 - a. **RIGHT** click the **Network Neighborhood** icon to display a dialog.
 - b. Select the **Services** tab.

- Another way:
 - a. Select **Start**, then **Settings**, then **Control Panel**, then **Network**.
 - b. Select the **Services** tab.

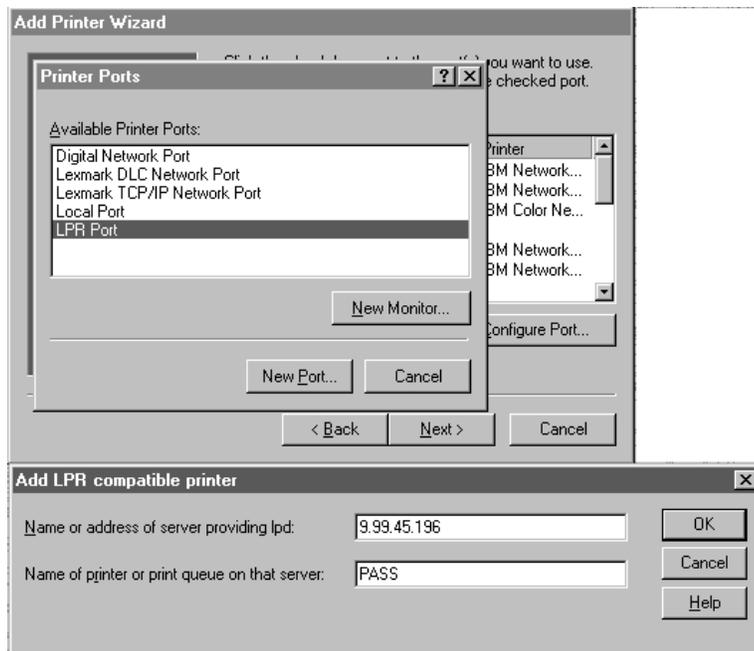
Verify that Microsoft TCP/IP Printing is on the list of installed services. If the service is not on the list, use the NT 4.0 documentation to install it.



3. Back at the main NT window, select **Start**, then **Programs**, then **Windows NT Explorer**.
4. Select the **Printer** folder from the **All Folders** list.
5. From the **Contents of 'Printers'** list, select **Add Printer**.



6. In the **Add Printer Wizard** window, click the **My Computer** radio button, then click **Next**.
7. In the next screen, click **Add Port**.
8. In the **Printer Ports** window, double-click **LPR Port** from the **Available Printer Ports** list.
9. In the **Add LPR compatible printer** window:
 - a. Enter the hostname or IP address assigned to the NIC in the **Name or address of server providing lpd** field.
 - b. Enter the capitalized word **PASS** in the **Name of printer or print queue on that server** field. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word **TEXT**.)



10. Click **OK**.
11. Click **Close** on the **Printer Ports** window.
12. Verify that the correct port is checked in the **Available ports** list.
13. Click **Next**.
14. If you have not yet installed the IBM NT 4.0 printer driver, click the **Have disk** button and follow the installation instructions. If you have already installed the printer driver, go to step 15.
15. Click **IBM** in the **Manufacturers** list, then click the printer driver for the printer you are configuring.
16. Click **OK**.
17. In the next new driver screen, click the radio button for the option you want, then click **Next**.
18. In the next screen, change the **Printer name**, if you want, then click the radio button if you want the printer to be the default printer.
19. Click **Next**.
20. In the printer sharing window, click the button for your sharing option. Optionally, change the **Share name** by which the printer is to be known on the network.
21. Optionally, select the OS printing support you want, then click **Next**.
22. Print a test page by clicking the appropriate button, then click **Finish**.

16.4.3 Verifying the Configuration

Test the NT configuration for TCP/IP by sending a print job from the command line or an application:

16.4.3.1 From the Command Line: Send a print job from the command line by entering a command in the form:

```
lpr -S ip_address -P PASS filename
```

where *ip_address* is the IP address of the NIC—not the IP address of the host workstation, and *PASS* is the printer name specified at step 9b on page 166.

Notes:

1. The -S and -P must be in capitals, as shown.
2. If the print queue says the print job is printing but nothing prints, check the timeout value. If set too high, the print job may not print right away.

16.4.3.2 From an Application: Test the configuration by sending a print job to the printer from any Windows application:

1. Select **Print Setup** from the **File** menu, then select the printer queue.
2. Click **OK**, then select **Print** from the **File** menu.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 162. GO TO STEP 7 ON PAGE 162 BY PERFORMING THE PROCEDURE IN 20.1, "DISABLE NETWARE IF YOU'RE NOT USING IT" ON PAGE 203.

17.0 TCP/IP Addresses

This chapter contains procedures that you are referred to from numerous checklists. Do **not** do any of these procedures unless directed to do so. Do not do these procedures as if they formed a sequence.

17.1 Microcode Level Needed to Set IP Addresses at the Printer

Use this procedure to determine if you have the necessary printer microcode level to set TCP/IP addresses from the operator panel. You can set TCP/IP addresses on your NIC(s) directly from the printer operator panel if the printer has the necessary microcode level.

To find out if your printer operator panel can be used to set IP and other addresses, do the following steps:

1. Press the ONLINE key to take the printer **Offline**.
2. Press the MENU key until the operator panel displays TOKEN RING MENU (or ETHERNET MENU).
3. Press the ITEM key until the operator panel displays the desired address to change, for example:

```
TOKEN RING MENU
IP ADDRESS
```

4. If the Ethernet or Token Ring menu displays IP ADDRESS, then you can use the panels to set the IP address. Otherwise, you must use another one of the procedures described in this chapter.

WHEN YOU HAVE COMPLETED THIS PROCEEDURE, RETURN TO THE CHECKLIST THAT DIRECTED YOU HERE.

17.2 Printer Operator Panel Actions

This section describes the printer operator panel.

Following is a description of the various actions you can perform when using the IBM network printer operator panel:

Cancel	Press the MENU or ITEM key to cancel any change or entry before it takes effect. The change has taken effect if an asterisk (*) is displayed to the right of the changed value.
Increment	Press the VALUE key. The value increments by one each time you press the key.
Fast Increment	Press and hold the VALUE key. The value increments by ten at a time while you hold the key.
Decrement	Press the SHIFT and then VALUE keys.
Fast Decrement	Press and hold the SHIFT and then VALUE keys.

Note: See the *User's Guide* for your printer for additional details about the operator panel.

17.3 Setting the LAA from the Printer Operator Panel

LAA is Token Ring Only

The capability of changing a MAC address to an LAA address is implemented on Token Ring cards only. This capability is not available on Ethernet cards.

When to use this Procedure

Use this procedure only if you want to change the MAC address to an LAA address and you have the "MAC ADDRESS" item in the TOKEN RING MENU. Obtain a unique LAA address from the network administrator. You can use 17.4, "Setting the LAA from the Command Line" on page 171 instead.

The MAC address for Token Ring NICs only can be changed to a Locally Administered Address (LAA). This change can be performed either from the printer operator panel (as described in this section) or from the command line (as described in 17.4, "Setting the LAA from the Command Line" on page 171).

The following procedure allows you to change a MAC address to a Locally Administered Address.

Note: Resetting the NIC to factory defaults (see B.1, "Resetting NIC Parameters to Factory Defaults" on page 265) sets the LAA back to the MAC address.

MAC and LAA must be Unique

See your network administrator before changing the MAC address because each LAA must be unique on the network.

Note: Before using the procedure described in this section, refer to 17.2, "Printer Operator Panel Actions" on page 169.

To change the LAA address for the NIC:

1. Press the ONLINE key to take the printer Offline.
2. Press the MENU key until the operator panel displays TOKEN RING MENU.
3. Press the ITEM key until the operator panel displays the following:

```
TOKEN RING MENU
MAC ADDRESS
```

What If?

If your operator panel does not display any of the items above, then the microcode level of your printer does not support setting addresses. See the box on page 169.

4. Press the **Enter*** key. For a new NIC whose MAC address has not yet been changed, the operator panel displays the unique MAC address that came with the card, for example:

```
MAC ADDRESS 01<
04-AC-9A-00-00
```

The "<" points to the value you can change at this point. Notice that the first pair of values (01, in this case) is shown on the same line as "MAC ADDRESS."

Note: The range for LAA addresses is 40-00-00-00-00-00 to 40-FF-FF-FF-FF-FF.

5. Press the **Value** key. The asterisk (*) goes away and the value is incremented by one. The range of the address values is zero to 255 hex (that is, FF).
6. Press the **Value** key until the desired value is displayed, then press **Enter*** to set the value. The "<" moves to the next value, for example:

```
04<AC-9A-00-00
```

7. Press the **Value** key until the desired value is displayed, then press the **Enter*** key.
8. Repeat step 7 until all six value fields have been set, then press the **Enter*** key to set the LAA address. The value has been set if an asterisk (*) displays to the right of the value, for example:

```
MAC ADDRESS 01-
04-9A-01-02-02 *
```

9. Press the ONLINE key to display the READY message. The panel displays the message I/O INITIALIZING and writes the new addresses to non-volatile memory. (This process takes a few minutes.) **Do not power off the printer** while the I/O INITIALIZING message is displayed.
10. When the READY message is re-displayed, turn the printer off, count to ten, then turn the printer back on.

Beware of Beacons on Token Ring

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause a Token Ring card to start beacons.

RETURN TO THE CHECKLIST THAT DIRECTED YOU TO USE THIS PROCEDURE.

17.4 Setting the LAA from the Command Line

LAA is Token Ring Only

The capability of changing a MAC address to an LAA address is implemented on Token Ring cards only. This capability is not available on Ethernet cards.

When to use this Procedure

Use this procedure to change the MAC address to the LAA address. You must have obtained a unique LAA address from the network administrator and you must have NIC microcode level 5.18 or higher. (Refer to 17.1, "Microcode Level Needed to Set IP Addresses at the Printer" on page 169.)

The factory-written MAC address for a NIC can be changed to a Locally Administered Address (LAA) on Token Ring NICs only.

This section describes how to make this change using the command line. Refer to 17.3, "Setting the LAA from the Printer Operator Panel" on page 169 for the procedure for changing the MAC to the LAA from the printer operator panel.

To set the LAA from the command line:

1. Login to the NIC using the procedure described in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. At the Local> prompt, enter the command to set the LAA address:

```
define server laa laa
```

where *laa* is the LAA address that is to replace the MAC address. The LAA address must be entered as a series of six pairs of hex values separated by a dash. LAA addresses range from 40-00-00-00-00-00 to 40-FF-FF-FF-FF-FF.

3. Reboot the NIC by entering the command:

```
init delay 0
```

If Problems Occur

If you have problems setting the LAA address, reset the ARP table by referring to 18.2.3.1, "Clear Out ARP Table Entries" on page 184

RETURN TO THE CHECKLIST THAT DIRECTED YOU TO USE THIS PROCEDURE.

17.5 Resetting the LAA back to the MAC Address

LAA is Token Ring Only

The capability of changing a MAC address to an LAA address is implemented on Token Ring cards only. This capability is not available on Ethernet cards.

Caution!

Do not reset the LAA except when explicitly directed to do so by your network administrator.

17.5.1 Resetting the LAA to the MAC Address from the Operator Panel

When to use the Operator Panel

You can use the operator panel to reset LAA addresses only if you have NIC microcode level 5.18 or higher. Refer to 17.1, "Microcode Level Needed to Set IP Addresses at the Printer" on page 169 to verify this.

1. Access the proper menu on the printer operator panel.
2. Select the MAC address entry panel. The panel displays the currently assigned LAA address.
3. To reset the LAA address back to the MAC address, **do not enter the MAC address**. Instead, enter zeroes, for example 00-00-00-00-00, then press **Enter**.
4. As soon as you press **Enter**, the printer will read the MAC address and display it.
5. Press the ONLINE key to display the READY message, The panel displays the message I/O INITIALIZING and writes the new address to non-volatile memory. (This process takes a few minutes.) **Do not power off the printer** while the I/O INITIALIZING message is displayed.
6. When the READY message is re-displayed, turn the printer off, count to ten, then turn it back on.

Note: If you enter the MAC address rather than zeroes, the printer will not revert to the MAC address. You must enter zeroes.

If Problems Occur

If you have problems setting the LAA address, reset the ARP table by referring to 18.2.3.1, "Clear Out ARP Table Entries" on page 184

17.5.2 Resetting the LAA to the MAC Address from the Command Line

To reset the LAA address to the MAC address:

1. Login to the NIC using the procedure described in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. At the Local> prompt, enter the command:

```
define server laa none
```
3. Reboot the NIC by entering the command:

```
init delay 0
```

If Problems Occur

If you have problems setting the LAA address, reset the ARP table by referring to 18.2.3.1, "Clear Out ARP Table Entries" on page 184

RETURN TO THE CHECKLIST THAT DIRECTED YOU TO USE THIS PROCEDURE.

17.6 Setting TCP/IP Addresses from the Printer Operator Panel

This section describes how to set the IP, Subnet Mask, or Gateway address from the printer operator panel.

Note: IBM recommends that you do not use this method to set IP addresses on multiple printers; use 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 or 17.9, "Setting TCP/IP Addresses with BOOTP" on page 176 instead.

Note: Before using the procedure described in this section, refer to:

- 17.1, "Microcode Level Needed to Set IP Addresses at the Printer" on page 169 to determine if you can use the printer operator panel for this task,
- 17.2, "Printer Operator Panel Actions" on page 169.

To set an IP, Subnet Mask, or Gateway address for the NIC:

1. Press the ONLINE key to take the printer **Offline**.
2. Press the MENU key until the operator panel displays ETHERNET MENU (or TOKEN RING MENU).
3. Press the ITEM key until the operator panel displays the desired address to change, for example:

```
ETHERNET MENU
IP ADDRESS
```

Note: The items that may be shown on the second line of the above example are:

- IP ADDRESS
- SUBNET MASK
- GATEWAY ADDRESS

What If?

If your operator panel does not display any of the items above, then the microcode level of your printer does not support setting addresses. See the box on page 169.

4. Press the **Enter*** key. For a new NIC whose IP address has not yet been set, the operator panel displays:

```
IP ADDRESS
0<0.0.0 *
```

The "<" points to the field whose value you can change at this point.

5. Press the **Value** key. The asterisk (*) goes away and the value is incremented by one. The range of the address values is zero to 255.
6. Press the **Value** key until the desired value is displayed, then press **Enter*** to set the value. The "<" moves to the next value, for example:

```
10.0<0.0
```

7. Press the **Value** key until the desired value is displayed, then press the **Enter*** key.
8. Repeat step 7 until all fields have been set. The value has been set if an asterisk (*) displays to the right of the value, for example:

```
9.99.40.2 *
```

9. Repeat steps 3 to 8 in this procedure for each address item you want to set.
10. Press the ONLINE key to display the READY message. The panel displays the message I/O INITIALIZING and writes the new addresses to non-volatile memory. (This process takes a few minutes.) **Do not power off the printer** while the I/O INITIALIZING message is displayed.
11. When the READY message is re-displayed, turn the printer off, count to ten, then turn it back on.

Beware of Beaconing on Token Ring

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause a Token Ring card to start beaconing.

WHEN YOU HAVE FINISHED SETTING TCP/IP ADDRESSES FROM THE PRINTER OPERATOR PANEL, RETURN TO THE TCP/IP-RELATED CONFIGURATION PROCEDURE THAT DIRECTED YOU TO USE THIS PROCEDURE.

17.7 Setting an IP Address on a Local Segment with ARP

Use this section to set the **initial** IP address for NICs. To set the Subnet Mask or Gateway addresses, use one of:

- 22.6, "Setting Subnet Mask and Gateway Addresses with NPM" on page 217
- 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line" on page 175

The following procedure will work only if you are on the same physical segment as the printer.

A Note on Examples

Adapt the following examples to your version of TCP/IP. The OS/2 examples, for instance, are for Version 3.0 of TCP/IP.

1. Login to the AIX or SUN Solaris host as root or begin at the DOS or OS/2 command line.
2. Verify that the IP address is not already being used by entering the command:

```
ping ip_address
```

ip_address Obtain this IP address from the network administrator. It is entered in decimal dot notation.

You should get **no** response. If a response is received, check with the network administrator to select another IP address.

The response differs between AIX, SUN Solaris, OS/2, and Windows NT, but:

- If there is a response, the address is already in use.
- If there is no response, the address is not already in use.

3. Assign the IP address using a command appropriate for your operating system.

Using the Optional temp Parameter

In the following examples, the ARP command is used to set the IP address on the NIC and also create an entry in the host's ARP Table. If you do not want the entry in the host's ARP table to be permanent, then use the "temp" parameter. The IP address on the card will remain set across power cycles regardless of whether or not you use the temp parameter.

OS/2 and SUN Solaris:

On OS/2 or SUN Solaris, enter the command in the form:

```
arp -s ip_address MAC_address [temp]
```

For example:

```
arp -s 138.239.252.183 0:0:c9:0:c1:a9 [temp]
```

Note: Do not use leading zeroes in the IP address.

AIX:

In AIX, enter the command in the form:

```
arp -s interface ip_address MAC_address [temp]
```

For example:

```
arp -s ether 123.212.232.191 0:0:c9:0:c1:a9 [temp]
```

```
arp -s 802.5 123.212.232.191 0:0:c9:0:c1:a9 [temp]
```

Note: On an AIX system, you must include an additional argument that specifies the interface type. Use **ether** for Ethernet. Use **802.5** for Token Ring.

Windows NT:

On Windows NT, enter the command in the form:

```
arp -s ip_address MAC_address
```

For example:

```
arp -s 9.99.7.2 00-00-c1-00-c1-a9
```

Note: The MAC address for AIX, SUN Solaris and OS/2 uses colons; for Windows NT, dashes are used.

4. Verify the newly set IP address by entering the command:

```
ping ip_address
```

where *ip_address* is the newly set IP address of the NIC. You should get a response. Cancel the display with a CTRL+C.

IF YOU WANT TO SET SUBNET MASK OR GATEWAY ADDRESSES, GO TO ONE OF THE FOLLOWING:

- [22.6, "SETTING SUBNET MASK AND GATEWAY ADDRESSES WITH NPM" ON PAGE 217](#)
- [17.8, "SETTING SUBNET MASK AND GATEWAY ADDRESSES FROM THE COMMAND LINE"](#)

OTHERWISE, RETURN TO THE CONFIGURATION PROCEDURE THAT DIRECTED YOU HERE.

17.8 Setting Subnet Mask and Gateway Addresses from the Command Line

When to use this Procedure

You can use this procedure as an alternative to 22.6, "Setting Subnet Mask and Gateway Addresses with NPM" on page 217. Before using either procedure, you should have set an initial IP address using 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174.

1. Login to the NIC using the procedure described in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. At the Local> prompt, enter the commands to set the Subnet Mask and Gateway addresses.
3. Enter the following command to set the Subnet Mask:

```
define server subnet subnet_mask
```

where *subnet_mask* is the Subnet Mask for the NIC (for example: 255.255.255.0).

4. Next, assign a Gateway address to the card by entering the following commands:

```
define node ip ip_address gateway default
```

where:

ip_address is the IP address of the NIC.

5. Write the changes to permanent memory by reinitializing the NIC with the command:

```
init delay 0
```

The Telnet session terminates automatically when you initialize the NIC. (The NIC takes about two minutes to reinitialize itself.)

6. You may Telnet back into the NIC and print a new NIC configuration page with the command:

```
show config l
```

to see if the addresses were set correctly.

7. If you logged back into the NIC, logoff the NIC with the command:

Logout

RETURN TO THE CHECKLIST THAT DIRECTED YOU TO USE THIS PROCEDURE.

17.9 Setting TCP/IP Addresses with BOOTP

When to use this Procedure

Use this procedure if you are on a WAN and you do not use the printer operator panel (see 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173) or 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 to set TCP/IP addresses.

Hostname Tag

The IBM NIC will reset the **node name** if the DHCP or BOOTP server enables the HOSTNAME Tag 12.

Configuring the BOOTP daemon involves two tasks:

- Editing the BOOTPTAB file
- Starting the BOOTP daemon

This section describes how to do these two tasks for AIX, SUN Solaris and OS/2 systems.

Notes:

1. Only one BOOTP daemon needs to be configured per LAN segment.
2. If the BOOTP function is performed across routers, then routers need to be configured to forward BOOTP requests.
3. The default name of the NIC changes to the hostname on the BOOTPTAB entry. Refer to 17.9.1.3, "Fields in the BOOTPTAB File" on page 177.

A Note on Examples

Adapt the following examples to your version of TCP/IP. The OS/2 examples, for instance, are for Version 3.0 of TCP/IP.

17.9.1 Setting up the BOOTPTAB File

The BOOTPTAB file contains a separate entry with configuration information for each NIC.

17.9.1.1 What the BOOTPTAB File Does: When a NIC is initialized, it broadcasts its MAC address to the BOOTP daemon. The BOOTP daemon searches for a corresponding entry in the BOOTPTAB file. If an entry is found, the BOOTP daemon returns information, such as IP address, defining the NIC to the TCP/IP network. For details on this BOOTP function, refer to 18.1.1, "BOOTP" on page 181.

17.9.1.2 Editing the BOOTPTAB File: AIX, SUN Solaris, and OS/2 use a BOOTPTAB file with **almost** the same format.

- On AIX and SUN Solaris, the BOOTPTAB file is accessed under the /etc directory.
- In OS/2 using TCP/IP Version 3.0, the file is in the \mpn\etc directory.

To configure the BOOTPTAB file, you need to add the unique IP address value for each IBM network printer on the network.

Note: Root user authority is required to edit the BOOTPTAB file on AIX and SUN Solaris systems.

AIX BOOTPTAB file Example:

Following is an example of an AIX BOOTPTAB file entry for an IBM NIC on a Token Ring network ("ht=tr"):

```
NPM001:ht=tr:ha=0004AC9B0101:ip=9.99.12.134:
sm=255.255.255.0:gw=9.99.12.254:
```

Note: On AIX systems, the BOOTPTAB file has **no** spaces after the colons and no continuation character is required.

OS/2 and SUN Solaris BOOTPTAB file Example:

Following is an example of an OS/2 and SUN Solaris BOOTPTAB file entry for an IBM NIC on a Token Ring network (ht=token-ring):

```
NPM001: ht=token-ring: ha=0004AC9B0101: ip=9.99.12.134: \
sm=255.255.255.0: gw=9.99.12.254:
```

Note: On OS/2 and SUN Solaris, each field is followed by a colon and a space, and the required line continuation character is a backslash (\).

