

IBM Network Printers
IBM InfoPrint 20
IBM InfoPrint 32



Ethernet and Token Ring Configuration Guide

Note!

Before using this information and the product it supports, be sure to read the general information in "Appendix D. Notices" on page 351.

Seventh Edition (September 1998)

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

This book is designed to help you install and configure the IBM Network Card for Ethernet and the IBM Network Card for Token Ring for your printer.

Notes:

1. This book uses the term **network printer** to generically refer to the following IBM printers:
 - IBM Network Printer 12
 - IBM Network Printer 17
 - IBM InfoPrint 20
 - IBM Network Printer 24
 - IBM InfoPrint 32
2. This book uses the term **InfoPrint printer** to generically refer only to the following IBM printers:
 - IBM InfoPrint 20
 - IBM InfoPrint 32
3. This book uses the terms **network interface card** or **NIC** to generically refer to the IBM Network Card for Ethernet and the IBM Network Card for Token Ring. Some networking software uses the term **printer network card**.

Server-to-Printer Attachments Described in this Book

This book describes the server-to-printer attachments described in the following table. Direct attachment of multiple machines to the printer, without the use of a print server, is also described for OS/2 and Windows systems.

Table 1. Server-to-printer Attachments

Server Environment	Server-to-Printer Protocol	Datastreams
AIX	TCP/IP	ASCII, IPDS, PCL, PostScript
Apple	AppleTalk: <ul style="list-style-type: none">• EtherTalk• TokenTalk	PostScript
AS/400	TCP/IP	ASCII, IPDS, PCL, PostScript
MVS	TCP/IP	IPDS, PCL, PostScript
Novell NetWare	IPX/SPX	ASCII, PCL, PostScript

Table 1. Server-to-printer Attachments (continued)

Server Environment	Server-to-Printer Protocol	Datastreams
OS/2 • LAN Server • LAN Manager	• TCP/IP • NetBIOS	ASCII, IPDS, PCL, PostScript
SUN Solaris	TCP/IP	ASCII, PCL, PostScript
HP-UX	TCP/IP	ASCII, PCL, PostScript
SCO UNIX	TCP/IP	ASCII, PCL, PostScript
Windows NT or 95	• Microsoft Service for NetWare • Novell Service for NT or 95 • TCP/IP	ASCII, PCL, PostScript

Notes:

1. To print PostScript, you must install the optional PostScript SIMM on the printer. (PostScript is standard on some printers.)
2. To print IPDS, you must install the optional IPDS SIMM on the printer and PSF for AIX, PSF/400, PSF/MVS, or PSF/2 on the host.
3. IPDS must use the TCP/IP protocol.

Contents of the NIC Package

The NIC package includes the following:

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

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

Obtain the latest version of any of the following items by accessing the IBM Printing Systems Company home page at <http://www.printers.ibm.com>.

Software Utilities

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

IBM Network Printer Manager (NPM)

NPM for OS/2, NPM for Windows NT and 95, and NPM for the Web allow network administrators to monitor, control, and configure IBM network printers in various environments. See “Chapter 26. IBM Network Printer Manager (NPM)” on page 277 for more information.

LAN Server Printer Utility, LAN Manager Printer Utility

These utilities allow you to redirect the output of as many as 16 printer queues to IBM network printers installed on your network using the TCP/IP or NetBIOS protocol. LAN Server Printer Utility works with OS/2 2.11 or greater and IBM LAN Server/Requester 3.0 or greater. LAN Manager Printer Utility requires OS/2 1.3 or above and LAN Manager 2.1 or above.

For detailed information including requirements, see the README file that accompanies each utility.

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 NIC commands described in “Part 7. NIC Command Reference” on page 281.

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.

Conventions

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.

key+key

Press both keys at once. (For example, **ALT+P**.)

NPM

When NPM can be used to perform a function described in a chapter or section, you will see an indicator (**NPM**) immediately following the title.

Platform-Specific Conventions

This book follows 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.

Product Support

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

IBM Support operates seven days a week, 24 hours a day 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 9
- A NIC configuration page, see page 11
- 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 description of the network topology

Part 1. The IBM NIC

Chapter 1. Start Here—Install the Network Interface Card (NIC)

Important

The information in this chapter applies to all NIC users. This chapter includes the following sections:

- “Installing the NIC in the Printer”
- “Default NIC Parameter Values” on page 7
- “Printing the Printer Configuration Page” on page 9
- “The NIC Configuration Page” on page 11
- “Installing a NIC in the Printer” on page 16
- “Physically Connecting a NIC to a LAN” on page 16
- “Verifying a Physical NIC-to-LAN Connection” on page 20

Installing the NIC in the Printer



DANGER

<1-13> Do not connect or disconnect a communication port, a teleport, or any other connector during an electrical storm.

hcsf0113



DANGER

<1-14> Switch off printer power and unplug the printer power cord before connecting or disconnecting a communication port, a teleport, or any other attachment connector.