17.9.1.3 Fields in the BOOTPTAB File: Following is a description of the fields in the BOOTPTAB file entry for an IBM NIC:

NPM001 The first field is the hostname. The name is required. You can use any name you want. In some cases, the node name on the NIC may be replaced by this hostname. Only alphanumeric characters should be used in the hostname for AIX systems.

ht Identifies the host hardware type:

- For OS/2, the types are **6** or **token-ring** for Token Ring and **ethernet** for Ethernet.
- For AIX, the types are **tr** for Token Ring and **ether** for Ethernet.
- For SUN Solaris, the types are **ether** for Ethernet and **token_ring** for Token Ring.

In the example, a Token Ring NIC is used.

ha The MAC address of the NIC.

ip The IP address to be assigned to the NIC.

sm The Subnet Mask of the NIC.

gw The Gateway address of the NIC.

vm **vm** stands for Version Mode. If you are using DHCP (and the DHCPD)⁹ on Windows NT, AIX, or SUN Solaris to define TCP/IP addresses, you need to add this field to the file. Enter the field as "vm=rfc1048."

⁹ For information about DHCP, refer to 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181.

Once the BOOTPTAB file has been edited, the next task is to start the BOOTP daemon. Use one of the following procedures:

- 17.9.2, "Starting the BOOTP Daemon on AIX Systems"
- 17.9.3, "Starting the BOOTP Daemon on OS/2 Systems" on page 179
- 17.9.4, "Starting the BOOTP Daemon on SUN Solaris Systems" on page 179

17.9.2 Starting the BOOTP Daemon on AIX Systems

1. Login to the AIX host as root user.
2. Determine if BOOTP is running on the host, with the command:

```
#ps -ef | grep -v grep | grep bootp
```

If BOOTP is defined for background operation, an active BOOTP daemon is displayed. Otherwise, no BOOTP daemon is displayed.
3. If an active BOOTP daemon is not listed, enter:

```
#grep bootp /directory/inetd.conf
```

where *directory* may be *etc* or *usr/etc*.

If a BOOTP daemon is present, it is listed with its parameters.
4. If a BOOTP daemon is not present, edit */etc/inetd.conf* and make sure the line containing BOOTP and **tftp** are not commented out. If they are commented out, remove the pound sign (#) from the beginning of the lines. If the lines are not in the file, then add the following lines to the file:

```
bootps dgram udp wait root /etc/bootpd bootpd
```

and:

```
tftp dgram udp nowait nobody /etc/tftpd tftpd -n
```
5. Start the BOOTPD daemon with the command:

```
refresh -s inetd
```

or enter the following two commands:

 - a. The command returns the Process ID (PID) number for INETD:

```
ps -ef | grep inetd
```
 - b. Stop the BOOTPD daemon with the command:

```
kill -1 inetdPID
```

Note: If neither of these command options work, refer to the prolog file in */etc/inetd.conf* for information on restarting INETD.
6. Turn the printer off, count to ten, then turn the printer on.

Beware of Beaconing

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause a Token Ring card to start beaoning.

[RETURN TO THE CHECKLIST THAT DIRECTED YOU HERE.](#)

17.9.3 Starting the BOOTP Daemon on OS/2 Systems

To start the BOOTP daemon on OS/2 systems, do the following:

1. Determine if the BOOTP daemon is running on the BOOTP server:

Locate the **bootpd.exe** file in the OS/2 task list by pressing **CTRL+Esc**. If the **bootpd.exe** is found, stop it by pressing mouse button two (normally the right button) and select **Close** from the pop-up menu.

2. Restart the BOOTP task by entering one of the following commands on the OS/2 command line:

For BOOTP running in Foreground:

```
bootpd -d -d -d -d -d -b
```

For BOOTP running in Background:

```
start bootpd -d -d -d -d -d -b
```

-d The **-d** parameter turns the debug option on. You can check for messages displayed in the BOOTP task window whenever one of the printers in the **bootptab** file is turned on.

-b The **-b** parameter broadcasts messages on a WAN.

3. Check the output of the BOOTPD command to ensure that it has read the entries in the BOOTPTAB file. There should be a line that looks something like:

```
read 7 entries from c:\MPTN\ETC\bootptab
```

4. Turn the printer off, count to ten, then turn it back on.

Beware of Beaconing

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause a Token Ring card to start beaconing.

5. When you turn the power on to the printer, check the output of the BOOTPD command to ensure that it has received a request from the NIC's MAC (hardware) address.

RETURN TO THE CHECKLIST THAT DIRECTED YOU HERE.

17.9.4 Starting the BOOTP Daemon on SUN Solaris Systems

1. Login to the SUN Solaris host as root user.

2. Determine if BOOTP is running on the host, with the command:

```
#ps -ef | grep -v grep | grep bootp
```

If BOOTP is defined for background operation, an active BOOTP daemon is displayed. Otherwise, no BOOTP daemon is displayed.

3. If an active BOOTP daemon is not listed, enter:

```
#grep bootp /directory/inetd.conf
```

where *directory* may be *etc* or *usr/etc*.

If a BOOTP daemon is present, it is listed with its parameters.

4. If a BOOTP is not present, edit */etc/inetd.conf* and make sure the lines containing BOOTP and TFTP are not commented out. If either of these is commented out, remove the pound sign (#) from the beginning of the line. If the lines are not in the file, then add the following lines to the file:

```
bootp dgram upd wait root /usr/sbin/bootpd bootpd
```

and:

```
tftp dgram upd wait root /usr/sbin/initftpd in.tftpd -s /tftpboot
```

5. Start the BOOTPD daemon by entering the following two commands:

a. This command returns the PID number for INETD:

```
ps -ef | grep inetd
```

b. Stop the BOOTPD daemon with the command:

```
kill -1 inetdPID
```

Note: If neither of these command options work, refer to the prolog file in `/etc/inetd.conf` for information on restarting INETD.

6. Turn the printer off, count to ten, then turn the printer on.

Beware of Beaconing

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause a Token Ring card to start beaoning.

RETURN TO THE CHECKLIST THAT DIRECTED YOU HERE.

17.10 Setting a Symbolic Name for an IP Address

For AS/400

For AS/400, refer to 10.4.3, "Configuring a Local Domain and Hostname" on page 105 and 10.4.4, "Configuring a TCP/IP Host Table Entry" on page 106.

This **optional** task can be completed on the host and every workstation from which print jobs are submitted.

Note: If the `/etc/hosts` file is administered by NIS (formerly Yellow Pages), update the appropriate NIS master hosts databases instead. Refer to host documentation for more information.

1. Login to the AIX or SUN Solaris host as root or begin from the OS/2 or Windows NT workstation.
2. From the command line:
 - For AIX and SUN Solaris, edit the `/etc/hosts/` file.
 - For OS/2, edit the `\mptn\etc\hosts` file.
 - For NT, edit the `\winNT35\system32\drivers\etc\host` file.
3. Add a line describing the server node name.

```
ip_address server_node_name
```

ip_address The IP address just assigned for the NIC.

server_node_name The symbolic name describing the NIC (server).

For example:

```
138.239.252.184 accounting_printer
```

RETURN TO THE CHECKLIST THAT DIRECTED YOU TO USE THIS PROCEDURE.

18.0 Dynamic Host Configuration Protocol (DHCP) and BOOTP

Use the material in this chapter only if you have been directed to do so by one of the TCP/IP-related procedures.

HOSTNAME Tag 12

The IBM NIC will reset the **Node Name** if the DHCP or BOOTP option, "HOSTNAME Tag 12," is enabled. Disable this option if you do not want to change the NIC Node Name.

18.1 Industry Standards for Setting TCP/IP Addresses

This section provides a technical overview and explanation of the way IBM NICs respond to DHCP servers. Possible DHCP environments include:

- AIX 4.1.4 and 4.2
- NetWare 4.1 and 4.11
- OS/2 Warp Server 4
- Windows NT Server 3.51 and 4.0

There are four ways to set a TCP/IP address into an IBM network printer. Three of these methods can be done remotely over the network and one is done at the printer operator panel. For new printers that do not have a TCP/IP address already assigned in the NIC, the NIC tries to obtain a TCP/IP address across the network with the following methods and in the following order:

- BOOTP
- DHCP
- RARP

18.1.1 BOOTP

The traditional method of assigning a TCP/IP address on a Local Area Network or Wide Area Network is through BOOTP; see Request for Comments (RFC) 1497.

The BOOTP daemon is shipped with and supported on most Unix platforms and OS/2 TCP/IP and LAN servers. BOOTP is most widely used on LANs and WANs to set up X stations and other IP devices. BOOTP runs as a daemon on a server system and uses a local look-up table (known as the BOOTPTAB file) in the server to associate a NIC MAC address with an IP address. The BOOTPTAB file is configured manually by the LAN administrator. It should include the following items for each device that is defined:

ha	Hardware MAC address of the requesting device (printers)
ip	The TCP/IP address that is a pre-allocated address used and assigned to the destination MAC address
gt	Default gateway address that is used and assigned to the destination MAC address
sm	Subnet address that is used and assigned to the destination MAC address

The BOOTP server listens on the network for BOOTP requests with the MAC address listed in its lookup table. If a BOOTP request MAC address matches a MAC address listed in the BOOTPTAB file, then the server replies on the network with TCP/IP address, default gateway, and subnet mask that should be used by the MAC address for its IP environment. Network administrators can set up their routers to enable forwarding of BOOTP requests and replies across the entire enterprise. Figure 17 on page 182 shows the network flow of this transaction for a new IBM network printer.

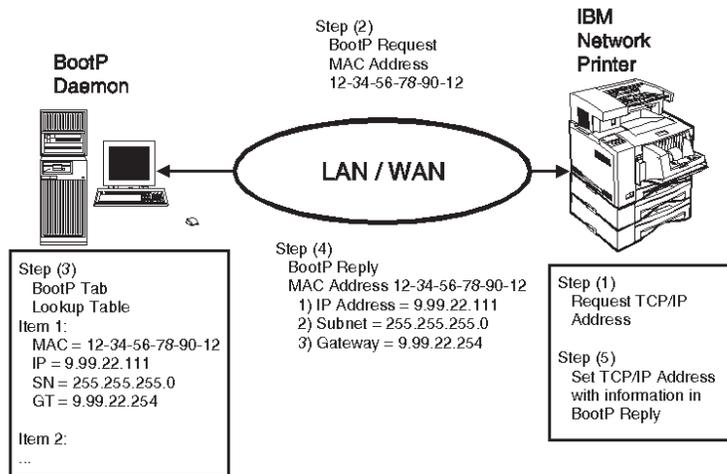


Figure 17. Network Printer BOOTP Model

18.1.2 DHCP

The second method of assigning an IP address to a device on the network is with Dynamic Host Configuration Protocol (DHCP); see RFC 1541. DHCP is very similar to BOOTP, but it allows for dynamic assignment of IP addresses. This allows LAN administrators to share a limited number of IP addresses on a network with a larger group of devices.

DHCP is set up by installing a DHCP server. The server is configured to listen to the network and respond to DHCP requests.

When a request is received by the DHCP server, it replies with an IP address out of an address pool. The DHCP server also returns the default gateway and subnet mask with the new IP address. If configured correctly, the pool is a reserved range of IP addresses that are allocated for the DHCP server when it is set up by the LAN administrator. The default gateway and subnet mask are also setup in the DHCP server and associated with an address pool.

In Windows NT, the pool of addresses is pre-defined as a "scope." A scope defines the range of TCP/IP addresses and their gateway, subnet mask and lease length. Multiple scopes can be set up for an NT DHCP server. Some of these addresses defined in the scope should be reserved as permanent in the DHCP server. The reserved addresses, or addresses outside the range managed by the DHCP server, should be allocated to routers and printers since these type of devices need well-known IP addresses.

In order to reserve an IP address as permanent, the system administrator must associate the IP address and the MAC (hardware unique address in NT) in the DHCP scope configuration. The lease period for these permanent address should also be set to unlimited time. A DHCP permanent lease has the same effect as the static one-to-one mapping table used by BOOTP.

Note: Network administrators can set up their routers to enable forwarding of DHCP requests and replies across the entire enterprise. Figure 18 on page 183 shows the network transaction of a DHCP request between a new IBM network printer and a DHCP server.

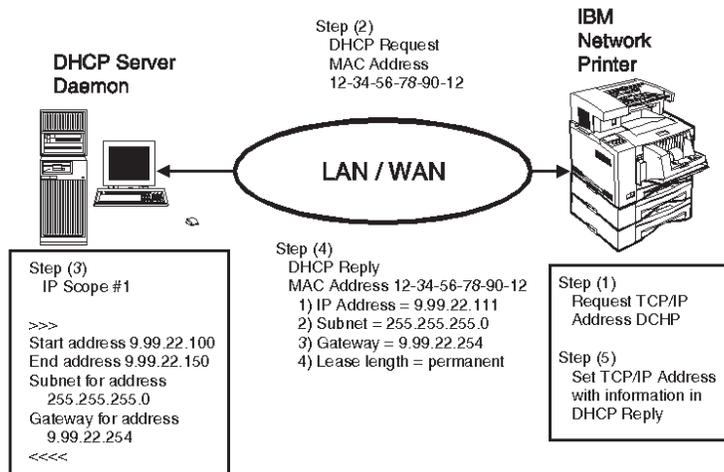


Figure 18. Network Printer DHCP Model

DHCP servers are shipped with NT and OS/2 LAN Server as standard features, but you have to install and enable DHCP manually. Refer to 18.4, "Installing and Configuring DHCP for OS/2" on page 187 and 18.5, "Installing and Configuring DHCP on Windows NT" on page 192.

18.1.3 RARP

Reverse ARP (RARP) is another traditional method of setting only the IP address on a device across a Local Area Network. RARP does not support setting the default gateway or the subnet mask, and it does not support being routed across Wide Area Network routers. It is no longer shipped with today's LAN Server environments such as Window NT, OS/2 Warp, or AIX and is not a recommended method of setting a TCP/IP address.

RARP works similarly to BOOTP and DHCP in a client/server model. RARP runs as a server on a server system. The RARP server listens on the network for RARP requests that contains a MAC address pre-defined in the local RARP lookup table. If the MAC address in the request matches one in the table, a RARP reply is sent by the RARP server. The reply contains the MAC address and the IP address for the device that made the request. After the RARP is received by the device, it is enabled only for an Local Area Network and does **not** work on a Wide Area Network because it does not have a default gateway set or a network-specific subnet mask. The RARP method of configuration is not recommend by IBM, so no network flow is shown here.

PLEASE CONTINUE ONTO THE NEXT SECTION, 18.2, "OPTIONS FOR CONFIGURING NICs FOR DHCP AND BOOTP."

18.2 Options for Configuring NICs for DHCP and BOOTP

The default values for BOOTP, DHCP, and RARP in the IBM Ethernet and Token Ring NICs have changed in Version 5.18 of the microcode. This change to the default settings was made so the NIC operates more consistently with emerging DHCP management approaches in workstation operating systems like Windows NT or OS/2 Warp Server.

Before starting, you should know the microcode level of each NIC in your network. To learn the microcode level of your NIC, obtain a printer configuration page by performing the procedure in 1.5.1, "Obtaining a Printer Configuration Page" on page 6.

18.2.1 The IP Address Algorithm for NICs

The default setting for NICs at microcode levels 5.13, 5.16, and 5.17 for the BOOTP, DHCP, and RARP options is to request an IP address, whether or not one has already been assigned. The default setting for NICs at microcode level 5.18 or greater is **not** to request an IP address if one has already been assigned.

18.2.1.1 How Microcode Levels 5.13, 5.16, and 5.17 Function: The IBM NIC with microcode levels 5.13, 5.16, and 5.17 have the following defaults:

- On power-up, NICs request another IP address from the BOOTP, DHCP, or RARP server even if one is set into the NIC memory.
- The NIC replaces any existing IP address with the one provided in the BOOTP, DHCP, or RARP request/reply. **This occurs in the DHCP environment even if a newly-assigned IP address is defined.**

18.2.1.2 How Microcode Levels Above 5.18 Function: The IBM NIC with microcode 5.18 and higher have the following defaults:

- On power-up, NICs do **not** request another IP address from the BOOTP, DHCP, or RARP server(s) if one has already been assigned using the printer operator panel.
- The NIC does not replace any existing IP address with one provided by the BOOTP, DHCP, or RARP reply.

18.2.2 How the NIC Defaults are Set

Built into each NIC by IBM is a default setting for the DHCP, BOOTP, and RARP functions of the NIC. Each setting includes two values:

- The first value represents the number of times a NIC requests its IP address **if it does not know its IP address.**
- The second value controls whether or not a NIC requests an IP address **even if it already has one assigned to it**

Table 17 summarizes the default values set for the NICs.

Microcode Level	The number of times a NIC requests its IP address if it does NOT have one	The number of times a NIC is to request an IP address if it does have one
5.13, 5.16, 5.17	2	1
5.18 and greater	2	0

18.2.3 What You Need to Do

IBM recommends that all NICs running in a DHCP environment with code levels 5.13, 5.16, and 5.17 be configured to function the way code 5.18 functions, that is, **not** to request an IP address if one has already been assigned. However, if NICs are in a BOOTP only environment, then these changes are not needed.

DHCP can control the address-requesting process if it is set up so that each NIC is assigned a permanent, leased address or an address outside the range of addresses managed by DHCP.

18.2.3.1 Clear Out ARP Table Entries: After making the changes to the NICs, you may need to clear the local ARP table entries and any router ARP table entries that have previously saved the IP and MAC addresses for the NICs. You should consult your LAN administrator for help in removing these ARP table entries.

18.2.3.2 Situations Affecting Your Network Interface Cards: Following is a description of four situations affecting your NICs. Select the procedure that describes your situation.

MICROCODE LEVEL	WHAT YOU WANT	WHAT YOU SHOULD DO
Pre 5.18	Earlier NICs to Work Like 5.18 (DHCP Suggestions)	If you have NICs at microcode levels 5.13, 5.16 or 5.17 and you want them not to request an IP address if they already have one assigned (the 5.18 default), use the procedure in 18.2.5, "Configuring 5.13, 5.16, and 5.17 NICs for DHCP Environments" on page 186.
Pre 5.18	Update Earlier NICs with 5.18 Microcode	If you want to update your existing NICs with new 5.18 microcode, you must still do the procedure in 18.2.7, "Configuring Upgraded 5.13, 5.16, and 5.17 NICs" on page 187 once you have updated the old NICs with the 5.18 or greater microcode. (The IP address controls are not totally within the 5.18 microcode.)
5.18 or later	Install NICs at Microcode Level 5.18 or Greater	If you have microcode level 5.18 or greater, the BOOTP, DHCP, and RARP function of requesting an IP address even if one has already been assigned is disabled . 18.2.4, "Installing and Configuring a New 5.18 NIC" on page 185 describes how to install a new 5.18 NIC to take advantage of the new default settings.
5.18 or later	5.18 NICs to Work Like Earlier Cards (BOOTP Suggestions)	If you want your NIC(s) with 5.18 or later code to function the way version 5.13, 5.16, or 5.17 functioned, that is, to always request an IP address even if they had already been assigned one, then do the procedure in 18.2.6, "Configuring 5.18 NICs for BOOTP Environments" on page 186.

18.2.4 Installing and Configuring a New 5.18 NIC

With microcode level 5.18 or greater, you can use either local or remote modes to set the IP address.

18.2.4.1 Configuring a New NIC Locally: The following procedure assigns an IP address from the printer's operator panel **before** attaching the printer to the LAN cable. The result is that the printer does not request an IP address from a DHCP server, because you have already defined one.

1. Install the NIC in the printer, but do not attach it to the LAN.
2. Enter an IP address for the printer from the printer operator panel. Refer to 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel" on page 173.
3. Turn the printer off, attach the printer to the LAN cable, then turn the power back on.

18.2.4.2 Configuring a New NIC Remotely: The following procedure allows a network administrator to remotely attach to a new NIC and configure it remotely.

1. Install the 5.18 NIC in the printer and attach the printer to the LAN cable.
2. Power up the printer.
3. The printer requests an IP address from DHCP (since one has not yet been assigned to it).
4. Since the address may not be a permanent one, you should do one of the following:
 - Assign an IP address using the operator panel, NPM, or log into the NIC with Telnet and use the command line.
 - Map the address assigned by DHCP to the range of reservation addresses in DHCP to make the address a permanent one. Refer to 18.2.4.3, "Making a DHCP Address Permanent" for a procedure on how to do this.

18.2.4.3 Making a DHCP Address Permanent: DHCP is one way in which TCP/IP addresses can be assigned to devices and managed on a network server. It is particularly useful where the number of devices exceeds the number of available IP and other addresses. When using DHCP, these addresses can be assigned dynamically, on an as-needed basis. By using DHCP, no device needs to be assigned a permanent address.

Printers should be administered with well-known, permanently-assigned IP addresses. For this reason, IBM recommends that if you use DHCP server management, you assign a permanent address to a network printer and configure DHCP to exclude IBM network printer IP addresses from the range of dynamically allocated addresses.

To exclude IBM network printer IP addresses from the range of dynamically allocated addresses use one of the following sections:

- 18.4, "Installing and Configuring DHCP for OS/2" on page 187
- 18.5, "Installing and Configuring DHCP on Windows NT" on page 192

18.2.5 Configuring 5.13, 5.16, and 5.17 NICs for DHCP Environments

The following procedure sets NICs with pre-5.18 code so they function the way 5.18 or greater code functions. When completed, pre-5.18 NICs do **not** request an IP address with BOOTP, DHCP, or RARP **if they already have one assigned**.

Note: These tasks **cannot** be done from the printer operator panel.

1. From the AIX, OS/2, or Windows DOS or NT command line prompt, login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. Display the current settings of the BOOTP, DHCP, and RARP requests, including TCP/IP addresses by entering the following command:

```
list server tcp
```

This lists the TCP values in the NIC. This includes IP address, gateway, subnet mask, BOOTP, DHCP, and RARP requests. The first value in the BOOTP, DHCP, and RARP columns is the number of requests sent by the NIC for the particular protocol if it does **not** know its IP address. The second column is the number of times the NIC sends a particular request if it knows its IP address.

3. To cause the NIC to request an IP address through BOOTP, DHCP, or RARP twice if it does **not** know its IP address and to set the number of BOOTP, DHCP, or RARP requests sent to zero if the NIC already knows its IP address, enter the following commands:

```
define server bootp 2 0
```

```
define server dhcp 2 0
```

```
define server rarp 2 0
```

4. Verify the new settings with the command:

```
list server tcp
```

This lists the IP address, gateway, subnet mask, BOOTP, DHCP and RARP requests saved in the NIC.

5. Reboot the printer with the command:

```
init delay 0
```

6. The "init..." command automatically logs you off the NIC.

18.2.6 Configuring 5.18 NICs for BOOTP Environments

The following procedure sets NICs with code level 5.18 or greater so they function the way NICs at code levels 5.13, 5.16, or 5.17 function. When set, NICs **do** request an IP address from the BOOTP or RARP servers **even if an IP address has been assigned** to them. The following procedure should be done for NICs only if no DHCP server is attached to the LAN. If you do have a DHCP server on the LAN, do one of the DHCP-related procedures in 18.2.4.3, "Making a DHCP Address Permanent" on page 185 or 18.2.5, "Configuring 5.13, 5.16, and 5.17 NICs for DHCP Environments."

1. Login to the NIC using the procedure in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. Display the current settings of the BOOTP, DHCP, and RARP requests with the command:

```
list server tcp
```

3. Enter the commands:

```
define server bootp 2 1
```

```
define server rarp 2 1
```

4. Perform steps 4 to 6 on page 186 in 18.2.5, "Configuring 5.13, 5.16, and 5.17 NICs for DHCP Environments" on page 186 to verify, reboot, and logoff the NIC.

18.2.7 Configuring Upgraded 5.13, 5.16, and 5.17 NICs

If you upgrade 5.13, 5.16, or 5.17 NICs with the 5.18 microcode, the upgraded NIC will, nevertheless, still use the pre-5.18 IP address-setting default. To have the 5.18 IP address-setting default take effect, you must:

- **Either** login to the NIC and use NIC commands to explicitly change the NIC's current settings to the new settings using the procedure in B.1.2, "Resetting NIC Parameters from the Command Line" on page 265
- **Or** reset the NIC to factory defaults **and** then re-configure the NIC's TCP/IP addresses. If you want to reset the NIC to factory defaults, use one of the following procedures:
 - B.1.3, "Resetting Ethernet NICs Using Hardware Pin Jumpers" on page 265
 - B.1.4, "Resetting Token Ring NICs using Hardware Pin Jumpers" on page 266

You will Lose TCP/IP Addresses

Resetting the NIC using any of these procedures causes you to lose the TCP/IP addresses (IP, subnet mask, and gateway) that have been set for the NIC.

IF YOU NEED TO INSTALL AND CONFIGURE DHCP ON OS/2 OR WINDOWS NT, PLEASE GO TO 18.3, "SETTING DYNAMIC IP ADDRESSES WITH DHCP."

18.3 Setting Dynamic IP Addresses with DHCP

This section describes:

- The relationship of the NIC and the DHCP method of setting TCP/IP addresses, and
- How to set a NIC address using DHCP

If you want technical details about the IBM NIC and DHCP, refer to 18.1, "Industry Standards for Setting TCP/IP Addresses" on page 181.

18.4 Installing and Configuring DHCP for OS/2

Dynamic Host Configuration Protocol (DHCP) is a standard method of passing TCP/IP configuration information between a server and a client. You can use DHCP to set a client's IP address, subnet mask, and default gateway. This section explains how to install and configure DHCP for OS/2.

Note: For more information about DHCP, see the OS/2 Warp Server RedBook *Inside OS/2 Warp Server*, Volume 1, Chapter 4, TCP/IP Services. This book may be found on the World Wide Web at:

<http://www.austin.ibm.com/pspinfo/redbtoc.htm>

HOSTNAME Tag 12

The IBM NIC will reset the **Node Name** if the DHCP or BOOTP option, "HOSTNAME Tag 12," is enabled. Disable this option if you do not want to change the NIC Node Name.

18.4.1 Installing DHCP on OS/2 Warp Server

The DHCP Server is included as part of the OS/2 Version 3.0 Warp Server TCP/IP Services. However, it is not installed by default.

18.4.1.1 Installing DHCP Server if Warp Server is not Installed: To install the DHCP Server Service on a system that does not have OS/2 Warp Server already installed:

1. Install OS/2 Warp Server.
2. On the Network configuration dialog, select **TCP/IP** and click the **MORE...** button.
3. Select **DHCP Server**.
4. DHCP is installed.
5. Reboot OS/2.
6. The DHCP Server folder is installed in the TCP/IP folder.

18.4.1.2 Installing DHCP Server if Warp Server is Installed: To install the DHCP Server Service on a system that has OS/2 Warp Server already installed:

1. Insert the OS/2 Warp Server CD-ROM.
2. Open an OS/2 command window and change to the CD-ROM drive.
3. Type "Install".
4. On the Network configuration dialog, select **TCP/IP** and click the **MORE...** button.
5. Select **DHCP Server**.
6. DHCP is installed.
7. Reboot OS/2.
8. The DHCP Server folder is installed in the TCP/IP folder.

18.4.2 Configuring DHCP:

1. Ask your network administrator for the range of IP addresses, the gateway, and the subnet to be managed by DHCP.
2. Open the DHCP Server folder and double-click the **DHCP Server Configuration** icon. You see the DHCP Server Configuration dialog, which lets you configure the various parameters.

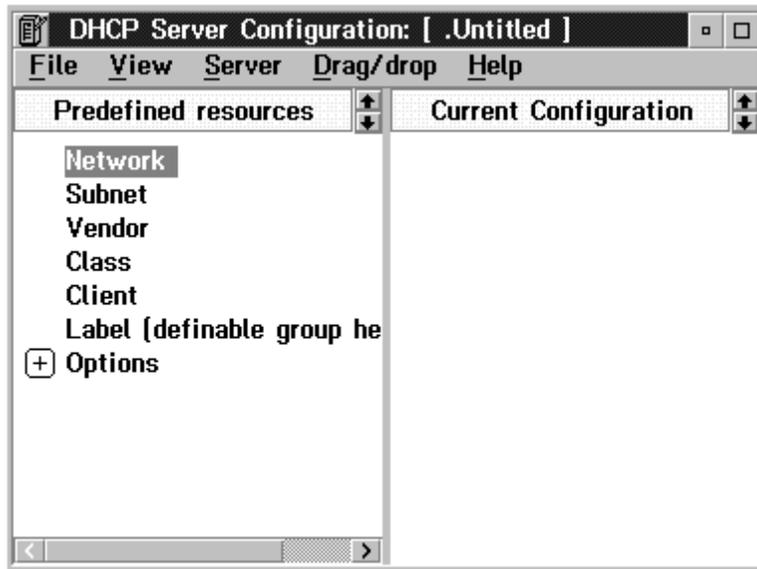


Figure 19. DHCP Server Configuration Dialog

3. To define the parameters:
 - Drag (hold down mouse button two while moving the mouse pointer) items from the left side of the **DHCP Server Configuration** dialog (Predefined Resources) to the right side of the dialog (**Current Configuration**).
 - To remove items from the Current Configuration, drag them to the shredder on your OS/2 desktop.
 - To configure an item after you have placed it in the Current Configuration, double-click it to open it.

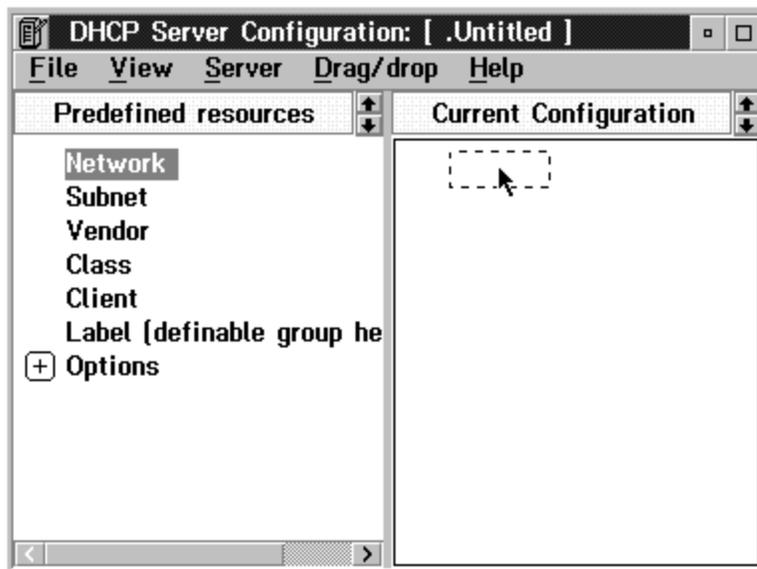


Figure 20. Dragging an Item

4. Drag "Network" from **Predefined Resources** to the **Current Configuration**. Double-click "Network" in the **Current Configuration** to open the Network dialog.

The screenshot shows the 'Network' dialog box. The 'Comment' field contains '[blank]'. The 'Network Address' field is empty. The 'Subnet mask' field contains '255.255.255.128'. The 'Dynamic DNS server' field is empty. The 'Range' and 'To' fields are empty. The 'Not Subnetting' radio button is selected. The 'List of excluded addresses' list box is empty. The 'Add', 'Change', and 'Delete' buttons are visible. The 'OK', 'Cancel', and 'Help' buttons are at the bottom.

Figure 21. Network Dialog

5. Select **Not Subnetting**. This lets you select a range of IP addresses for DHCP to manage. (If you select Subnetting, DHCP manages the entire subnet.)
Note: IBM recommends that you do not select Subnetting. Instead, select **Not Subnetting** to define a range within your subnet and to let DHCP manage that range.
6. Enter the Network Address. This must be 9.0.0.0 for Class A Internet addresses, 129.32.0.0 for Class B Internet addresses, and 199.17.21.0 for Class C Internet addresses.
7. Do not enter a value in the **Dynamic DNS Server** field unless you are sure that there is a Dynamic Domain Name Server available on your network.
8. In the **Range** and **To** fields, enter the range of IP addresses you got from your network administrator.
9. Do not enter a value in the **List of excluded addresses** field unless your network administrator tells you to. This field prevents IP address conflicts. If you do have to enter a value in this field, enter the value and then select **Add**. This places the address in the list of excluded addresses.
10. Select **OK** to close the dialog. You see the DHCP Server Configuration dialog.
11. Click + next to **Options** to expand the list.
12. Click + next to **Base Operations** to expand the list. Drag Option 1 Subnet Mask to the Current Configuration. Double-click "Subnet Mask" to open the Subnet Mask dialog. Enter the value your network administrator gave you.
13. Select **OK** to close the dialog. You see the **DHCP Server Configuration** dialog.
14. Drag Option 3 Router to the Current Configuration. Double-click "Router" to open the Router dialog. Enter the value your network administrator gave you. Select **Add** to place the value in the list.
15. Select **OK** to close the dialog. You see the DHCP Server Configuration dialog.

16. Click + next to **App/service**.
17. Drag **Option 51 IP Address Lease Time** to the Current Configuration. Double-click **IP Address Lease Time** to open the IP Address Lease Time dialog.
18. Select **Infinite**.

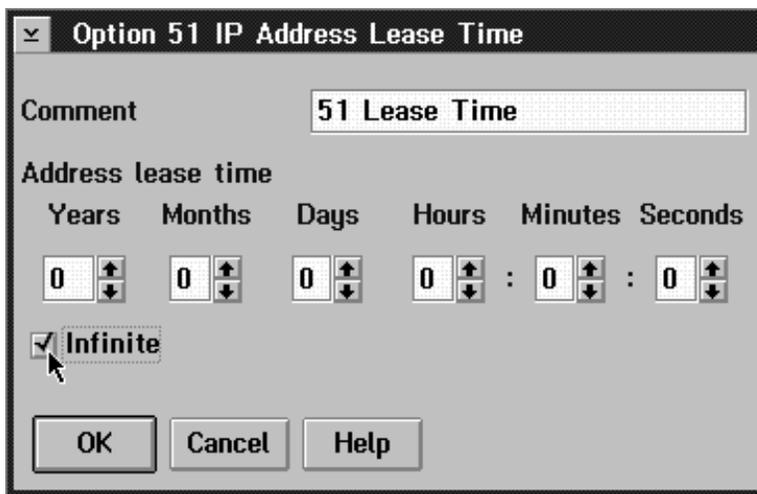


Figure 22. IP Address Lease Time Dialog

19. Select **OK** to close the dialog. You see the **DHCP Server Configuration** dialog.
20. On the DHCP Server Configuration dialog, select **Server** from the menu bar and then select View/change server parameters.

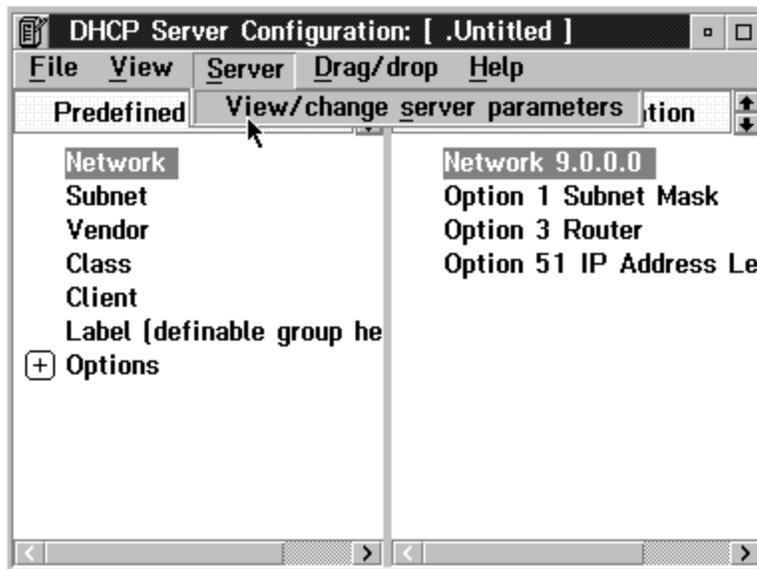


Figure 23. DHCP Server Configuration Dialog

21. You see the **Server Parameters** dialog. View or change various DHCP Server settings, such as whether to support BOOTP clients and various Log File settings.

Note: Changing the values for Lease Time Default and Lease Expire Interval on the Server Parameters dialog has no effect unless you select **Support BootP**. If you do not select **Support BootP** and attempt to change these fields to set the default intervals, IP addresses will NOT be set. Use the IP Address Lease Time dialog instead.

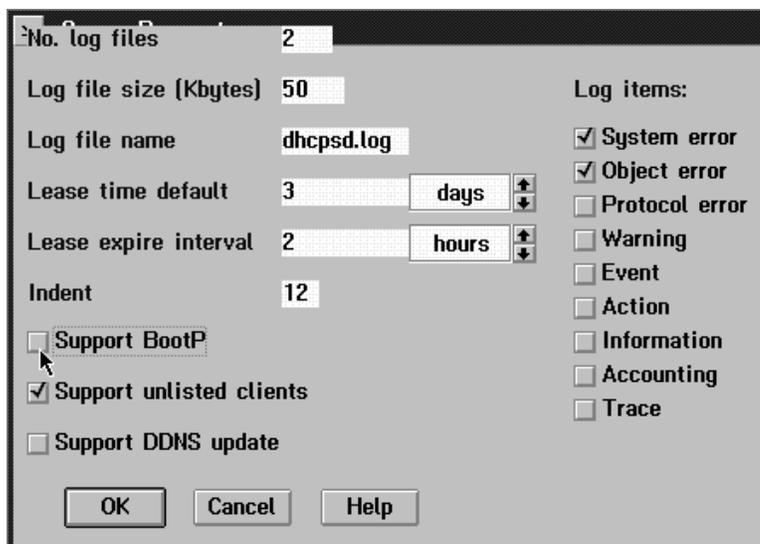


Figure 24. Server Parameters Dialog

22. Select **OK** to close the dialog. You see the DHCP Server Configuration dialog.
23. Select **File, Save As** and then enter the name of the new configuration. If you see a warning message that an item is not complete, either complete the item or drag it to the shredder on your OS/2 desktop. You usually see this message if you put more than the required options in the Current Configuration.
24. To start the DHCP Server, open an OS/2 command window and enter this command:
- ```
OS/2 boot drive\TCP/IP\BIN\DHCPD name of configuration file
```
25. DHCP is now running.

WHEN YOU ARE FINISHED SETTING UP DHCP, RETURN TO THE CHECKLIST THAT DIRECTED YOU TO THIS CHAPTER AND CONTINUE THE PRINTER CONFIGURATION TASKS.

## 18.5 Installing and Configuring DHCP on Windows NT

### HOSTNAME Tag 12

The IBM NIC will reset the **Node Name** if the DHCP or BOOTP option, "HOSTNAME Tag 12," is enabled. Disable this option if you do not want to change the NIC Node Name.

Dynamic Host Configuration Protocol (DHCP) is a standard method of passing TCP/IP configuration information between a server and a client. This section describes how to install and configure DHCP for Windows NT.

The Dynamic Host Configuration Protocol (DHCP) Server is included as part of the Microsoft Windows NT Server TCP/IP Services. It is installed by default when the Windows NT Server software is installed.

Before configuring DHCP, ask your network administrator for the range of IP addresses, gateway and subnet to be managed by the DHCP server.

1. To configure DHCP, you must first start the service. To do this, open the **Control Panel** and double-click the **Services** icon. Select the Microsoft DHCP Server, and press the **Start** button.

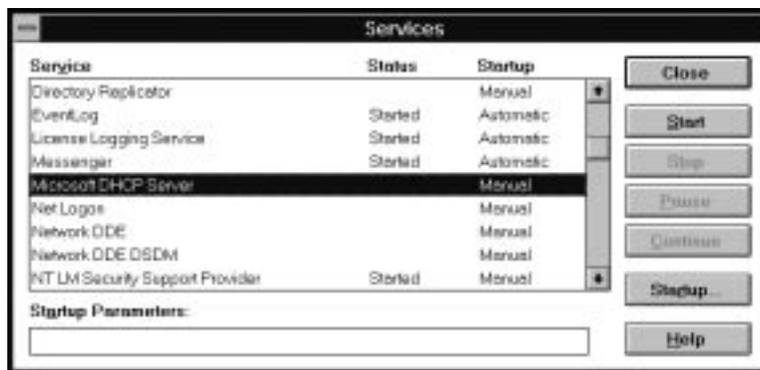


Figure 25. Services Window

2. To configure DHCP to start automatically, press the **Startup...** button. Click the **Automatic** radio button in the Startup Type box and click the **OK** button.

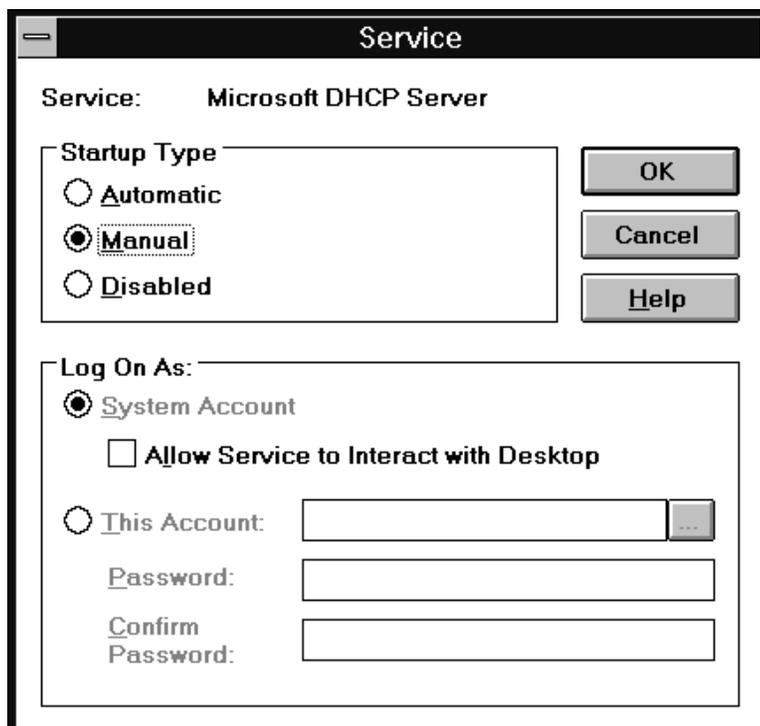


Figure 26. Service Startup Window

3. Press the **Close** button to close the Services window and close the Control Panel.
4. Open the Network Administration Group and double-click the **DHCP Manager** icon. The following window appears.

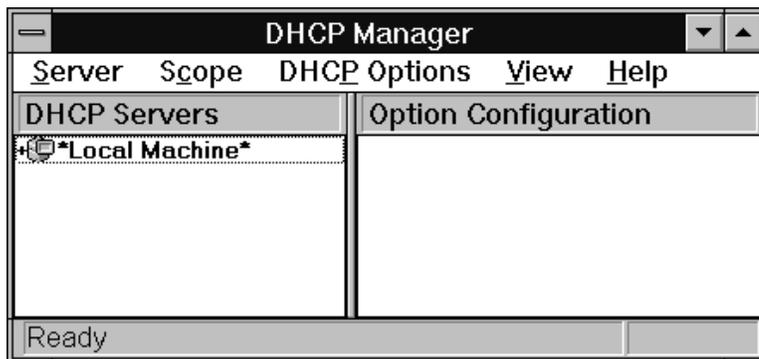


Figure 27. DHCP Manager Window

5. From the menu bar, select **Scope**, then **Local**. This brings up this window:

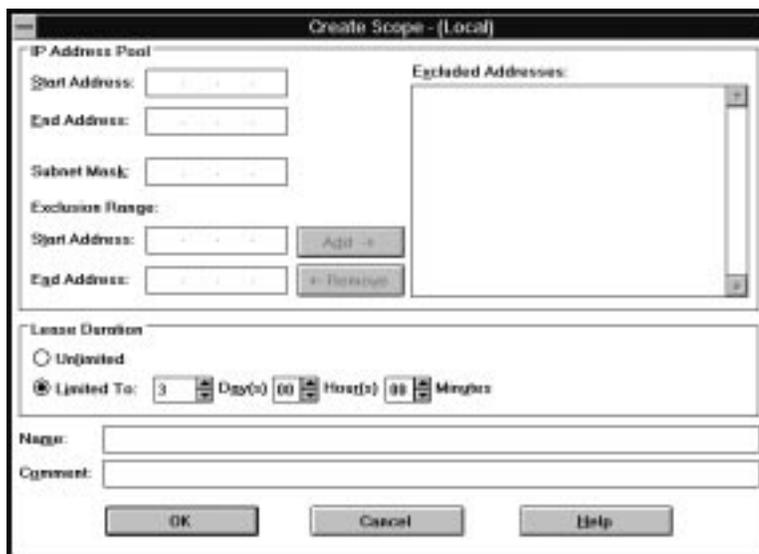


Figure 28. Create Local Scope Window

In this window, you can define the range of IP addresses that the DHCP Server can manage, as well as set the subnet mask and Lease Duration. Set the Lease Duration to “Unlimited.”

6. Press the **OK** button to return to the DHCP Manager window.
7. From the menu bar, select **DHCP Options**, then **Global**. This brings up the following window:



Figure 29. DHCP Global Options Window

8. Select the options from the list of **Unused Options** (left window) and press the **Add** button to move them to the list of **Active Options** (right window). Then select the option in the Active Options window and press the **Value>>>** button. You can then edit the values. For example, in the following screen, to add a Router press the **Edit Array** button and add the address. In this way, you can add several values if you need to.

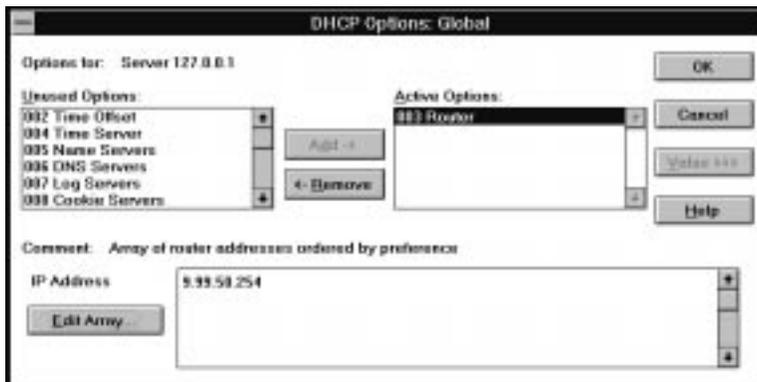


Figure 30. DHCP Active Options Window

9. When you have completed that screen, press **OK** to return to the DHCP Manager window.
10. Close the DHCP Manager window.
11. You then need to go back to the Control Panel, open the Services screen, stop the DHCP Server and restart it. The changes you have made take effect and DHCP is now running.

WHEN YOU ARE FINISHED SETTING UP DHCP, RETURN TO THE CHECKLIST THAT DIRECTED YOU TO THIS CHAPTER AND CONTINUE THE PRINTER CONFIGURATION TASKS.



---

## 19.0 Handling TCP/IP Problems

Use this chapter as a guide for finding and resolving network printer and NIC printing problems on TCP/IP networks.

The following types of problems are described here:

- Hardware
- Connectivity
- Formatting
- Printing

---

### 19.1 Network Setup

Before doing anything else to try to resolve problems, you should verify that you have entered the correct configuration data. Refer to the configuration data worksheets in the configuration chapters.

---

### 19.2 Hardware Problems

When printing problems occur, the first task is to check the physical condition of the printer and related hardware.

#### 19.2.1 Introduction

The hardware is where diagnosis of network printer problems begins. The hardware includes the following elements:

- The printer itself
- The physical connection of the hardware to the network
- The cabling system
- The NIC

#### 19.2.2 Resolving Hardware Problems

To determine whether a problem is a hardware problem or not, check the following:

1. Verify that power is going to the printer by checking the printer operator panel.
2. Verify that the printer is Ready.
3. Verify that a NIC is installed in the printer by looking at the slots on the rear of the printer.
4. Verify that the NIC is connected to the network. Refer to 1.9, "Physically Connecting a NIC to a LAN" on page 12.

---

### 19.3 Connectivity Problems

The network/transport level of a network provides the capability of routing signals from one device to another device on the network or to a different network on an internetwork system.

1. Verify that the NIC has an IP address by printing a NIC configuration page (see 1.6, "The NIC Configuration Page" on page 8).
2. Verify that there is no duplicate IP address by:
  - a. Disconnecting the NIC from the network.
  - b. Using the **Ping** command to try to communicate with the NIC.
3. Connect the printer to the network and ping the NIC to verify that there is a connection to the network.
4. Printing problems may occur if the subnet mask has not been set correctly. Verify that the subnet mask is correct either by printing a NIC configuration page or checking with the network administrator.

5. A related problem is that the gateway address may be incorrect. Verify the gateway address from the NIC configuration page printed in the previous step.

---

## 19.4 Formatting Problems

One possible problem is the format of the data for the network printer. A printer may be set up to handle PCL, but is sent PostScript data. To verify that the printer is set up to receive the correct data, print a test page from the printer operator panel menus and check it for the proper settings.

---

## 19.5 Printing Problems

### 19.5.1 Verify Printer Operation

Many printing problems occur on the application level. To verify the operation of the printer, test the printing function with the following procedures:

From an IP system, enter an LP/LPR command. Following are some examples.

#### From AIX:

**Note:** Before using the following command, a queue with *queuename* must be created.

```
lp -d queuename filename
```

**queuename**        Name of the destination queue.  
**filename**        Name of the file to be printed.

#### From OS/2:

```
lpr -s ip_address -p PASS filename
```

**ip\_address**        IP address of the destination server.  
**PASS**            Destination printer name. Could also be TEXT.  
**filename**        Name of the file to print.

#### From Windows NT:

```
lpr -S ip_address -P PASS filename.ext
```

**Note:** The -S and -P flags **must** be in upper case.

**ip\_address**        IP address of the destination server.  
**filename**        name of the file to print.

#### From NetWare TCP/IP:

To print a file from a NetWare workstation configured for TCP/IP, enter the command:

```
lpr -h ip_address -p print_queue_name filename
```

**ip\_address**        The IP address of the NIC.  
**print\_queue\_name**    The print queue name. 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.)  
**filename**        The name of the file to be printed.

### 19.5.2 Verify LPD Queue or Printer Names

Another problem that may occur to create printing problems is that the LPD queue names (sometimes also called the printer name) may be specified incorrectly.

Following are the descriptions of the LPD queue names.

1. The LPD queue name must be either **PASS** or **TEXT**. No other name can be used, that is, you cannot modify these names.
2. **TEXT** is used for print files that contain plain (raw), unformatted text with only carriage returns (CR) or carriage returns and line feeds (CRLF).
3. **PASS** is used for **binary** print files or files that are processed through any IBM printer driver to produce PCL or PostScript files.



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**Part 6 - Administration**

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## 20.0 Customizing the NIC

Before using any of the following commands, you should be familiar with the material in 24.0, "Command Syntax, Conventions, and Operations" on page 227. **Do not use any of the following commands until after you have configured your network printer for the FIRST time.**

### Important!

After making any changes to a NIC or using a NIC command, enter the command:

```
init delay 0
```

This command makes your changes take effect.

---

### 20.1 Disable NetWare if You're Not Using It

If you are **not** using NetWare printing, disable NetWare on your NIC by:

1. Logging into the NIC using one of the procedures described in 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. Entering the command:

```
define server authorize netware disable
```

**Note:** This is particularly important if your network has a large NetWare component, since the NIC will otherwise search the entire network in a futile attempt to find its configuration.

---

### 20.2 Disable DEC/LAT and MOP Announcements

DEC/LAT and MOP broadcast/announcements must be turned **off** if IBM NICs are to work on DEC systems.

To disable DEC/LAT and DEC/NET announcements:

1. Login to the NIC using one of the procedures described in 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.

2. Disable DEC/LAT announcements with the command:

```
define server announcement lat disable
```

3. Disable DEC/NET MOP announcements with the command:

```
define server announcement disable
```

4. Logout of the NIC.

**Note:** For additional information about the "Announcement" command, refer to 28.2, "Announcements" on page 244.

---

### 20.3 Rebooting a NIC

To abandon changes you may have made to temp settings and return to permanently stored values or to implement changes you may have made to the perm values, use the following command:<sup>10</sup>

---

<sup>10</sup> Refer to 24.2.3, "Where Changes are Written" on page 228 for an explanation of the terms "temp" and "perm."

```
init delay 0
```

The command reboots (initializes) the NIC immediately (0 minute delay).

---

## 20.4 Handling Services

This section describes the commands to add, delete, and enable services on a NIC. Refer to 31.0, "Services Commands" on page 259 for details on service-related NIC commands.

Services on the NIC can be thought of as virtual printers much like multiple queues on a network server (all serviced by the same physical printer).

### 20.4.1 Adding a Service

Print traffic may be segregated, monitored, and managed by departments within an enterprise, by priority, or by protocol. Each service may have one or more protocols enabled. If the TCP/IP protocol is enabled for a given service, that service's TCP/IP port number must be unique.

```
define service service_name [TCPport number]
```

### 20.4.2 Deleting a Service

To delete a service, use the command:

```
[clear|purge|delete] service service_name
```

### 20.4.3 Enabling a Protocol on a Service

To enable a service, use the command:

```
define service service_name protocol protocol_name enable
```

Valid protocol names are appletalk, netbios, netware, and tcp.

### 20.4.4 Disable a Protocol on a Service

To disable a service, use the command:

```
define service service_name protocol protocol_name disable
```

Valid protocol names are appletalk, netbios, netware, and tcp.

---

## 20.5 Changing NIC Default Parameters

Refer to 1.3, "Default NIC Parameter Values" on page 5 for a listing of NIC default parameters.

### 20.5.1 Changing the NIC Name (Node Name)

The node name is used by IPX and NetBIOS printing redirector code. Care should be used when changing the name.

To change the node name, enter the command:

```
define server name new_name
```

where:

**new\_name**            The NIC's new name.

Recycle power on the printer.

## 20.5.2 Changing the NIC Password

When logging into the NIC with Telnet, an access and then a privilege password are required.

To change the access password (the default is **access**), enter the command:

```
define server login password "password"
```

**"password"** The new privilege or access password enclosed in quotation marks.

To change the privilege password to allow changing NIC parameters (the default is **system**), enter the command:

```
define server privilege password "password"
```

---

## 20.6 TCP/IP Procedures

Refer to 17.0, "TCP/IP Addresses" on page 169 for information about the use of TCP/IP-related commands.

---

## 20.7 NetWare Procedures

You may use either native NetWare utilities or the NIC command line to change NIC parameters. Refer to 27.0, "NetWare Commands" on page 237 for a description of all NetWare-related commands.

Most NetWare characteristics are either displayed or set via commands consisting of:

```
[list|show|define] server netware ...
```

followed by some additional parameter(s). A few of the more common setup tasks are listed below.

### 20.7.1 Enabling/disabling NetWare Print Server Function

If you want the NIC to log into a NetWare server and directly service one or more print queues that reside on that server, the NIC's print server function must be enabled. Connecting to a NetWare File Server in this fashion consumes one licensed connection on the server. If you intend to only use the RPrinter function of the NIC, you can prevent the NIC from making such connections and reduce network traffic by disabling the print server function.

```
define server netware pserver [auto|disable|3.X|4.X]
```

### 20.7.2 Enabling/disabling NetWare RPrinter Function

If you want the NIC to function as an RPrinter under the traffic control of an existing NetWare print server (.NLM or .EXE), then the NIC's RPrinter function must be enabled.

```
define server netware rprinter [enable|disable]
```

### 20.7.3 Renaming a NetWare Service

If you want to rename a service (virtual printer) to conform with printer naming conventions on your NetWare LAN, refer to 20.4, "Handling Services" on page 204.

**Note:** A service on an IBM NIC cannot be renamed, in the precise sense. An existing service can be deleted, and a NEW service with a different name can be created in its place (using the same protocols, TCP/IP port number, and so on).

#### **20.7.4 Specifying a Preferred NetWare Server**

Use the following command to specify the preferred NetWare fileserver to be used by a printer.

```
define node servername nfserver
```

Refer to 27.4, “File Server (Preferred)” on page 238 for details.

#### **20.7.5 Specifying a Required NetWare Server**

If you want to specify a file server as the required file server for a NIC, use the following command:

```
define server netware required [enable|disable]
```

Refer to 27.5, “File Server (Required)” on page 238 for details.

---

## 21.0 Monitoring Network Printers

This chapter describes the IBM printer management model and several different tools that can be used to monitor network printers.

### Using NPM

Refer to 22.8, "Monitoring with NPM in a NetWare IPX Environment" on page 218 or 22.7, "Monitoring with NPM in TCP/IP Environments" on page 218 for monitoring procedures using NPM.

---

### 21.1 The IBM Network Printer Management Model

Use this section if you want to install a network management system and need to understand IBM's use of network printer management capabilities with the SNMP agent on the NIC.

#### 21.1.1 Implementing Printer Management

Printer management includes the following tasks:

- Monitoring the status of network printers
- Responding to alarms
- Gathering statistics on printer operations

The three elements of network printer monitoring and management are:

- Agent/manager model
- MIB, the management information database
- SNMP, the protocol used to get management information

#### 21.1.2 Agent/Manager Model

The elements of a monitoring system, MIB and SNMP, are implemented in an agent/manager model:

- The **manager** is a console, workstation, or server on working hubs or routers that has a global knowledge of NICs and printers.
- **Agents** are utilities that reside on devices, such as a NIC, that respond through SNMP to management requests for information. The information is stored in a MIB (Management Information Base).

#### 21.1.3 MIB

A MIB is a management information base that contains information a device makes available to SNMP. The MIB describes information about actual objects to be managed and controlled. There are many different MIBs defined.

**21.1.3.1 Standards of IBM Network Printer MIBs:** The Printer MIB is based on the following standards:

- System and Interfaces Group MIB (RFC 1213 of March 1991)
- Host Resource MIB (RFC 1514 of September 1993)
- Printer MIB (RFC 1759 of March 1995)

**21.1.3.2 Components of the Printer MIB:** The IBM Printer MIB gives the network manager access to most of the information that is normally accessible through the NIC command set for configuring the server with SNMP. Some objects identified by this MIB are not applicable to the NIC.

The complete definition of the Printer MIB is provided in the Printer MIBs in DOS Format and Printer MIBs in TAR Format, which are shipped with the NIC. The MIB is provided in a subset of the ASN.1 syntax. The Printer MIB is composed of the following sections:

- General
- Cover
- Localization
- Input
- Output
- Marker
- Media Path
- Channel
- Interpreter
- Console
- Alert

**21.1.3.3 Information Provided by the MIB:** The Printer MIB contains the following types of information about IBM network printers:

|                     |                                              |
|---------------------|----------------------------------------------|
| <b>Descriptions</b> | Printer configuration, location, and contact |
| <b>Status</b>       | Current operating status of printers         |
| <b>Alerts</b>       | Reportable events from printers              |

**21.1.3.4 General Information about MIBs:** For further information on SNMP and MIB, refer to the following:

- RFC 1155—Structure and Identification of Management Information for TCP/IP-based Internets (SMI)
- RFC 1156—Management Information Base for Management of TCP/IP internets (MIB)
- RFC 1157 A Simple Network Management Protocol (SNMP)
- The Simple Book: An Introduction to Management of TCP/IP-based Internets

**21.1.3.5 Getting the Latest MIB Information:** To obtain the latest copy of these and other RFCs, FTP the files from one of the following two sources:

**21.1.3.5.1 Internet**

`ftp.isi.edu\internet-drafts`

**21.1.3.5.2 World Wide Web**

`http://www.ietf.cnri.reston.va.us/lid-abstracts.html`

#### 21.1.4 SNMP

SNMP is the protocol used to communicate between manager and agent. Managers request information, usually through automated polling at specified intervals, and agents respond. Though used primarily on TCP/IP networks, SNMP can be implemented on other protocols, for example, IPX.

SNMP is a standard by which a network manager can get statistics and configuration information from the NICs and other devices on the network. This is done through a Network Management Station (NMS), such as IBM NetView.

#### 21.1.5 Monitoring Tools

Many tools can be used to monitor printers with SNMP agents. One of these tools is IBM NetView. There are also other MIB browsers, which are not described here.

#### 21.1.6 OS/2 TCP/IP

To get SNMP.EXE to work correctly to browse MIB items, you may need to delete the following statement:

```
d:\mptn\etc\mib2.tbl
```

---

### 21.2 Monitoring with AIX NetView/6000

The IBM AIX NetView/6000 program can manage any IP-addressable device with an SNMP agent.

NetView/6000 can be used to set a network topology, monitor a network, diagnose problems, and measure network performance.

Through its MIB Browser, information about the resources affecting an event (such as an alarm) can be obtained.

---

### 21.3 Monitoring Network Printers on NetWare

This section describes how to set up monitoring on a NetWare system. Two steps are involved in setting up printer monitoring for IPX/SPX:

1. Enabling the protocol
2. Setting the community name and trap host address

#### 21.3.1 Enabling the IPX Protocol

Verify that each NIC is installed and configured for the network. IPX is enabled by default.

1. Logon to the NIC using the procedure described in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
2. Verify the current protocol setting by entering the command:  

```
show server network
```
3. To display details on the settings for the IPX protocol, enter the command:  

```
show server netware
```
4. To enable the NetWare protocol, enter the following command:  

```
define server authorize protocol netware enable
```
5. Turn the printer off, then on to reboot the NIC.

### Beware of Beaconing

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause a Token Ring card to start beaconing.

## 21.3.2 Setting the Community Name and Trap Host

With the following procedure, the user can set the community name, access rights, and the trap host IPX address. See B.2.4, "Preparing the Load Host" on page 269 for a description of how trap hosts are used when updating NIC microcode.

1. Verify the current settings with the command:  
`show server ch`
2. Change the SNMP community name and associated access mode and trap host IP address with the command:  
`change server snmp community com_name access acc_right trap IPX ip_addr`

**com\_name**      The community name.  
**acc\_right**      The access mode for the community. Access modes may be read, rw, or none.  
**trap**            Enter IPX for NetWare.  
**ip\_addr**        The IPX address of the trap host, in the form: 00-00-00-02 00-04-ac-33-64-08.

## 21.3.3 Enabling/Disabling SNMP Sets

SNMP sets are enabled by default. To disable these sets, the network administrator must enter the following command to enable or disable the SNMP sets as necessary:

```
change snmp set [enabled|disabled]
```

## 21.3.4 Monitoring Network Printer Status

In addition to NetWare printer monitoring tools, you can use the NIC command line to monitor printer and NIC status.

To monitor the status of a NIC using the command line:

1. Logon to the NIC using the procedure described in 25.1, "Logging into a NIC using NetWare IPX" on page 229.
2. Enter the command:  
`monitor server status`

---

## 21.4 Monitoring with NetView for OS/2

NetView for OS/2 is a management system for administering, controlling, and monitoring network printers.

As required by the IBM NIC, NetView for OS/2 uses the SNMP protocol. NetView for OS/2 can use IP and IPX as the transport mechanism. One of its applications is a MIB Browser.

NetView for OS/2 can manage OS/2 systems like LAN Server, IP-based systems and NetWare resources (with the NetWare Client for OS/2 addition). Any device with an SNMP agent can be managed by the system.

---

## 21.5 Monitoring Network Printers on TCP/IP Networks

This section describes how to set up monitoring on a TCP/IP system. Two steps are involved in setting up printer monitoring for IP:

1. Enabling the protocol
2. Setting the community name and trap host address

### 21.5.1 Enabling the Protocol

Verify that each NIC is installed and configured for the network. TCP/IP is enabled by default.

1. Logon to the NIC using the procedure described in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. Verify the current protocol setting by entering the command:

```
show server network
```

3. To display details on the settings for the TCP/IP protocol, enter the command:

```
show server tcpip
```

4. To enable the protocol, enter the following command:

```
define server authorize protocol tcpip enable
```

5. Turn the printer off, then on to reboot the NIC.

#### Beware of Beaconing

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause the Token Ring card to start beaconing.

### 21.5.2 Specifying the Community Name and Trap Host

With the following procedure, the user can set the community name, access rights, and the trap host IP address. See B.2.4, "Preparing the Load Host" on page 269 for a description of how trap hosts are used when updating NIC microcode.

1. Verify the current settings with the command:
2. Change the SNMP community name and associated access mode and trap host IP address with the command:

```
change server snmp community com_name access acc_right trap IP ip_addr
```

**com\_name**      The community name.

**acc\_right**     The access mode for the community. Access modes may be read, rw, or none.

**ip\_addr**        The IP address of the trap host. For IP, the form is: 9.99.99.99.

3. If the Network Management Station (NMS) and the NIC are on different networks or different subnets, add the NMS to each NIC's routing table. Use the command:

```
change route up nms_address gateway gwy_name gwy_ip
```

**nms\_address**    Address of the Network Management Station.

**gwy\_name**       Gateway name.

**gwy\_ip**         IP address of the gateway.

4. Turn the printer off, then on.

### **Beware of Beaconing**

When you turn the printer off, wait at least two or three seconds before turning it back on. A quick off-on may cause the Token Ring card to start beaoning.

### **21.5.3 Enabling/Disabling SNMP Sets**

SNMP sets are enabled by default. To disable these sets, the network administrator must enter the following command to enable or disable the SNMP sets as necessary:

```
change snmp set [enabled|disabled]
```

### **21.5.4 Monitoring Network Printer Status**

In addition to native or Unix status monitoring tools, you may use the NIC command line to monitor printer status.

To monitor printer status from the NIC command line:

1. Logon to the NIC using the procedure described at 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. Enter the command:

```
monitor server status
```

---

## **21.6 Configuring AIX/UNIX for Syslog Support**

The native AIX/UNIX Syslog facility provides the ability to log certain printer status changes. Messages are logged into a standard TCP/IP Syslog Facility at one or more AIX/UNIX hosts or other hosts supporting the TCP/IP Syslog Facility.

**Note:** Knowledge in the administration of the Syslog Facility on the AIX/UNIX Syslog server host is required.

### **21.6.1 Syslog Messages**

Syslog messages contain the following components:

- A date/time stamp generated on the Syslog host
- The NIC's node name or IP address
- The network printer to NIC connection
- A brief description of the event

An example of a Syslog message generated by a NIC follows.

```
Sep 14 16:30 Printer on server NCT000214 (138.239.17.81),port1(PSIO): Paper out
```

Printer events are automatically reported if at least one node is configured for Syslog support. Otherwise Syslog reporting is disabled. Refer to 21.6.4, "Configuring a Node for Syslog" on page 213 for information on how to configure Syslog for a node.

### **21.6.2 Setting up Syslog on AIX and SUN Solaris**

The following procedure sets up Syslog support on AIX and SUN Solaris.

1. Logon to the AIX or SUN Solaris host machine as root.
2. Edit the `/etc/syslog.conf` file.

3. Add a line that looks like the following to the file:

**AIX:**

```
.err;.info;*.debug TAB TAB /usr/adm/syslog
```

**For SUN Solaris:**

```
.err;.info;*.debug TAB TAB /var/adm/messages
```

**TAB** Insert two tab spaces between the left and right arguments of the command.

### 21.6.3 Starting the Syslogd Daemon

**21.6.3.1 AIX:** To start the **syslogd** daemon, enter the following commands:

1. Create the log file, if the file does not already exist:  

```
touch /usr/adm/syslog
```
2. Stop the **syslogd** daemon with the command:  

```
stopsrc -s syslogd
```
3. To make sure the **syslogd** daemon has stopped, enter the command:  

```
ps -ef | grep syslogd
```
4. Start the **syslogd** daemon with the command:  

```
startsrc -s syslogd
```
5. Verify that the **syslogd** daemon has started with the command:  

```
ps -ef | grep syslogd
```

**21.6.3.2 SUN Solaris:** To start the **syslogd** daemon under SUN Solaris, enter the following commands:

1. Create the log file, if the file does not already exist:  

```
touch /var/adm/messages
```
2. Refresh the **syslogd** daemon with the commands:  

```
ps -ef /grep syslogd
kill -1 syslogdPID
```

### 21.6.4 Configuring a Node for Syslog

To configure a node to support Syslog:

1. Login to the NIC using the procedure described in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
2. Enter a command in the form:  

```
change node node_name ip ip_address syslog lpr
```

**node\_name** Name of the AIX or SUN Solaris machine.  
**ip\_address** IP address of the AIX or SUN Solaris machine.
3. Logout of the NIC.



---

## 22.0 IBM Network Printer Manager (NPM)

### Obtaining the Latest NPM

NPM comes on a diskette or CD-ROM included in the NIC box. If you want the latest version of NPM:

1. Access the IBM Printing Systems Home Page on the World Wide Web:  
<http://www.can.ibm.com/ibmprinters>
2. Select Printer drivers/product updates.
3. Under Products, select IBM Network Printer Manager.
4. Follow the instructions to download NPM. Installation instructions are in the READ.ME file.

This chapter is a collection of procedures related to the IBM NPM utility.

---

### 22.1 What is Network Printer Manager (NPM)?

IBM Network Printer Manager lets network administrators, who are responsible for a computer network, monitor, control, and configure IBM network printers in various environments:

Table 18. NPM Environments

| Using this version of NPM:              | You can configure these network protocols in the printers:                                            | And use this protocol to monitor the printers: |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------|
| NPM for OS/2 (IP version)               | <ul style="list-style-type: none"><li>• TCP/IP</li><li>• AppleTalk</li><li>• NetBIOS</li></ul>        | TCP/IP                                         |
| NPM for Windows NT and 95 (IP version)  | <ul style="list-style-type: none"><li>• TCP/IP</li><li>• AppleTalk</li></ul>                          | TCP/IP                                         |
| NPM for Windows NT and 95 (IPX version) | <ul style="list-style-type: none"><li>• TCP/IP</li><li>• AppleTalk</li><li>• Novell NetWare</li></ul> | NetWare IPX                                    |
| NPM for the World Wide Web (IP version) | <ul style="list-style-type: none"><li>• TCP/IP</li><li>• AppleTalk</li></ul>                          | TCP/IP                                         |

**Note:** Refer to 22.7, "Monitoring with NPM in TCP/IP Environments" on page 218 or 22.8, "Monitoring with NPM in a NetWare IPX Environment" on page 218 for descriptions of how to use the different versions of NPM for monitoring.

NPM works with the IBM network printer family, including IBM Network Printers 12, 17, and 24, to let you perform tasks such as:

- Viewing the status of each printer, such as its alarm conditions
- Viewing and changing printer properties, such as the default input tray
- Viewing and changing printer network properties, such as the NetBIOS printer network workgroup name
- Adding new network services to printers so you can customize the environment, such as creating high- and low-priority print services

---

## 22.2 Starting NPM

After you have installed NPM:

- For OS/2 or Windows NT 3.51:
  1. Double-click the Network Printer Manager folder.
  2. Double-click the Network Printer Manager icon to start NPM.
- For Windows NT 4.0 or Windows 95:
  1. From the Start menu, select **Programs**.
  2. Select Network Printer Manager.
  3. Select NPM to start NPM.
- For the World Wide Web:
  1. Start your Java-enabled Web browser.
  2. Open the document:  
`http://your_web_server/IBMNetworkPrinterManager.html`

---

## 22.3 Obtaining a NIC Configuration Page

You may also use the IBM NPM utility to obtain a network-dependent configuration page.

1. Start NPM as described in 22.2, "Starting NPM."
2. From the NPM Main Window, select the printer, select **Network**, then select **Print Configuration Page**.

---

## 22.4 Configuring for NetWare 3 using IBM NPM for Windows NT or 95

To use the IBM Network Printer Manager for Windows NT or 95 to do the printer configuration, you must have Windows NT 3.51 or 4.0 or Windows 95.

### 22.4.1 Data Requirements

You need a name for the queue to which the printer is to be assigned. The name can be anything you want.

### 22.4.2 Configuration Procedure

To configure NetWare 3 as a Print Server or Remote Printer using NPM for NT or 95, do the following:

1. Turn the printer on.
2. Login to Windows NT or 95 from your workstation.
3. Login to the desired NetWare server (in bindery or bindery emulation mode) or NDS tree and context (NDS mode) as a supervisor equivalent using the tools and features of the Novell Client for NetWare that is installed on your system. (See the README.TXT that accompanies NPM NT or 95 for a list of supported NetWare client software.)
4. Start the IBM NPM for NT or 95 utility.
5. NPM does an automatic discovery of the printers visible to your selected NetWare server or NDS context using the node name of the NIC for any newly-attached printer.
6. Installed printer(s), including newly installed ones, are displayed:
  - Already configured printers shows a status of normal.
  - Not-yet-configured printers display with a corresponding status message.
7. Select the target printer, then click **Printer**, then **New** or click the New Printer icon. Follow the directions that come up.
8. A set of panels will display to guide you through the configuration process. When completed, and if necessary, NPM asks if you wish to reboot the NIC.
9. Take the PServer down and bring it back up.

**Note:** For information on how to use NPM for other tasks, click **Help**, then **General Help**.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 41. GO TO STEP 6 ON PAGE 42 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION" ON PAGE 47.

---

## 22.5 Configuring for NetWare 4 using IBM NPM for Windows NT or 95

To use the IBM Network Printer Manager for NT or 95 to do the printer configuration, you must have Windows NT 3.51 or 4.0 or Windows 95.

### 22.5.1 Data Requirements

You need a user-assigned name for the queue to which the printer is to be assigned.

### 22.5.2 Configuration Procedure

1. Turn the printer on.
2. Login to Windows NT or 95 from your workstation.
3. Login to the desired NetWare server (in bindery or bindery emulation mode) or NDS tree and context (NDS mode) as a supervisor equivalent using the tools and features of the NetWare Client for NetWare that is installed on your system. (See the README.TXT that accompanies NPM for a list of supported NetWare client software.)
4. Start the IBM NPM for NT or 95 utility.
5. NPM does an automatic discovery of the printers on the network using the Novell node name of the NIC for any newly-attached printer.
6. Installed printer(s), including newly installed ones, are displayed:
  - Already configured printers shows a status of normal.
  - Not-yet-configured printers displays with a corresponding status message.
7. Click **Printer**, then **New** or click the New Printer icon.
8. A set of panels will display to guide you through the configuration process. When completed, and if necessary, NPM asks if you want to reboot the NIC.
9. Take the PServer down and bring it back up.

**Note:** For information on how to use NPM for other tasks, click **Help**, then **General Help**.

YOU HAVE NOW COMPLETED STEP 5 ON PAGE 52. GO TO STEP 6 ON PAGE 52 BY PERFORMING THE PROCEDURE IN 4.7, "VERIFYING THE NETWARE CONFIGURATION" ON PAGE 47.

---

## 22.6 Setting Subnet Mask and Gateway Addresses with NPM

### When to Use this Procedure

You can use the following procedure to set Subnet Mask or Gateway addresses only if you have previously set the IP address using 17.7, "Setting an IP Address on a Local Segment with ARP" on page 174 and you have NPM for OS/2 or NT or 95 installed on your network. Otherwise, you can use 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line" on page 175.

To use IBM Network Printer Manager for OS/2 or NT or 95 to set subnet mask and gateway addresses, you must have installed and started it.

1. Start NPM, as described in 22.2, "Starting NPM" on page 216.
2. From the NPM main window, select **Printer** from the menu bar and then select **New**.
3. Enter a printer name and the IP address assigned to the printer.
4. You see the new printer shown in the NPM main window.
5. From the NPM main window, select a printer from the container.

6. Do one of these:
  - From the toolbar, select **Network**.
  - From the menu bar, select **Network**, then from the Network pull-down menu, select **Properties**.
7. You see the **Printer - Network Properties** dialog. The dialog is set up as a notebook with tabs.
8. Select the TCP/IP tab, which lets you configure the TCP/IP network properties for the printer.
9. Enter the **Subnet Mask** and default **Gateway** you want to assign to the printer.
10. You see a message telling you to reset the printer. When you select **OK**, NPM resets the printer so your changes take effect.
11. After the printer is reset, the NPM main window shows normal status for the printer.
12. From the NPM main window, select the printer, select **Network**, and then select **Print Configuration Page** to verify your changes.

RETURN TO THE CONFIGURATION CHECKLIST THAT DIRECTED YOU TO USE THIS PROCEDURE.

---

## 22.7 Monitoring with NPM in TCP/IP Environments

**Note:** NPM for OS/2, NPM for Windows NT, NPM for Windows 95, and NPM for the World Wide Web work in the TCP/IP environment and use the IP version of NPM.

1. Start NPM, as described in 22.2, "Starting NPM" on page 216.
2. From the NPM Main Window, select **Printer** from the menu bar and then select **New**.
3. Enter a printer name and the IP address you assigned to the printer.
4. You see the NPM Main Window with the new printer shown in the container.
5. Select **Network**, select **Properties**, and then select **TCP/IP**.
6. If necessary, enter the **Subnet Mask** and default **Gateway** you want to assign to the printer.
7. From the NPM Main Window, select the printer, select **Network**, and then select **Print Configuration Page** (OS/2) or **Print Network Configuration Page** (NT or 95) to verify your changes. The configuration page is printed on the printer you selected.
8. You can now monitor the IBM network printers using NPM.

**Note:** For information about how to use NPM, select **Help** from the menu bar and then select **General Help**.

RETURN TO THE CHECKLIST THAT DIRECTED YOU HERE.

---

## 22.8 Monitoring with NPM in a NetWare IPX Environment

**Note:** Only NPM for Windows NT or 95 work in the NetWare/IPX environment.

1. Start NPM using one of the procedures in 22.2, "Starting NPM" on page 216.
2. You see the NPM Main Window.
3. If you are not already logged into NetWare, you see the NetWare login dialog. Select a file server (bindery mode) or a tree (NDS mode) and fill in the fields to login to NetWare.
4. You see the NPM Main Window. Select a printer, select **Printer** from the menu bar, and then select **New**. Fill in the fields to assign the selected printer to one or more NetWare queues.

**Note:** For information about how to use NPM, select **Help** from the menu bar and then select **General Help**.

RETURN TO THE CHECKLIST THAT DIRECTED YOU HERE.

---

## 23.0 Peer-to-Peer Attachments to IBM Network Printers

The other chapters of this configuration guide are primarily concerned with server-to-printer attachments. Use this chapter if you want to set up peer-to-peer attachments instead. By peer-to-peer attachments, we mean attachments where no file or print server is used to control printing; each workstation may serve as a mini-server (to share resources) and workstation (to use resources) at the same time.

The following topics are described here:

- First, we tell you about the limitations of peer-to-peer attachments.
- Second, we tell you about some of the ways of making peer-to-peer attachments.
- Third, we describe how peer-to-peer attachments are done for several of the standard peer-to-peer environments. We provide examples for native OS/2, WIN-OS2, and Windows 95.

---

### 23.1 Limitations of Peer-to-Peer Configurations

From the perspective of IBM network printer NICs, there are three principal limitations of peer-to-peer attachments:

- Small network requirements
- Lack of security
- Limited TCP/IP capabilities

#### 23.1.1 Peer-to-Peer is for Small Networks

IBM network printers and the IBM NIC are intended for use mainly, though not exclusively, in large networking environments where security and traffic control are of primary concern.

Peer-to-peer printing is best used in a small, low-traffic LAN, where all users know each other. Because the NIC does not have the disk resources of a network server, large jobs or many jobs sent concurrently to the printer will probably cause the NIC to issue error messages such as "LPD Server is busy" or "Not responding."

#### 23.1.2 Security Limitations

Similarly, in a peer-to-peer environment all security controls are bypassed. The printer may be used by anyone who configures their workstations for peer-to-peer.

#### 23.1.3 TCP/IP Limitations

The IBM NIC provides support mainly for TCP/IP peer-to-peer connections. This means that the NIC supports peer-to-peer where workstation operating systems have at least the LPR function and a redirector, like LPRMON, as well. However, some workstation operating systems come with only a limited TCP/IP capability, which requires the use of third-party LPR/redirector capabilities.

---

### 23.2 Forms of Peer-to-Peer Attachment

There are several ways of attaching IBM network printers to workstations in a peer-to-peer environment:

- Attaching a workstation to the printer's parallel port, then sharing the printer with other workstations.
- Attaching the printer through the NIC to the network, then using TCP/IP to send print jobs over the network to the printer.
- Some combination of these.

In this chapter, we describe the first two methods of attachment.

Table 19 summarizes the peer-to-peer attachment capabilities of the operating systems described in this book.

| Peer System            | Default P2P Protocol | LPR/Redirector on OS |
|------------------------|----------------------|----------------------|
| Apple                  | AppleTalk            | No                   |
| Personal NetWare       | IPX/SPX              | No                   |
| OS/2 (Standard)        | NetBIOS              | Yes                  |
| OS/2 Warp Peer Service | NetBIOS              | Yes                  |
| Windows for Workgroups | NetBEUI              | No                   |
| Windows 95             | NetBEUI              | No                   |
| Windows NT             | NetBEUI              | Yes                  |

**Note:** All peer-to-peer networking systems can attach their workstations to the network printer's parallel port, but this makes no use of the NIC.

---

## 23.3 Peer-to-Peer in the OS/2 Environment

Three ways of using the OS/2 environment for peer-to-peer printing are described in this section:

- Using Warp Connect Peer services
- Using native OS/2 applications
- Using similar services on WIN-OS2

### 23.3.1 Configuring Peer-to-Peer on OS/2

There are two ways in which to configure the IBM network printers for use in a peer-to-peer network under OS/2:

- Using Warp Connect Peer Services
- Using standard OS/2 TCP/IP services

**23.3.1.1 Using Warp Connect Peer Services for Windows for Workgroups:** Warp Connect peer services are available in OS/2 Warp. When installing the system, you can elect to install either peer-to-peer or LAN Requester.

If you install Peer Services, you can connect Windows for Workgroups, Windows 95, and other workstations directly to OS/2.

Taking Windows for Workgroups (WFW) as an example, you would need to configure it as follows:

1. Make sure the Warp Connect and WFW userid and passwords are the same.
2. Make sure the Warp Connect domain name and the WFW workgroup names are the same.
3. Run "share network resources" on WFW so that WFW will pick up the name of the Warp Connect machine and display it on the browse list. If you cannot do this, type the Warp Connect server name in the network connections dialog box like this:

```
\\server_name
```

then press **Enter** to see a list of shared resources on Warp Connect.

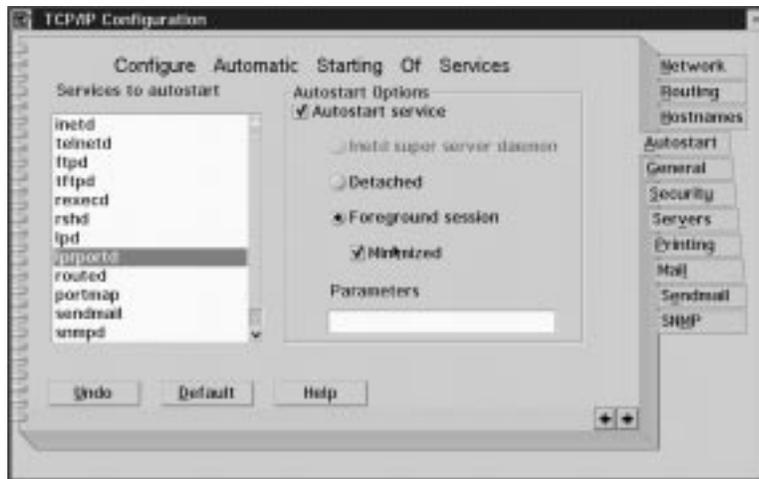
4. The printer can be parallel-connected to either the OS/2 peer station or a WFW station and shared with the rest of the workgroup.

**23.3.1.2 Configuring Peer-to-Peer for Native OS/2 Applications:** To configure IBM network printers for native OS/2 applications in a peer-to-peer environment using TCP/IP:

1. Set up the printer and install the NIC using the instructions in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
2. Assign an IP address (and maybe other TCP/IP addresses, like subnet mask and gateway) to the NIC using the instructions in 17.0, "TCP/IP Addresses" on page 169.
3. Install the printer driver for OS/2. (Refer to 3.3, "Installing the Printer Driver for OS/2" on page 29.)
4. Create a printer object on the OS/2 desktop. Define the Output port for that printer as port LPDx. (Refer to 13.4, "Installing the Printer using Standard OS/2 TCP/IP" on page 147.)

**Note:** This approach uses OS/2's LPR port driver (LPRPORTD) to direct all printing (drag-and-drop as well as native OS/2 printing) to the mini LPD server on the NIC.

5. Select the **TCP/IP Configuration** directory in the TCP/IP folder on OS/2.
6. Select the **Autostart** page.
7. Select **LPRPORTD** from the list of services.
8. Select **Autostart Service**.
9. Select the **Foreground** button.
10. Select the **Minimized** button.



11. Close the TCP/IP Configuration window, then **Save** the new settings when prompted.
12. At an OS/2 command line, enter:  

```
tcpstart
```

  
to start TCP/IP.
13. Test the configuration with a print job.

### 23.3.2 Configuring for WIN-OS2 Applications using LPRMON

To configure IBM network printers for WIN-OS2 applications in a peer-to-peer environment using TCP/IP:

1. Set up the printer and install the NIC using the instructions in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
2. Assign an IP address (and maybe other TCP/IP addresses, like subnet mask and gateway) to the NIC using the instructions in 17.0, "TCP/IP Addresses" on page 169.
3. Install the Windows 3.1x printer drivers on an LPT*n*.OS2 output port.
4. From an OS/2 session, start the LPR Monitor program by issuing a command like:

```
start lprmon -b -r3 -q10 -p PASS -s ip_address LPTn
```

**ip\_address** IP address of the NIC.

**LPT*n*** Port number to be redirected. The port was defined at step 3. Even though you defined the port number at step 3 as LPT*n*.OS2, specify it here without the "OS2" suffix (that is, as LPT*n*). Caution should be used for LPT1 since the port may already be used for a locally attached printer.

After the monitor is started, you can access the LPRMON window to view current print jobs.

5. From an OS/2 session, check the connection to the printer with a command like:

```
copy filename lpt2
```

**Note:** When you enter the command, the print job will display (perhaps only momentarily) in the LPRMON window.

---

### 23.4 Configuring Windows 95 Systems for Peer-to-Peer

This section describes how to configure the IBM network printers for a peer-to-peer network on Windows 95 workstations.

**Note:** The following material is also generally, though not necessarily specifically, applicable to Windows for Workgroups and Windows NT.

#### Microsoft Peer-to-Peer Documents

For detailed information on connecting Windows 95 machines in peer-to-peer relationships, access the following Web location to obtain the Microsoft Windows Peer-to-Peer publication:

<http://www.windows95.com/connect/peercom.html>

**Note:** IBM neither supports nor supplies these documents, and makes no claims about their suitability for fulfilling your purposes.

To print to the network printers from Windows 95, you need one of the following:

- 23.4.1, "Using the Printer's Parallel Port"
- 23.4.2, "Using an LPR Port Driver" on page 223

#### 23.4.1 Using the Printer's Parallel Port

To set up this option, you need to configure:

- The printer to which the printer is parallel attached
- Other machines that will use the printer

### 23.4.1.1 Configuring the Workstation with attached Printer

1. Connect the printer to the parallel port of the Windows 95 system.
2. Navigate your way through the **Settings, Control Panel**, then **Network** windows and verify that the following are installed:
  - Client for Microsoft Networks
  - An appropriate driver for your NIC
  - An appropriate protocol for the other devices in your workgroup (for example, NetBEUI is the default for Windows networking)
  - File or printer sharing for Microsoft Networks
3. Share the printer by right-clicking the printer icon and then selecting **Sharing** from the drop-down menu.
4. Select **Shared as...** and enter the name by which this printer is to be known to other network users.
5. Verify that the "hand," which indicates that the printer is now shared, appears below the printer icon.

### 23.4.1.2 Configuring Workstations without an attached Printer

1. Select My Computer, Printers, then start the **Add a Printer** wizard.
2. Select **Network Printer**, then **Next**.
3. Enter the network path as follows:  
`\\machinename\printername`  
or browse the network to locate the printer you want to share.
4. Indicate whether or not you want this printer to be your default printer, then print a test page.

## 23.4.2 Using an LPR Port Driver

Another way of printing to IBM network printers from Windows 95 is to use an LPR port driver for Windows 95.

To use an LPR port driver, Windows 95 users must obtain a third-party LPR port driver since Windows 95 does not ship with an LPR spooler. You can obtain one vendor's Windows LPR Spooler from the Web at the following locations:

`ftp://ftp.winsite.com/pub/pc/win3/winsock/wlprs41.zip`

or

`ftp://ich210.ich.kfa-juelich.de/pub/win31/wlprs41.zip`

**Note:** The Windows LPR Spooler is neither supplied nor supported by IBM.

Once you have the Windows LPR Spooler (or equivalent), you can configure Windows 95 to use an IBM network printer in the following way:

1. Install the network printer to the LAN.
2. You must set up the printer and install the NIC, as described in 1.0, "Start Here—Install the Network Interface Card (NIC)" on page 3.
3. Install the network printer on the LAN.
4. Assign an IP (and maybe other TCP/IP addresses such as subnet mask and gateway) to the printer using the instructions in 17.0, "TCP/IP Addresses" on page 169.
5. Install the Windows LPR Spooler on every Windows 95 workstation in the group and allow each workstation to send print jobs to the printer using LPR.



---

## Part 7 - NIC Command Reference

# C O M M A N D S

**Terminology:**

NIC=**server**.

The commands described in "Part 7 - NIC Command Reference" refer to the NIC as a server.



---

## 24.0 Command Syntax, Conventions, and Operations

This chapter provides an introduction to the commands described in subsequent chapters. It also provides a set of instructions on how and when to use some of the more common commands.

**Note:** To use the commands described in this chapter, you must login to the NIC using one of these procedures:

- 25.1, “Logging into a NIC using NetWare IPX” on page 229
- 25.2, “Logging into a NIC using TCP/IP Telnet” on page 230

---

### 24.1 Introduction

At the heart of the IBM NIC is a very compact multi-tasking operating system that resides on the card and is specifically designed for the performance of tasks related to processing of print jobs from multiple connections (Parallel, Ethernet, Token Ring), through multiple protocols (TCP/IP, IPX/SPX, Appletalk, NETBIOS), and consisting of multiple types of data streams (PCL, Postscript, IPDS, and so on).

---

### 24.2 Command Syntax and Conventions

Use this section to find out about the syntax and function of the NIC command set. The information contained here applies to all NIC commands documented in this manual.

#### 24.2.1 Syntax Notation

The following notational conventions are used to specify command syntax:

- A vertical bar “|” between parameters, values, or options indicates that the user should choose one from among them.
- Brackets “[ ]” enclose two or more options or parameters.
- Variables, whose value you must enter, are indicated by *italics*.
- Case-sensitive strings are enclosed in “quotation marks.”

#### 24.2.2 Command Operations

Command operations are one of the following:

##### 24.2.2.1 [Set|Define|Change]

|               |                                                                                                                                                                                                                                                                                   |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Set</b>    | Modifies values temporarily in volatile memory. Stored values are restored when ports are logged on or when nodes or NICs are reinitialized.                                                                                                                                      |
| <b>Define</b> | Modifies values permanently when ports are logged off or when nodes and NICs are reinitialized.                                                                                                                                                                                   |
| <b>Change</b> | Modifies values immediately in volatile memory and in non-volatile storage.<br><b>Note:</b> There is a 30-second delay in writing values to the EAROM (Flash or non-volatile memory). If power is turned off on the NIC during the delay period, the change does not take effect. |

### 24.2.2.2 [Clear|Purge|Delete]

- Clear** Removes values temporarily in volatile memory. Stored values are restored when the NIC is logged off or reinitialized.
- Purge** Removes values from non-volatile memory when the NIC is logged off or reinitialized.
- Delete** Removes values immediately from volatile memory and non-volatile memory (EAROM).

### 24.2.2.3 [Show|Monitor|List]

- Show** Displays current volatile memory values.
- Monitor** Displays current volatile memory values and updates those values every second for privileged users and every ten seconds for non-privileged users.
- List** Displays values stored in non-volatile memory.

### 24.2.3 Where Changes are Written

The NIC reads its software from a permanent source (usually Flash Memory) into temporary RAM. Many parameters or characteristics of the IBM NIC may be defined or changed either in temporary RAM or permanent Flash memory. Changes to **perm** settings affect all subsequent operation of the NIC; Changes to **temp** settings of the NIC remain in effect only until the NIC is rebooted, at which time **perm** settings are once again reloaded.

Many of the commands described here involve READING values from either **temp** or **perm** memory, or WRITING values for various parameters to either **temp** or **perm** memory. The following table identifies which command performs which read or write function:

|       | PERMANENT Memory | TEMPORARY Memory | BOTH   |
|-------|------------------|------------------|--------|
| READ  | list             | show             | N/A    |
| WRITE | define           | set              | change |

Examples:

#### **define server ip** *ip\_address*

Inserts a value for the IP address into the NICs **permanent** memory, such that the value will be re-read into **temp** memory next time the NIC is booted.

#### **set server ip** *ip\_address*

Inserts a value for the IP address into the NICs **temp** memory only, leaving the permanent value unchanged. The new value will be in effect only until the NIC is rebooted, at which time the **permanently** stored value will become effective.

#### **list server tcp**

Displays all **permanently** stored TCP/IP values such as IP address, subnet mask and router/gateway address.

#### **show server tcp**

Displays all TCP/IP values that are currently in effect in **temp** memory such as IP address, subnet mask and router/gateway address.

---

## 25.0 Logging into a NIC

Before using any of the commands described in this manual, you must login to the NIC. There are two procedures for logging into a NIC:

- 25.1, "Logging into a NIC using NetWare IPX"
- 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230

---

### 25.1 Logging into a NIC using NetWare IPX

Novell workstations require the Kermit terminal emulation program and the TES protocol to do a remote login to the NIC.

TES can be loaded at any DOS prompt or loaded from the AUTOEXEC.BAT file. TES must be loaded before starting the Kermit program.

The following procedure installs the TES and Kermit software on the system and establishes a connection to the NIC.

#### 25.1.1 Logging into a NetWare Workstation or Server

##### IPX/SPX Needed

You must be logged into a DOS workstation attached to a NetWare server running IPX/SPX for the following procedures to work. Novell Client 32 for DOS/Windows 3.1 will not work. You must use a VLM client.

1. Login to a NetWare workstation or server.
2. Change to a DOS prompt.
3. Install TES and Kermit using the procedure described in 25.1.2, "Installing TES and Kermit." If TES and Kermit are already installed, go to 25.1.3, "Connecting to the NIC."

#### 25.1.2 Installing TES and Kermit

The following steps assume that TES and Kermit are on a diskette or CD-ROM and are loaded from drive A:\ and that C:\ is the root directory.

1. Insert the diskette or CD-ROM with the DOS Utilities into drive A.
2. Enter

```
C:> a:\tes\install a:\tes c:
```

This command installs the files on the diskette or CD-ROM from drive A to drive C.

**Note:** You can put the files wherever you want, but TES and Kermit must be run from wherever you store the files.

#### 25.1.3 Connecting to the NIC

1. Go to the TES-Krmt subdirectory:

```
C:> cd\tes-krmt
```

2. Run TES:

```
C:\tes-krmt>tes
```

TES terminates but stays resident in the workstation.

**Note:** To display information about TES commands, enter:

- ```
c:\tes-krmt>tes help
```
3. Run Kermit:


```
C:\tes-krmt>kermit
```
 4. The MS-Kermit> prompt appears.
 5. Set the port used for the NIC:


```
MS-Kermit>set port tes netcard_name
```

netcard_name The node name of the NIC. The default node name is NCE (for Ethernet cards) or NCT (for Token Ring cards) concatenated to the first six characters in the MAC address, for example, NCE9B1234. The node name is displayed under the Network Information section of the NIC configuration page.
 6. Connect to the NIC:


```
MS-Kermit>connect
```
 7. Press **Enter** until the NIC/printer server login banner is displayed.
 8. At the Enter Username or Help> prompt, enter any letter, then press **Enter** to get to the Server> prompt.
 9. Enter the two characters, **su**, for supervisor status:


```
server>su
```
 10. Enter the default privileged password, **system**:


```
password>system
```
 11. View or change current parameters. For example, you can print the NIC configuration page with the command:


```
show config 1
```

Note: If you change any NIC parameters with **define** commands, the NIC must be rebooted with the command `init delay 0` so the changes will take effect. Refer to "Part 7 - NIC Command Reference" on page 225.
 12. To log out of the NIC, do the following:
 - a. Log off the NIC with the command:


```
logout
```
 - b. While holding the Ctrl key down, press "]" (the right bracket).
 - c. Press **C** to get back to the MS-Kermit> prompt.
 - d. Exit Kermit:


```
MS-Kermit>exit
```
 13. To unload the TES TSR, enter:


```
tes u
```

 at the DOS prompt.

25.2 Logging into a NIC using TCP/IP Telnet

Before you can logon to an IBM NIC using Telnet, the NIC must have an IP address assigned to it. 17.0, "TCP/IP Addresses" on page 169 describes how TCP/IP addresses can be set on NICs.

To do a remote login to an IBM NIC from a host machine supporting Telnet, use the following procedure.

Note: "2048" is the default remote login port number.

1. Connect to the NIC with one of the following commands:

AIX and SUN:

```
telnet ip_address 2048
```

DOS:

```
telnet ip_address -p 2048 [-e ansi]
```

Note: Some NIC (server) commands may not work properly if you telnet in with the “-e ansi” parameter.

OS/2:

```
telnet -p 2048 [-t hft] ip_address
```

Windows NT:

Method 1

Use the DOS version (above).

Method 2:

- a. Start the Telnet Windows program.
- b. From the **File** menu, select **Connect**, then **Connect to Remote**.
- c. Enter the IP address of the NIC for **Hostname**.
- d. Enter 2048 for the port number.
- e. Enter or accept the ANSI terminal emulation.

Note: If you have problems with the Telnet command or with any of the NIC (server) commands once you have logged in successfully, logout, then log back in without the “-e ansi” parameter on the Telnet (for DOS) command.

2. At the # prompt, enter the default NIC remote login password, **access**.

```
#access
```

3. The system responds with something like:

```
Welcome to Token Ring INA
```

```
Local>
```

4. At the Local> prompt, enter **su** for supervisory status.
5. At the Password> prompt, enter the default privileged password, **system**.

Note: On some systems, you may have to press the **backspace** key before entering the password since some systems append a carriage return before the password.

6. At the Local> prompt, enter desired commands.

Note: If you change any NIC parameters with **define** commands, the NIC must be rebooted with the command `init delay 0` so the changes will take effect.

7. Logoff the NIC by entering the command:

```
logout
```

26.0 Global NIC Commands

This chapter describes general or global NIC commands. Use Table 20 to find the command corresponding to the function you want to perform.

To use these commands, you must be logged onto the NIC. See 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.

Table 20. Global Commands Defined by Function

Command	Principal Function
ARP	Define NIC IP address.
CRASH	Stops the NIC, dumps its memory to host, and reinitializes it.
INITIALIZE	Initializes NIC, resets parameters to defaults, upgrades microcode.
LOGOUT	Disconnects the NIC from its current session.
PING	Queries an IP address.
SU	Sets a user's privilege level to super user/supervisor.
SYNC	Updates non-volatile memory with recently entered commands.
TEST	Sends a test pattern to the attached network printer.

26.1 ARP

Syntax

ARP [-a|-b|-d|-f|-l|-s|-t]

Purpose

The ARP command displays or controls the NIC's internal address resolution protocol table.

Parameters

- a Displays the ARP table.
- b Displays cache mappings from all ARP broadcasts.
- d Deletes the specified IP address entry.
- f Turns off the timer for all entries in the ARP table.
- l Caches only locally addressed mappings.
- s Allows the addition of NIC IP and MAC addresses.
- t Turns on the timer.

Note: Only one option may be specified at a time.

26.2 CRASH

Syntax

CRASH 300

Purpose

CRASH 300 is used to halt the NIC. It executes an upload of the NIC memory to a dump host, provided a dump host is configured,¹¹ then reinitializes the NIC. All users are logged off and all sessions are disconnected, without any warning to users. The value 300 is a constant.

26.3 INITIALIZE

Syntax

```
INITIALIZE [server] [delay delay_min] [cancel|flash|default|disable]
```

Purpose

INITIALIZE initializes a NIC. When issued, a warning message is sent every thirty minutes to all logged-on ports. Five minutes before initialization, the warning is broadcast every minute.

Parameters

delay_min	Specifies the length of the period of time before the command takes effect. The default is one minute.
cancel	Cancels a previously entered initialization request before it takes effect.
default	Resets the NIC to factory defaults.
disable	Initializes the NIC but prohibits its use.
flash	Updates the NIC's non-volatile memory with a software upgrade.

26.4 LOGOUT

Syntax

```
LOGOUT [port port_number]
```

Purpose

LOGOUT logs out a port and disconnects associated sessions. *port_number* is required only if the object is not the port from which the command is issued. When issued, any connected session is disconnected.

26.5 PING

Syntax

```
PING ip_address
```

Purpose

PING checks whether a local IP address exists and is responding. If the IP address exists, it returns the message:
Remote is alive

26.6 SU

Syntax

```
SU
```

Purpose

SU sets the privilege level to super user. The factory default password to use when logging on as super user is **system**.

¹¹ Refer to 28.9, "Dump" on page 248 for information about dump hosts and how to set one up.

26.7 SYNC

Syntax

SYNC

Purpose

SYNC synchronizes volatile and non-volatile memory by updating non-volatile memory with recently entered changes.

26.8 TEST

Syntax

TEST *port_number* count *count_number*

Response

Local - Test complete, *nn* bytes sent

Purpose

TEST sends a test pattern from the NIC to the specified port. To send data to the printer, specify port 1. The test pattern is a diagnostic tool for determining the operability of the port. Press any key to terminate the test. When sent to a PostScript printer, the printer displays an error message.

Parameters

port_number Port 1 is the only valid port number.
count_number The number of times the test pattern is sent. The default is 23.

27.0 NetWare Commands

This chapter describes the NetWare-specific NIC commands. To use these commands, you must be logged onto the NIC. See 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.

Command	Principal Function
Characteristics	Display the NIC's characteristics.
Context (NDS)	Specify the NDS context of the card's PServer.
Discovery	Specify the discover method to be used by PServer.
File Server (Preferred)	Specify the preferred NetWare file server.
File Server (Required)	Set up a Novell file server as a required file server for a card.
Forms	Enable or disable the NetWare forms function.
Frame	Specify the order in which frame types are to be handled.
Password	Define the NetWare print server login password.
Print Server (Preferred)	Specify the preferred Novell print server.
Processing Speed	Adjust the processing speed of your computer.
Rediscovery	Set the RPrinter rediscovery process.
Remote Printer (RPrinter)	Allows a NIC to emulate a NetWare remote printer.
Tree (NDS)	Specify the NDS tree where the PServer exists.

Important!

After making any changes to a NIC or using a NIC command, enter the command:

```
init delay 0
```

This command reboots the NIC and makes your changes take effect.

27.1 Characteristics (NetWare)

Syntax

```
[show|list|monitor] server netware
```

Purpose

Use this command to display the NIC's NetWare characteristics.

27.2 Context (NDS)

Syntax

```
define server netware context "context"
```

Purpose

Use this command to specify the NDS context where the PServer definition of the NIC exists.

Parameters

context Enclose the context name in double quotes. The factory default is no context. To clear it, enter "".

27.3 Discovery

Syntax

```
define server netware pserver [auto|disable|3.x|4.x]
```

Purpose

Use this command to specify the discovery method to be used by PServer.

Parameters

auto	Discovers using both NDS and bindery. This is the factory default.
disable	Disables the NetWare PServer.
3.x	Discovers using bindery mode.
4.x	Discovers using NDS mode.

27.4 File Server (Preferred)

Syntax

```
define node node_name nfserver
```

Purpose

Use this command to specify the preferred NetWare file server.

node_name	Name of the preferred file server node.
nfserver	Specifies a file server as the preferred Novell file server.

27.5 File Server (Required)

Syntax

```
define server netware required [enable|disable]
```

Purpose

Use this command to set up a Novell preferred file server as the required file server for a NIC.

Parameters

enable	If enabled, the NIC attaches only to the required file server, even if that server is currently down.
disable	If disabled, the NIC attaches on the preferred file server.

27.6 Forms

Syntax

```
define server netware forms [enable|disable]
```

Purpose

Use this command to enable or disable the NetWare forms function.

Parameters

238 Ethernet/Token Ring Configuration

enable	When enabled, the NIC pauses a print job that requires a different type of paper and waits for the paper to be changed.
disable	This is the factory default. The printer does not pause a print job that requires a different type of paper.

27.7 Frame

Syntax

```
define server netware [default|802.2|snap|802.3|ethernet_IIether_type][802.2|snap]
```

Purpose

Use this command to specify the frame type to be used by the NIC for NetWare. For NetWare only, the frame type can be specified. For all other protocols, refer to 1.4, "Ethernet and Token Ring Frame Types on IBM NICs" on page 6.

Parameters

default	IPX tries 802.2, Ethernet II, 802.3, and SNAP in that order for the Ethernet NIC. The first one found is selected. For Token Ring NICs, IPX tries 802.2, then SNAP.
802.2	IPX looks only for 802.2 Ethernet frames.
802.3	IPX looks only for 802.3 Ethernet frames.
ethernet_II	IPX looks only for Ethernet II frames.
ether_type	If Ethernet II is selected, the user can specify the Ethernet type in hexadecimal characters. The factory default is 0x8137.
snap	IPX looks only for SNAP Ethernet frames.
802.2	IPX looks only for 802.2 Token Ring frames.
snap	IPX looks only for SNAP Token Ring frames.

27.8 Password

Syntax

```
define server netware password "password"
```

Purpose

Use the NetWare password command to define a password for the RPrinter emulation program to use to login to the NetWare print server.

Parameters

password	Enter a maximum of 8 characters and enclose them in quotes. The factory default is no password. To clear the password, enter "".
-----------------	----------------------------------------------------------------------------------------------------------------------------------

27.9 Print Server (Preferred)

Syntax

```
define node node_name npserver
```

Purpose

Use this command to specify the preferred Novell print server that runs as an NLM (on the file server) or as an EXE (on a workstation).

node_name	Name of the preferred print server node.
------------------	------------------------------------------

pserver Specifies a print server as the preferred Novell print server. Up to eight Novell pservers can be defined.

27.10 Processing Speed

Syntax

```
define server netware fast pserver [enable|disable]
```

Purpose

This command enables NetWare PServer to adjust to the processing speed of the computer.

Parameters

pserver Print server name.
disable Use this setting when the computer's speed is less than 4.77 MHz. This is the factory default.
enable Use when operating the PServer at a speed greater than 4.77 MHz.

27.11 Rediscovery

Syntax

```
[set|define|change] server netware rediscover minutes
```

Purpose

Use this command to set the RPrinter rediscovery process, which queries the network for newly configured Novell NICs and starts all remote printers found.

Parameters

minutes Enter the time in minutes between 1 and 14 to set the automatic interval for periodic rediscovery. Enter 0 to disable rediscovery. The factory default is 2 minutes. If the time is not specified, the NIC rediscovers immediately.

27.12 Remote Printer

Syntax

```
define server netware rprinter [enable|disable]
```

Purpose

Use this command to allow the NIC to emulate a NetWare remote printer.

27.13 Tree (NDS)

Syntax

```
define server netware nds "tree_name"
```

Purpose

Use this command to specify the NDS tree where the PServer object exists.

Parameters

tree_name The NDS tree name where the NIC is located, enclosed in quotes. The factory default is no tree name. To clear the name, enter "".

28.0 NIC (Server) Commands

This chapter describes NIC commands. To use these commands, you must be logged onto the NIC. See 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.

Table 22. Network Interface Card Commands Defined by Function

Command	Principal Function
Alarms	Display alarms.
Announcement	Disable DEC/LAT and DEC/NET announcements.
AppleTalk	Display AppleTalk protocol characteristics.
Bootp	Specify the number of times a broadcast is to occur when a NIC is initialized.
Characteristics	Display characteristics of a NIC.
Configuration	Display a NIC's configuration page.
Debug	Display NIC activity status.
Domain	Modify a NIC's domain name.
Dump	Specify where a NIC's memory is to be dumped following a crash.
IP Address	Change an existing IP address.
LAA	Modify the MAC address to an LAA address.
Limits	Display the limits of a NIC's memory table.
Load	Specify a load host and associated parameters.
Name	Change a NIC's name.
Netbios	Display a NIC's NetBIOS characteristics.
Network	Display a NIC's network characteristics.
Passwords	Change a NIC's passwords.
Protocol	Enable or disable protocols.
Rarp	Change the parameters of the RARP command.
SNMP	Configure monitoring for a card.
Source Routing	Specify source routing for a card.
Status	Display a NIC's status.
Subnet Mask	Specify a NIC's subnet mask address.
TCPIP	Display a NIC's TCP/IP characteristics.

Important!

After making any changes to a NIC or using a NIC command, enter the command:

```
init delay 0
```

This command reboots the NIC and makes your changes take effect.

28.1 Alarms

Syntax

```
[show|list] server alarms
```

Purpose

This command displays the number of nonfatal errors that have occurred since the NIC was last booted, and the time and error number of the sixteen most recent errors.

Note: From a DOS machine telnet, the display cannot be read because the display does not remain on the screen.

28.2 Announcements

Syntax

```
define server announcement [lat] [enable|disable]
```

Purpose

Use this command to enable or disable either DEC/LAT or DEC/MOP announcements. To enable or disable DEC/LAT announcements, use the command with the "lat" option. To enable or disable DEC/MOP announcements, use the command without any options (MOP is assumed).

The default condition for IBM NICs with microcode version 5.18 or earlier is to broadcast its existence to a DEC system. If you have cards with microcode level 5.18 or earlier, you need to disable the DEC broadcast feature.

This command is used to disable DEC/LAT and DEC/MOP broadcasts/announcements if the IBM NIC is connected to a DEC system. DEC broadcasts must be disabled so as to avoid causing problems on DEC systems. For the specific procedure to use to disable DEC broadcasts, refer to 20.2, "Disable DEC/LAT and MOP Announcements" on page 203.

28.3 AppleTalk

Syntax

```
[show|list] server appletalk
```

Purpose

This command shows the characteristics of the AppleTalk protocol (such as zone, network address, and flow quantum) for the NIC.

28.4 BootP

Syntax

```
define server bootp n m
```

Purpose

BootP is a TCP/IP protocol used by a workstation to find its IP address. The command specifies the maximum number of times a broadcast occurs when the NIC is initialized or powered on.

Parameters

- m** The number of requests if the NIC IP address is known. The factory default is 0.
- n** The number of requests to make (between 0 and 7; 2 is the factory default) if the NIC does not know its IP address.

28.5 Characteristics (Network Card)

Syntax

```
[show|list|monitor] server [ch]
```

Purpose

The show server command displays brief information about NIC hardware and software configuration. Use 28.6, "Configuration" on page 245 to see detailed information.

28.6 Configuration

Syntax

```
show server config [port port_num] [ps]
```

Purpose

Displays the NIC "Configuration Page." The command displays the following detailed configuration information about the NIC:

Configuration	Description
server hardware	Software revision level, amount of memory, and self-test results.
server local	Overall server configuration and start-up parameter settings.
server network	Overall network configuration including MAC and IP addresses and protocols currently supported.
server netware	Network configuration parameters for a Novell NetWare environment.
server TCP	Network configuration parameters for a TCP/IP environment including the subnet mask.
server apple	Network configuration parameters for an Apple environment.

Parameters

port_num Specify 1 to send the configuration report to the printer.
ps Prints the output in PostScript format. The factory default is **pcl**.

28.7 Debug

Syntax

```
show server debug
```

Purpose

The Debug command is used to display NIC activity status conditions, including errors that may occur when loading NIC software (microcode) during microcode update operations. An operator at a remote terminal (accessed through Telnet or Tes) can view errors and status conditions, if any, by entering the command. Errors and status conditions are reported as numeric codes. See 28.7.1, "Debug Command Error Reporting."

Parameters

None.

28.7.1 Debug Command Error Reporting

Microcode errors are reported for the most recent microcode load operation. More than one error is possible on a load operation. Multiple errors are reported in the order in which they occurred.

The Debug command provides a report that looks like this:

```

-Debug Display for Server-----
sizeof( EAROMOF)      = 1E40
:
soft-error-index     = 00
Network Load Error  = 0x01
:
-----

```

The result of all software loads with errors is reported on the line “Network Load Errors.”

- A **successful** load is reported with a hex code of “FF.”
- An **unsuccessful** load is reported with a hex code ranging from 0x01 on up.

28.7.2 Load Error Numeric Codes

The following table displays some of the load error numeric codes, what they mean, and what to do about them.

Hex Code	Description	Remedial Action
0x01	At least one Flash sector was write protected	Retry the download operation. If the error persists, replace the NIC.
0x02	Flash erase error	Retry the download operation. If the error persists, replace the NIC.
0x03	Flash write error	Retry the download operation. If the error persists, replace the NIC.
0x04	LAN cable not connected.	Attach the LAN cable, make sure the LAN is working correctly, then retry the download operation.
0x05	LAN chip initialization error	Retry the download operation. If the error persists, replace the NIC.
0x06	Wrong loadfile for the hardware	Retry the download operation using the correct file (Ethernet or Token Ring file) for the NIC.
0x07	Ran out of buffers	Retry the download operation. If the error persists, replace the NIC.
0x10	Selfload image in Flash is corrupted.	Retry the download operation. If the error persists, replace the NIC.
0x11	Compressed header error	Retry the download operation. If the error persists, replace the NIC.
0x20	Undefined TFTP error	Retry the download operation. If the error persists, replace the NIC.
0x21	TFTP file not found	Correct the access to the file through the TFTP interface and retry the download command.
0x22	TFTP access violation error	Correct the access permission to the file, then retry the download operation.
0x23	TFTP disk full or allocation exceeded error	This error does not apply to microcode downloads.
0x24	TFTP illegal operation	An internal error occurred. Retry the download operation. If the error persists, contact IBM Support for assistance.
0x25	TFTP unknown transfer ID error	An internal error occurred. Retry the download operation. If the error persists, contact IBM Support for assistance.
0x26	TFTP file exists	This error does not apply to downloads.
0x27	TFTP no such user error	Retry the download operation. If the error persists, contact IBM support for assistance.
0x28	Unable to send TFTP ACK	Retry the download operation. If the error persists, contact IBM support for assistance.
0x29	TFTP packet sequence error	Retry the download operation. If the error persists, contact IBM Support.

Hex Code	Description	Remedial Action
0x2A	TFTP data packet error	Retry the download command. If the error persists, contact your local network administrator.
0x2B	Error sending TFTP request	Retry the download operation. If the error persists, contact IBM support for assistance.
0x2C	Timeout waiting for TFTP packet from load host	Verify that the NIC is communicating with the load host, then retry the download operation. If the error persists, contact your network administrator.
0x2D	Timeout waiting for TFTP put	Does not apply to downloads.
0x30	Error sending BOOTP request	Verify that the NIC is communicating with the BOOTP server system, then retry the download operation. If the error persists, contact your network administrator.
0x31	Timed out waiting for BOOTP response	Verify that the NIC is communicating with the BOOTP server system, then retry the download operation. If the error persists, contact your network administrator.
0x40	Error sending ARP request	Retry the download operation. If the error persists, contact IBM support for assistance.
0x41	Error sending ARP reply	Retry the download operation. If the error persists, contact IBM support for assistance.
0x42	Timed out waiting for ARP reply	Retry the download operation. If the error persists, contact IBM support for assistance.
0x50	Error sending DHCP request	Retry the download operation. If the error persists, contact IBM support for assistance.
0x60	Cannot find host with loadfile	Retry the download operation. If the error persists, contact IBM support for assistance.
0x61	Not a MOP packet or no data in packet	Verify that the NIC is communicating with the MOP support host. Retry the download operation. If the error persists, contact your local network administrator.
0x62	MOP RX'd a packet from a different host	Verify that the NIC is communicating with the MOP support host. Retry the download operation. If the error persists, contact your local network administrator.
0x63	MOP packet type not memory load or load parameters	Verify that the NIC is communicating with the MOP support host. Retry the download operation. If the error persists, contact your local network administrator.
0x70	Lower address limit error	An internal error occurred. Retry the download operation. If the error persists, contact IBM Support for assistance.
0x71	Upper address limit error	An internal error occurred. Retry the download operation. If the error persists, contact IBM Support for assistance.
0x72	PIDATA error	An internal error occurred. Retry the download operation. If the error persists, contact IBM Support for assistance.
0x73	Transfer address error	An internal error occurred. Retry the download operation. If the error persists, contact IBM Support for assistance.
0x74	Invalid OMF record	An internal error occurred. Retry the download operation. If the error persists, contact IBM Support for assistance.

28.8 Domain

Syntax

```
[set|define|change] server domain domain_name
```

Purpose

Use this command to modify a NIC's TCP/IP domain name.

Parameters

domain_name Domain name of the NIC (48 characters maximum).

28.9 Dump

Syntax

```
define server preferred dump [ip ip_address|none]
[set|define|change] server dump [enable|disable]
define server dump file filename
define server gateway [ip [ip_address|none]]
```

Purpose

The NIC dumps its internal memory onto a crash host (if one is defined) whenever a crash occurs.

28.9.1 Creating a Dump

1. Specify the IP address to which a dump is to be sent (first command).
2. Enable the dump (second command). The factory default is **enable**. After the NIC sends its file to the host, it reinitializes itself.
3. Specify the name of the file on the dump host with the IP address specified at step 1. (Third command)
4. If the dump or load host is on the other side of a gateway, you must specify the dump/host gateway to the NIC. Use the fourth command listed above. This gateway address is not shown when displaying configuration information.

28.9.2 When Dumps Occur

The dump occurs whenever one of the following occurs:

- You issue the CRASH 300 command.
- A fatal error occurs on the NIC.

Parameters

disable	Disable the dump.
enable	Enable the dump.
filename	The name of the file into which the dump is to go.
ip_address	The IP address where the dump is sent.
none	Removes an existing dump IP address.

28.10 IP Address

Syntax

```
define server ip ip_address
```

Purpose

Use this command to change the NIC's IP address. For commands that change other IP addresses, see the NIC Load, Dump, RARP, and Route commands.

Parameters

ip_address The new IP address for a NIC.

28.11 LAA

Syntax

```
define server laa [laa|none]
```

Purpose

Use the LAA command to modify the MAC address of a NIC to a locally administered address (LAA).

If the LAA address has been set, the `show server network` command displays both MAC and LAA addresses.

Parameters

- laa** The LAA address that is to replace the MAC address. The LAA address must be entered as a series of six pairs of hex values separated by a dash. LAA values range from 40-00-00-00-00-00 to 40-FF-FF-FF-FF-FF.
- none** Gives the LAA the value zero, causing the NIC to use its factory-defined MAC address when the NIC is re-started.

28.12 Limits

Syntax

```
[list|show|monitor] server limit
```

Purpose

This command displays the limits of six of the NIC's memory table resources:

- queues
- circuits
- sessions
- nodes
- services
- NB sessions

A limit is a memory table allocation.

28.13 Load

Syntax

```
define server load [selfload|tftp]
```

```
define server preferred load ip ip_address
```

```
define server software file_name
```

Purpose

These load commands are used to:

1. Specify the load host.
2. Specify the load file name.
3. Perform a load of the NIC's software.

Note: Commands other than the ones described here are needed to perform a load.

Parameters

file_name	Designates the load image file for the network load.
ip_address	The IP address of the load host.
selfload	On initialization of the NIC, the card loads its operating software from non-volatile memory.
tftp	Indicates that the TFTP protocol is to be used to download NIC software.

28.14 Name

Syntax

```
define server name server_name
```

Purpose

The default NIC name begins with a three-digit prefix unique to the type of IBM NIC:

- NCE for Ethernet
- NCT for Token Ring

The remaining digits are taken from the last six characters of the MAC address, without the dashes.

Parameters

server_name The name of the NIC.

28.15 Netbios

Syntax

```
[show|list] server netbios
```

Purpose

This command displays NetBIOS characteristics for the NIC.

28.16 Network

Syntax

```
[show|list] server network
```

Purpose

Use this command to display the NIC's network characteristics.

28.17 Password

Syntax

```
[set|define|change] server login password "string"[set] server privilege password "string"
```

Purpose

The IBM NIC provides two passwords to prevent access by unauthorized persons and the changing of IBM NIC parameters:

Login password	Permits access to the IBM NIC through a host connection. The factory default login password is access .
Privileged password	Permits changes to IBM card parameters, such as the IP address. The factory default privileged password is system .

Parameters

string One to sixteen characters enclosed in quotation marks. To mix upper and lower-case characters, enclose the string in quotes, for example, "password_1".

28.18 Protocol

Syntax

```
[set|define|change] server authorize protocol [all|none][p_nameenable|disable]
```

Purpose

This command allows individual protocols to be enabled or disabled. Valid protocol names are:

- Appletalk
- Netbios
- Netware
- Tcp

Use the Show Server Netware command to display the current status of these protocols.

Parameters

all Activates all protocols for the NIC.
disable Disables the affected protocol.
enable Enables the named protocol.
none Disables all protocols.
p_name Name of the protocol to authorize. The factory default is **all**.

28.19 RARP

Syntax

```
define server rarp n m[temp]
```

Purpose

The Reverse Address Resolution Protocol command is used to change the parameters associated with the RARP command.

Parameters

m The number of requests if the NIC IP address is known. The factory default is 1.
n The number of requests to make (between 0 and 7; 2 is the factory default) if the NIC does not know its IP address.
temp Stores infinite lease IP addresses in volatile memory only. The factory default is non-volatile memory.

28.20 SNMP

Syntax

```
[set|define|change]server snmp [community com_name access acc_right][trap [IP|IPX] ip_addr][set enable|disable]
```

Purpose

Use this command to configure the monitoring services (SNMP) for the NIC.

Parameters

acc_right	Access mode associated with a community: read, none, or rw.
com_name	Name identifying an SNMP community.
disable	Disable the affected object.
enable	Accepts SNMP requests.
IP or IPX	IP or IPX address of a community.
ip_addr	The IP or IPX address of the workstation to receive SNMP trap messages from the NIC. For IP, the form is 9.99.99.99. For IPX, the form is 00-00-00-02 00-04-ac-33-64-08.
set	Allows the SNMP manager station to perform set type operations on the NIC.
trap	Establishes a manager station configured to receive messages from an agent.

28.21 Source Routing

Syntax

```
define server source [routing] [enable|disable][send single|all][single_response specific|all]
```

Single-route Broadcast, Specifically Routed Return:

```
define server source [routing] send single single_response specific
```

Single-route Broadcast, All-routes Broadcast Return:

```
define server source [routing] send single single_response all
```

All-routes Broadcast, Specifically Routed Return:

```
define server source [routing] send all single_response specific
```

No Source Routing:

```
define server source [routing] disable
```

Purpose

Use this command to specify TCP/IP source routing for Token Ring NICs using any supported protocol. Source routing determination is used when a NIC has a Token Ring frame to transmit, but has no source route. The source routing command allows frames to traverse up to eight token rings across seven bridges in any given direction.

The factory default is **enabled** with the **send** parameter set to single and the **single_response** parameter set to specific.

Parameters

enable	Source routing is enabled. Settings for the send and single_response parameters are not changed.
disable	Source routing is disabled. Settings for the send and single_response parameters are not changed. When disabled, the NIC neither initiates nor responds to Token Ring Source Route frames. It will only send and receive Token Ring frames that do not contain routing information.
send	Used to specify the type of source route broadcast to transmit when determining a source route. Specifying this parameter also sets source routing to enabled.
single	Transmits a single-route broadcast.
all	Transmits an all-routes broadcast.
single_response	Used to specify the response when a single-route broadcast is received. Specifying this parameter also sets source routing to enabled.
specific	A specifically routed frame is returned to a received single-route broadcast.
all	An all-routes broadcast is returned to a received single-route broadcast.

28.22 Status

Syntax

```
[show|monitor] server status
```

Purpose

Use the **show** operation to list NIC status values at a specific time. Use the **monitor** operation to have the values continually updated.

28.23 Subnet Mask

Syntax

```
define server subnet mask subnet_mask|default
```

Purpose

Use this command to specify a subnet mask for a NIC. The value is used to determine if any other IP address is within the same subnet as the card.

Parameters

default	The factory default is 255.0.0.0.
subnet_mask	The masked portion of an IP address.

28.24 TCPIP

Syntax

```
[show|list] server tcpip
```

Purpose

Use this command to display the NIC's TCP/IP characteristics. See 28.21, "Source Routing" on page 252 to change a TCP/IP routing.

29.0 Node Commands

This chapter describes NIC commands related to nodes. To use these commands, you must be logged onto the NIC. See 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.

Command	Principal Function
Display	Display node information.
Gateway	Set the default gateway address for all nodes.
Remove	Remove nodes.
Syslog	Change various features of a node, including name, IP address, and Syslog facility.

Important!

After making any changes to a NIC or using a NIC command, enter the command:

```
init delay 0
```

This command reboots the NIC and makes your changes take effect.

29.1 Display

Syntax

```
[show|list] node [node_name] [all|ip ip_address]
```

Purpose

Use this command to display one or all nodes.

Parameters

node_name Name of the node.
ip_address IP address of the node.

29.2 Gateway

Syntax

```
[set|define|change] node [node_name] IP ip_address gateway [default]
```

Purpose

Use this command to set the default gateway address.

If the network uses a gateway or router to connect networks together, specify the gateway node in the IBM NIC configuration. Otherwise, hosts not on the local network (relative to the IBM NIC) are not able to send print jobs. The keyword **default** is used to specify the default node if no other route can be found to a remote node. In addition to the IP address, a node name can be supplied.

To display the newly set gateway address, reboot the NIC by entering the `init delay 0` command.

Parameters

ip_address IP address of the node.
node_name Name of the node, if any.

29.3 Remove Node

Syntax

```
[clear|purge|delete] node [node_name] [all|ip ip_address]
```

Purpose

Use this command to remove nodes.

Parameters

node_name Name of the node.
ip_address IP address of the node.

29.4 Syslog

Syntax

```
[set|define|change] node node_name[ip ip_address][syslog[facility]]
```

Purpose

Node IP addresses can be changed using this command. For commands that change other IP addresses, see the NIC commands:

- 28.9, “Dump” on page 248
- 28.13, “Load” on page 249
- 28.19, “RARP” on page 251
- 28.21, “Source Routing” on page 252

Parameters

facility Specifies the type of reporting. The types are: LPR and Local0 to Local7. The Default is LPR.
ip_address The IP address of the node.
node_name Name of the node.
syslog Establishes, removes, or shows the node as a TCP/IP syslog node.

30.0 Port Commands

This chapter describes NIC commands that concern ports. To use these commands, you must be logged onto the NIC. See 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.

Table 25. Port Commands Defined by Function

Command	Principal Function
Access	Specify the type of access a port can make.
Characteristics	Display the characteristics of a port.
Mapcrlf	Control the line feed character on a port.
Type	Specify the type of device connecteed to a port.

Important!

After making any changes to a NIC or using a NIC command, enter the command:

```
init delay 0
```

This command reboots the NIC and makes your changes take effect.

30.1 Access

Syntax

```
[set|define|change] port port_num access[dynamic|local|remote|virtual|slprt|none]
```

Purpose

Use this command to specify the type of access the port can make.

Parameters

dynamic	Allows the port to originate and accept remotely-originated connections. This is a combination of remote and local access.
local	Allows a device connected to the port to originate connections and use the NIC's local-mode command set.
none	Disables all access to the port.
port_num	The port number whose access is affected.
remote	Restricts the port to receiving connections. Such a port is termed a service.
slprt	Unused.
virtual	Restricts the port to use as a transparent gateway.

30.2 Characteristics

Syntax

```
[show|list] port port_num ch
```

Purpose

Use this command to display the characteristics of a specified port.

Parameters

ch Abbreviation for characteristics.
port_num Number of the affected port.

30.3 MapcrLf

Syntax

```
[set|define|change] port port_num mapcrLf [enable|disable]
```

Purpose

Use this command to control the line feed character.

Parameters

disable Retains the line feed character in the carriage return.
enable Removes the line feed character from the carriage return line feed sequence.
port_num Number of the affected port.

30.4 Type

Syntax

```
[set|define|change] port port_num type [ansi|hardcopy|softcopy]
```

Purpose

Use this command to specify the type of terminal or printer connected to a port.

Parameters

port_num Number of the affected port.

31.0 Services Commands

This chapter describes NIC commands that affect services. To use these commands, you must be logged onto a NIC. See 25.1, "Logging into a NIC using NetWare IPX" on page 229 or 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.

Table 26. Services Commands Defined by Function

Command	Principal Function
Service Name	Create, delete, or specify logical printer parameters.
Service Priority	Specify logical printer priorities.

Important!

After making any changes to a NIC or using a NIC command, enter the command:

```
init delay 0
```

This command reboots the NIC and makes your changes take effect.

31.1 Service Name

Syntax

```
[show|list] service [ser_name] [ch]
```

```
[set|define|change] service "ser_name"[TCPport_num]telnet [disable|enable]  
[port port_num][password "pass_txt"][protocol p_name][enable|disable]
```

```
[clear|purge|delete] service "ser_name"
```

Purpose

The service commands display, modify, or create service (logical printer) name and other parameter values. Use the *first* command to display the configuration, including port number, name, and enabled protocols. Use the *second* command to create a service or enable or disable a protocol for a service. Use the *third* command to delete a service.

Parameters

ch	Abbreviation for characteristic.
disable	Disables the specified protocol.
enable	Enables the specified protocol.
pass_txt	A one to sixteen character password enclosed in quotes. Enter "" to remove the password. The factory default is none.
p_name	The name of the protocol. Valid protocol names are: <ul style="list-style-type: none">• APPLE• NETBIOS• NRP (Netware)• TCP• TES
port_num	The port number on which the service is being established. The command affects virtual ports only; RCF ports remain unchanged. Enter ALL for all ports. The standard port for printing is port 1.
ser_name	The name of the service. Must be enclosed in quotation marks. For AppleTalk, the maximum length of the service name is 32 characters; for NetWare, it is 47. For NetBIOS, the name must be in UPPER CASE.

TCPport_num	TCP port number for the service being created. If omitted for a service, the NIC creates an unsupported service type.
telnet	Telnet must be disabled when you are creating a new service name for printing. For NetBIOS printing, the name must be in UPPER CASE so the LAN Server host can find the name.

31.2 Service Priority

Syntax

```
change service service_name tcp_port priority n
```

Purpose

Services operate on a First-In-First-Out (FIFO) basis. Files are sent to the IBM NIC where they are processed and sent to the printer in the order in which they are received, regardless of their source or protocol.

In some situations, it is beneficial to establish a priority system in which files from a certain host or those using a particular protocol will be processed first. All files sent to this new service take priority over files sent to the default services. The highest priority files are processed first, followed by files sent to the services which have the default priority.

Parameters

n	A priority value, where 0 is the lowest and 15 the highest.
service_name	Name of the service.

Appendixes

Appendix A. NIC Specifications

A.1 Physical Dimensions

<i>Table 27. Physical Specifications of a Network Interface Card</i>	
Parameter	Range
Ethernet Compatibility	<ul style="list-style-type: none"> 10 BASE2 (Ethernet Type II, Thinwire, BNC) 10 BASE-T (Unshielded Twisted-pair, UTP, RJ45)
Token Ring Compatibility	<ul style="list-style-type: none"> UTP (Unshielded Twisted-pair, RJ45) STP (Shielded Twisted-pair, DB9)
Physical Dimensions	5.5 x 3.5 x 1.0 inches
Power Requirements	+ 5 VDC (5% variance) @ 1 Amp minimum
Temperature	Operating: 41 to 109.4 F (5 to 43C)
	Storage: 40 to 140 F (-40 to 60C)
Humidity	10% to 95% noncondensing

A.2 Agency Approval

<i>Table 28. Agency Approval for IBM Network Interface Cards</i>	
Agency Approval	FCC Class A; UL Listed to UL 1950, TUV Certified to EN60950; EN55022, CISPR22/85, Class A; CUL Listed to CSA22.2, No.950; Licensed by BZT, VFG 523/1969, Class A.

A.3 Ethernet 10Base2 (BNC) Connector Pinout

<i>Table 29. Ethernet 10Base2 Connector Pinout</i>	
Pin	Signal
1	Signal
2	Ground (Shield)

A.4 Ethernet 10Base-T (RJ-45) Connector Pinout

<i>Table 30. Ethernet 10Base-T Connector Pinout</i>	
Pin	Signal
1	Transmit High
2	Transmit Low
3	Receive High
4	No connection
5	No connection
6	Receive Low
7	No connection
8	No connection

A.5 Token Ring UTP (RJ-45) Connector Pinout

<i>Table 31. Token Ring UTP Connector Pinout</i>	
Pin	Signal
1	No connection
2	No connection
3	Transmit/3
4	Receive/4
5	Receive/5
6	Transmit/6
7	No connection
8	No connection

A.6 Token Ring STP (DE-9) Connector Pinout

<i>Table 32. Token Ring STP Connector Pinout</i>	
Pin	Signal
1	Receive/R1
2	No connection
3	No connection
4	No connection
5	Transmit/5
6	Receive/G6
7	No connection
8	No connection
9	Transmit/O9

Appendix B. Resetting or Updating NICs

This chapter describes two procedures:

- B.1, "Resetting NIC Parameters to Factory Defaults"
- B.2, "Updating the NIC Microcode" on page 267

B.1 Resetting NIC Parameters to Factory Defaults

NPM-OS2 and **NPM-NT** or **NPM-95**

The NIC parameters can be reset to factory defaults¹² using any of these methods:

- IBM Network Printer Manager (NPM)
- Commands issued from the command line
- Modifying hardware pin jumper placement

B.1.1 Resetting NIC Parameters using NPM

1. From the NPM Main Window, select a printer from the container.
2. From the menu bar, select **Printer**.
3. From the Printer pull-down menu, select **Reset**.
4. You see a message. Select either:
 - Yes:** Resets the selected printer and the NIC
 - No:** Does not reset the selected printer and the NIC

B.1.2 Resetting NIC Parameters from the Command Line

You can reset Ethernet or Token Ring NIC parameters to their factory defaults from the command line with the following procedure:

1. Logon to the NIC using either:
 - 25.1, "Logging into a NIC using NetWare IPX" on page 229
 - 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230
2. Enter the command:

```
init delay 0
```

The **init** command automatically logs you off the NIC.

delay_min Specifies the number of minutes to delay the initialization. The default is one minute. In this instance, enter zero (0) for the delay minutes to initialize the NIC immediately.

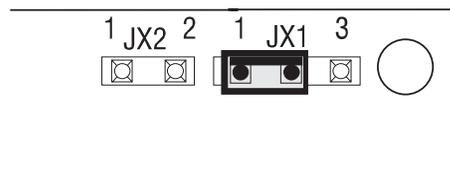
B.1.3 Resetting Ethernet NICs Using Hardware Pin Jumpers

To reset the Ethernet NIC's parameters to factory defaults, perform the following procedure:

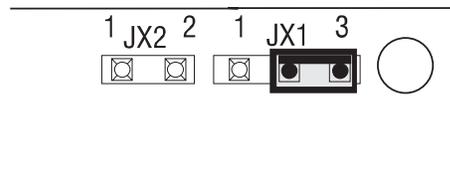
1. Turn the printer off.
2. Unscrew the two screws on the Ethernet NIC.
3. Remove the Ethernet NIC from the printer.
4. Lay the NIC in front of you with the faceplate facing you.

¹² Refer to 1.3, "Default NIC Parameter Values" on page 5.

5. On the right, rear side of the NIC are three pins with a jumper inserted between two of them. These pins are numbered 1, 2, 3, from left to right.
6. Remove the jumper from its current setting and place over the pins labelled **1** and **JX1**.



7. Place the NIC back in the printer (do not tighten the thumb screws to secure the NIC).
8. Turn the printer on and wait until it shows READY.
9. Turn the printer off.
10. Remove the NIC from the printer.
11. This time, remove the jumper and place it over the pins labelled **JX1** and **3**.



12. Put the NIC back in the printer and tighten the thumb screws to secure it.
13. Turn the printer on.

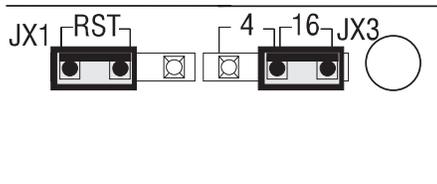
Note: The NIC's parameters have now been reset to factory defaults. The IP address is set to none; the subnet mask is set to none.

Note: If an IP address is set but a subnet mask is not, the default subnet mask is set to 255.0.0.0.

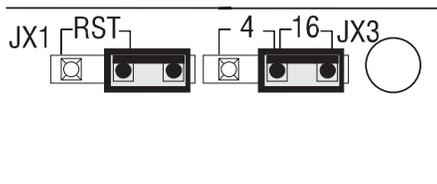
B.1.4 Resetting Token Ring NICs using Hardware Pin Jumpers

To reset the Token Ring NIC's parameters to factory defaults, perform the following procedure:

1. Turn the printer off.
2. Unscrew the two thumb screws on the Token Ring NIC.
3. Remove the Token Ring NIC from the printer.
4. Lay the NIC in front of you with the faceplate facing you.
5. On the right, rear side of the NIC are six pins with two jumpers inserted over them:
 - On the **left side**, the pins are labelled **JX1** and **RST**.
 - On the **right side**, the pins are labelled **4 16 JX3**.
6. Remove the jumper on the **left side** and place it over the pins labelled **JX1** and **RST**.



7. Place the NIC back in the printer (do not tighten the thumb screws to secure the NIC).
8. Turn the printer on and wait until it shows READY.
9. Turn the printer off.
10. Remove the NIC from the printer.
11. This time, remove the jumper and place it over the pin labelled **RST** and the unlabelled pin.



12. Put the NIC back in the printer and tighten the thumb screws to secure it.
13. Turn the printer on.

Note: The NIC's parameters have now been reset to factory defaults. The IP address is set to none as a default value. The subnet mask is set to none.

B.2 Updating the NIC Microcode

NPM-OS/2 or **NPM-NT** or **NPM-95**

Use this section to: obtain microcode and other software changes, and upgrade NIC microcode.

Note: You may also use NPM for OS/2 or NPM for NT/95 to perform this procedure.

B.2.1 Obtaining Software Changes

Use this section to get NIC microcode updates. B.2.2, "Upgrading NIC Microcode" on page 268 describes how to upgrade NIC microcode.

When software defect fixes or new releases become available, they can be obtained from three sources:

- The IBM Printing Systems World Wide Web Home Page
- The IBM Printing Systems BBS
- The IBM Support Center

B.2.1.1 Accessing the IBM PSC Home Page: Access the Home Page for the IBM Printing Systems Company (PSC) at:

<http://www.can.ibm.com/ibmprinters>

Refer to B.2.3, "Obtaining the Microcode Upgrade" on page 269 for instructions on obtaining the microcode updates.

B.2.1.2 Using the IBM Printing Systems BBS: The IBM Printing Systems BBS is a no-charge support service. The service can be accessed using one of many communications programs available. The IBM Printing Systems BBS is self-registering and provides online help.

1. Set the communications software to:
 - No parity bits
 - 8 data bits
 - One stop bit
2. Call one of the following numbers:

Montreal	(514) 938-3022
Toronto	(905) 316-4255
Vancouver	(604) 664-6464

3. To locate and download the file(s) you need, use the following suggested method. The letter in **bold** represents the key you press to select the menu item.
 - a. **F**iles: browse and download
 - b. **L**ocate a file in any area, for example, Network Printer 17.
 - c. **T**ag a file for downloading
 - d. **A**dd a file to the download list
 - e. **D**ownload a file

B.2.1.3 Using IBM Service: To obtain a software fix for an IBM NIC from IBM Service, call 1-800-358-6661 and request the latest fix.

B.2.2 Upgrading NIC Microcode

Use this section to upgrade NIC microcode.

B.2.2.1 Components of the Upgrade Process: To upgrade NIC microcode, you need:

- An IBM network printer with an IBM NIC
- Any "load host" workstation connected to the LAN with TCP/IP and able to be a TFTP server
- A logically separate administrative machine that can login to the NIC using either Telnet or TES/Kermit

Note: By "logically separate" we mean that you can use the same physical machine, but you need to have two separate sessions running, one serving as the load host and the other as the administrator.

B.2.2.2 Tasks You Must Do to Upgrade Microcode: You do three tasks to upgrade the NIC microcode:

1. Obtain the microcode.
2. Prepare the host system to do a load.
3. Enter the appropriate commands.

The commands you issue to upgrade the microcode (described at B.2.5, "Downloading Microcode to the NIC" on page 270) are the same for all systems.

How the load host is prepared differs from system to system. B.2.4.1, "Preparing to Load from AIX" on page 269 and B.2.4.2, "Preparing to Load from OS/2" on page 269 describe how to prepare AIX and OS/2 load hosts.

Note: You can use a TFTP server in other environments. See Request for Comments (RFC) 783.

B.2.3 Obtaining the Microcode Upgrade

To obtain the NIC upgrade microcode:

1. Make a directory such as C:\IBMNIC.
2. Access the Home Page for the IBM Printing Systems Company at:
<http://www.can.ibm.com/ibmprinters>
3. Follow the menu items for downloading the NIC microcode upgrade into the IBMNIC directory. Download the following items to the IBMNIC directory:
 - README
 - NCExxxx.SYS (for Ethernet)
 - NCTxxxx.SYS (for Token Ring)
 - TFTP.D.EXE (OS/2 only)

Note: TFTP.D.EXE is the TFTP daemon for OS/2 only. The EXE file contains the fix for APAR # 12482 for TCP/IP versions 2.0 and 3.0. The APAR number, rather than the PTF number, is given here to ensure that you get the latest fix and all prerequisites and corequisites for an APAR when requesting a PTF.

B.2.4 Preparing the Load Host

Use this section to prepare the host system **from** which the microcode will be loaded into the NIC.

B.2.4.1 Preparing to Load from AIX: This section describes how to prepare the AIX system, operating with AIX 3.5 or higher, to do a download of the microcode to the NIC.

B.2.4.1.1 Verify the Host Configuration for TFTP: The first step is to make sure TFTP is enabled on the host system. To do that:

1. Change directories to /etc.
2. Look for the inetd.conf file.
3. Edit the file and look for an entry for TFTP that looks like this:

```
tftp dgram upd nowait nobody /etc/tftpd tftpd -n
```
4. If the entry is commented out with a #, remove the # and save the file.
5. If the TFTP file in the inetd.conf file was commented out, the **inetd** daemon must be restarted with the following command:

```
refresh -s inetd
```

B.2.4.1.2 Place the Download File in the Proper Directories

1. Place the download file(s) in the root directory.
2. Set the file permissions to **read** for all users.
3. Go to B.2.5, "Downloading Microcode to the NIC" on page 270.

B.2.4.2 Preparing to Load from OS/2: The host system for the following procedure is assumed to be a workstation running OS/2 Warp Connect with TCP/IP support enabled.

1. Open an OS/2 window or full screen session.
2. If you are currently running the TFTP daemon (TFTP.D.EXE), then stop it.

3. Make C:\IBMNIC the active drive and directory. This directory contains the (new) TFTP.D.EXE program and the microcode files.
4. Start the TFTP.D program by entering the command:


```
tftpd
```
5. The system should respond:


```
IBM TCP/IP for OS/2 - TFTP Server ver...ready
```

 This session is now running the TFTP daemon. You will not see any further messages.

B.2.5 Downloading Microcode to the NIC

If You Have Problems Loading

If problems occur in the loading process, use the Debug command (see 28.7, "Debug" on page 245.) to determine the problem.

1. Check the current level of the NIC code by printing a Printer Configuration Page (as described in 1.5.1, "Obtaining a Printer Configuration Page" on page 6).
2. Open a new OS/2 window or full screen session or start at the AIX command line.
3. Login to the NIC using the procedure described in 25.2, "Logging into a NIC using TCP/IP Telnet" on page 230.
4. Set the NIC to load new microcode:


```
define server load tftp
```
5. Specify the name of the file to be downloaded:


```
define server software filename
```

filename Use NCExxxx.SYS for Ethernet; NCTxxxx.SYS for Token Ring, where xxxx is the identifying number for the upgrade code, for example, 0518.
6. Specify the IP address of the host system performing the TFTP load:


```
define server preferred load ip ip_address
```

ip_address The address of the load host system where the new NIC software resides.
7. Specify the gateway IP address of the router or gateway for the NIC, if any. This is required if one or more routers are between the load host system and the printer.


```
define server gateway load ip ip_address
```
8. Reboot the NIC to initiate the load of the new software by entering:


```
sync
```

```
init delay 0 flash
```
9. The Telnet connection is broken and the load process begins. During the download, the printer console shows the message:


```
I/O INITIALIZING
```

Notes:

- a. When the **Init** command is entered, the NIC disconnects from the terminal that issued the command and then the download process takes place.
 - b. No message is issued on the terminal to indicate that a download is taking place. You should wait for about ten minutes for the load to take effect.
 - c. Do **not** turn the printer off while the “/O INITIALIZING” message is displayed.
10. When the download is complete, the printer operator panel display returns to READY.
 11. Verify that the load was successful by checking the NIC code level on the Printer Configuration page. Refer to step 1.
 12. Log back into the NIC.
 13. Verify a satisfactory load with the Debug command (described in 28.7, “Debug” on page 245).
 14. Logoff the NIC with the logout command.

Appendix C. Related Publications

C.1 General Network Printer Publications

IBM Network Printers: IPDS and SCS Technical Reference, S544-5312.

- *IBM Network Printers: PCL5 and PostScript Technical Reference, S544-5344*
- *IBM Network Printers: Twinax/Coax Configuration Guide, G544-5241*

C.2 IBM Network Printer 12

- *IBM Network Printer 12: Quick Setup, G544-5371*
- *IBM Network Printer 12: Safety Instructions, S544-5372*
- *IBM Network Printer 12: Service Guide, G544-5373*
- *IBM Network Printer 12: User's Guide, S544-5370*

C.3 IBM Network Printer 17

- *IBM Network Printer 17: Quick Setup, G544-5346*
- *IBM Network Printer 17: Safety Instructions, G544-5347*
- *IBM Network Printer 17: Service Guide, G544-5369*
- *IBM Network Printer 17: User's Guide, S544-5343*

C.4 IBM Network Printer 24

- *IBM Network Printer 24: Quick Setup, G544-5375*
- *IBM Network Printer 24: Safety Instructions, G544-5376*
- *IBM Network Printer 24: Service Guide, G544-5377*
- *IBM Network Printer 24: User's Guide, S544-5378*

C.5 Related Documents

C.5.1 AS/400

- *TCP/IP Fastpath Setup, SC41-3430*
- *Client Access/400 for Windows 3.1 TCP/IP Setup, SC41-3580*
- *AS/400 TCP/IP Configuration and Reference, SC41-3420*

C.5.2 MVS

- *TCP/IP for MVS: Customization and Administration Guide, SC31-7134*
- *TCP/IP for MVS: Planning and Migration Guide, SC31-7189*

C.6 Publications from Other Vendors

- J.D. Marymee and Sandy Stevens, *Novell's Guide to NetWare Printing*, San Jose: Novell Press, 1996.

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Glossary of Terms and Abbreviations

This glossary contains definitions for terms and abbreviations used in this document. Terms in common use in the LAN environment are not defined here.

A

access community. Name for that set of people allowed to view or change SNMP data.

adapter. Hardware installed on a network printer and used to connect it to a network. In this publication, the adapter is called a Network Interface Card, abbreviated as NIC.

address. Internet address, usually in dotted decimal notation.

AFP. (1) AppleTalk Filing Protocol. A protocol allowing distributed file sharing on an AppleTalk network. (2) Advanced Function Printing or Presentation. IBM all-points-addressable printing that uses an intelligent print subsystem manager (PSF for AIX, PSF/2, PSF/400, PSF/VM, PSF/VSE) to print text and illustrations.

agent. Generally, a device under SNMP that can report alarm and other management information. Specifically, a term for that portion of the IBM NIC microcode that responds to requests for management services. SNMP uses an agent/manager model to describe the relationship between devices (agents) and management stations.

AIX. Advanced Interactive Executive OS. IBM version of Unix.

alarm. An indication of a status condition on a network resource.

AppleTalk. Apple's networking protocol.

ARP. Address Resolution Protocol. A TCP/IP protocol that provides IP to MAC address resolution.

AS/400. Application System/400, an IBM computer system.

ASN.1. Abstract Syntax Notation One. Syntax used to define MIBs.

ATP. Apple Transmission Protocol.

autodiscovery. Automated method of finding resources attached to a network.

B

beaconing. A signal repeatedly displayed on a Token Ring NIC on detection of a problem.

Bindery discovery. The method used by versions of Novell's NetWare prior to version 4.0 to discover resources on a LAN by querying file server binderies.

BNC. A type of connector used on coaxial cables.

BootP. Bootstrap Protocol. A TCP/IP internetworking protocol used to configure systems across networks.

bridge. The hardware and software used to connect two technologically similar networks into one network.

C

Common Name. The name of a leaf object in the NDS tree.

Community Name. A name used to identify an administrative relationship among SNMP entities.

Complete Name. The unique path from a leaf object to the root of the NDS tree.

configuration. The activity of describing the software settings that enable devices to communicate with each other.

console. The main display station for a network operating system or resource server.

context. The position of a leaf object within an NDS tree.

D

daemon. Disk and Execution MONitor. A program that waits for specific events and acts according to its instructions for dealing with them.

DHCP. Dynamic Host Configuration Protocol. An extension of the TCP/IP bootp protocol that is used to configure systems across networks on Windows NT and other systems.

directory services. Databases that list the names of logical units and where they are located on a network.

discovery. Activity of locating all resources (perhaps of a particular kind, such as IBM NICs) attached to a network.

DNS. Domain Name System. A mechanism used on the Internet for translating names of host computers into numerical IP addresses.

domain • lease length

domain. A server or collection of servers and all nodes attached to it logically. Each domain requires its own server.

domain name. Unique name for an internet site.

dotted decimal notation. A form of an IP address in which each byte is represented as numbers, with periods placed between the numbers (for example, 123.233.111.222).

E

EAROM. Electronically alterable ROM. The medium on which NIC microcode is stored.

Ethernet. A network cable and protocol scheme.

Ethernet Address. The MAC-layer address of a node. The physical address is recognized by the LAN controller hardware.

Ethertalk. AppleTalk packets encapsulated to run on Ethernet cables.

F

firmware. Software stored in EAROM on the NIC.

flash memory. A form of electronically erasable memory. Flash memory stores the software used by the NIC.

flow quantum. Term used in reference to AppleTalk communication parameters. Determines the rate at which data is sent over communications lines as well as the way in which different systems coordinate the flow of data between them. Also known as handshaking.

FTP. File Transfer Protocol (TCP/IP). This protocol makes it possible to transfer data among hosts.

G

gateway. The hardware and software needed to make two networks with different architectures communicate with one another.

H

hardware address. The low level address used by physical networks. Also known as the MAC address.

hop. A hop is one data link. A path to the final destination on an internetwork is a series of network hops away from the origin network.

host. Any independent computer system, such as a mainframe, that provides services to other computers.

I

IBM. International Business Machines Corporation.

ICMP. Internet Control Message Protocol.

IEEE. Institute of Electrical and Electronic Engineers.

IEEE 802.3. Standards for Ethernet cabling systems.

IEEE 802.4. Standards for Token bus cabling systems.

IEEE802.5. Standards for Token-Ring cabling systems.

IEEE1284. Standards for bi-directional interfaces.

internet. Any interconnected set of networks.

Internet. A collection of networks sharing the same name space.

internet address. An assigned number identifying a port on an internet. It has two or three parts: network number, optional subset (mask) number, and host number.

IP. Internet Protocol. The TCP/IP protocol that routes data from source to destination in an internet environment.

IP address. Internet Protocol Address. The notation in dotted decimal format (for example, 9.99.123.89) that uniquely identifies a node on a network. The first value represents the parent network, if any; the second represents the router or gateway, if any; the third represents the subnet name; and the fourth the specific device on the network.

IPDS. Intelligent Printer Data Stream. An IBM system-to-printer data stream for all-points-addressable printing.

IPX. Internetwork Packet Exchange. A protocol that allows the exchange of message packets on an internetwork. Used by Novell NetWare.

ISO/OSI. International Standards Organization Open Systems Interface.

J

job queue. A list of FIFO print jobs waiting to be printed.

L

LAA. Locally Administered Address. The local version of the MAC address.

LAT. Local Area Transport (DEC).

lease length. Under DHCP, specifies the duration of an IP address assigned to a device from a pool of addresses. A temporary assignment is assigned for the duration of a specific

LocalTalk • printer server

session. A permanent lease assignment assigns an IP address permanently to a device.

LocalTalk. Apple's peer-to-peer cabling scheme.

LPD. Line Printer Daemon. A printing protocol.

LPR. Line Printer.

M

MAC. Medium Access Control. A unique address associated with a NIC.

MIB. Management Information Base. A database used to provide management services.

MOP. Maintenance Operations Protocol (DEC).

MTU. Maximum Transmission Unit. TCP/IP packet size.

N

namespace. A commonly distributed set of names in which all names are unique.

NDIS. Network Driver Interface Standard.

NDS. NetWare Directory Services. A database built into NetWare 4.x used to access and maintain information about all resources on a network. The NDS replaces the Bindery database used in pre-4.x versions of NetWare.

NDS discovery. The version of discovery used by NetWare version 4.x and higher.

NetBEUI. NetBIOS Extended User Interface.

NetBIOS. Network Basic I/O System. An application program interface typically used on workstations that are attached to a Token Ring network.

network address. The NIC MAC address. Sometimes requested by systems like NT.

Network Management System. Programs that monitor and control network functions related to performance, resource and configuration management, and alarms and alerts from various network components.

network printer. A printer with a network interface that provides printing services to network users.

NFS. Network File System. A TCP/IP layer used to access files on Unix systems.

NIC. Network Interface Card.

NLM. NetWare Loadable Module. Software for NetWare 3.1+ that links dynamically to a NOS and can be added while the NIC is running.

NMP. Network Management Protocol.

NMS. Network Management Station. A workstation or server console set up to receive event notification from NICs.

node. Any device connected on a network.

NOS. Network Operating System.

O

object. An entity, such as a printer, server, or program, that is an element on a network. Each object has four characteristics: attributes, operations, notification capabilities, and relationships with other objects.

object identifier. A sequence of integers assigned to network objects by SMI to locate their position in the tree-like topology of a network.

originator. The node that starts route determination when it needs to find a source route to a remote node on a Token Ring network. Also known as the initiator or originating station.

OS/2. Operating System 2. An IBM operating system for IBM-compatible desktop computers.

OS/400. The operating system for IBM AS/400 systems.

P

PCL. Printer Control Language. Name for Hewlett-Packard's proprietary printer control language.

PCONSOLE. Novell NetWare Print Console software used to configure and manage network printers.

peer-to-peer. In the networking environment, any device that is on the same functional level as another device.

PID. Process ID.

polling. User-initiated request to get status information from devices.

port. Connection between a NIC and a printer. (The default port is 1.)

POST. Power On Self Test.

PPD. PostScript Printer Driver. Used in the Macintosh environment.

printer driver. Software used to enable specific printing capabilities, such as printing output of a specific nature.

printer server. Network interface card software that controls the operation of printers on a network.

printer services •zone

printer services. Interfaces between users requiring print services and printers.

PS. PostScript.

PServer. Novell NetWare software utility that manages the operation of printers on a network.

PSF. Print Services Facility. An IBM facility that provides inter-platform print services.

Q

queue. A list of items waiting to be processed.

R

RARP. Reverse Address Resolution Protocol. A protocol that maps 32-bit Internet addresses to 48-bit Ethernet addresses. See ARP.

RCF. Remote Control Facility.

RFC. Request for Comment.

remote printer. A printer, locally attached to a workstation, that also serves as a network printer.

responder. The node that receives a source route broadcast for source routing information from an originator.

route determination. The process of discovering a source route between nodes. Refer to "originator" and "responder."

RPrint. A Unix program that takes data from standard input, connects to a server, and transmits the data.

RPrinter. Novell NetWare remote printing protocol.

S

SAP. Service Access Point. Used to run an internet protocol over serial lines interconnecting two systems.

SCS. SNA Character String. A character string composed of EBCDIC control characters and (optionally) end-user data.

scope. Defines a range of TCP/IP addresses in a Windows NT environment that can be assigned on an as-needed basis by DHCP to devices needing a temporary IP address.

SMI. Structure of Management Information. A component of network management systems that defines the structure of management information as a tree with objects as leaves.

SNMP. Simple Network Management Protocol. One of the standard protocols used to communicate management information between manager and agents.

source routing. The forwarding of a message unit along a particular path through a network based on parameters specified by a NIC command.

SPX. Sequenced Packet Exchange.

SSAP. Source Service Access Point. A parameter type in an AS/400 printer line description. Identifies the service access point (SAP) that originated a data unit.

STP. Shielded Twisted Pair.

subnet. A term denoting any network technology that makes all nodes connected to it appear to be one hop away.

subnet mask. A part of the internet address that designates a subnet.

Syslog. A TCP/IP node designated to receive event notices.

T

TAR. A Unix file format.

TCP. Transmission Control Protocol.

10BASE-5. IEEE standard for thinwire Ethernet.

10BASE-T. IEEE standard for twisted pair Ethernet.

10BASE2. IEEE standard for thickwire coaxial Ethernet.

TES. A terminate and stay resident terminal emulation program.

TFTP. Trivial FTP.

trap. An unsolicited notification to an NMS of a significant event on an SNMP agent.

trap host. Workstation designated to receive messages about events from network objects, like printers or NICs. The workstation must run SNMP.

TSR. Terminate (and) Stay Resident.

U

UDP. User Datagram Protocol.

UTP. Unshielded Twisted Pair.

Z

zone. Apple's name for subnets or sections of a network.

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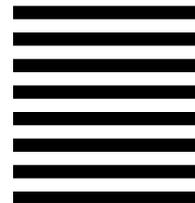
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