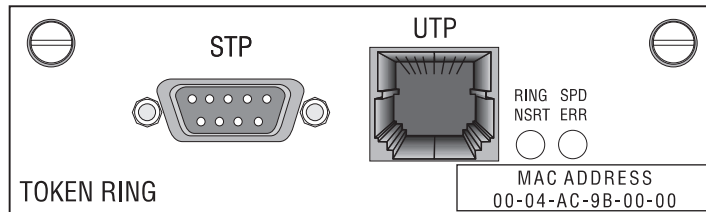
hcsf0114

- ___ 1. Set up your IBM network printer. Refer to the setup documentation shipped with your printer.
- ___ 2. Carefully remove the NIC from its anti-static bag.

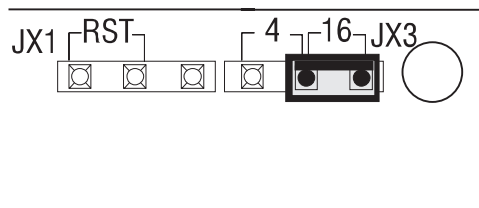
Beware of Static Electricity

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

- ___ 3. Write down the printer MAC address, which is located on the lower, right hand side of the NIC faceplate as shown below. (Some configuration procedures require the MAC address.)



- ___ 4. If you use a Token Ring network, do the following:
 - a. Lay the Token Ring card in front of you with the faceplate towards you.
 - b. On the card edge opposite the faceplate are six pins and two small jumpers.
 - If you are installing the card for a 16 Mbps network, make sure the jumper is placed over the pins labeled 16. (This is the default jumper position.)



- If you are installing the card for a 4 Mbps network, place the jumper over the pins labeled 4.
- ___ 5. Install the NIC in the printer. See page 16. **Do not attach the NIC cable to the network at this point.**

- ___ 6. Print a printer configuration page to verify the physical installation of the card. See “Printing the Printer Configuration Page” on page 9. If the “Installed Options” section does not show Ethernet or Token Ring, repeat step 5 on page 4.
- ___ 7. Connect the NIC to the LAN cable. See page 16.
- ___ 8. Verify the connection to the LAN cable. See “Verifying a Physical NIC-to-LAN Connection” on page 20.
- ___ 9. If you have a DHCP server on your network, review “Chapter 22. Dynamic Host Configuration Protocol (DHCP) and BOOTP” on page 239.
- ___ 10. If you want to change the MAC address on a Token Ring card to a Locally Administered Address (LAA), see “Setting the LAA from the Printer Operator Panel” on page 233, or use NPM (see the NPM online help).
- ___ 11. Configure your environment. Refer to one of the chapters in the following list.

Note to Windows Users: The CD-ROM supplied with the NIC contains a setup utility that runs in all Windows environments. The Setup Utility includes a printer setup wizard that can guide you through the network configuration steps. To run the Setup Utility, type *drive: setup*

at a command prompt, where *drive* is the letter of your CD-ROM drive.

AppleTalk, NetBIOS, and NetWare:

- “Chapter 2. AppleTalk” on page 27
- “Chapter 3. OS/2 NetBIOS” on page 35
- “Chapter 4. NetWare 3.X” on page 49
- “Chapter 5. NetWare 4.X” on page 61
- “Chapter 6. Windows NT using NetWare Services” on page 87

TCP/IP—AS/400

- “Chapter 7. Configuring on AS/400 as an ASCII Printer” on page 93
- “Chapter 8. Configuring on AS/400 as an IPDS Printer” on page 109

TCP/IP—MVS

- “Chapter 9. MVS to Print IPDS Files” on page 131

- “Chapter 10. OS/390 to Print S/390 Line Data, PCL, and PostScript Files” on page 143
- “Chapter 11. InfoPrintManager” on page 147

TCP/IP—OS/2

- “Chapter 12. OS/2 TCP/IP to Print PCL and PostScript Files” on page 151
- “Chapter 13. OS/2 TCP/IP to Print IPDS Files” on page 161

TCP/IP—UNIX

- “Chapter 14. AIX to Format and Print PCL and PostScript Files” on page 167
- “Chapter 15. AIX to Print Formatted PCL and PostScript Files” on page 175
- “Chapter 16. AIX to Print IPDS Files” on page 179
- “Chapter 17. HP-UX to Format and Print PCL and PostScript Files” on page 185
- “Chapter 18. SCO to Format and Print PCL and PostScript Files” on page 189
- “Chapter 19. SUN Solaris to Format and Print PCL and PostScript Files” on page 193

TCP/IP—Windows NT and 95

- “Chapter 20. Windows Platforms on TCP/IP Networks” on page 197

Optional Steps

- ___ 12. TCP/IP, NetWare, Appletalk, and NetBIOS network protocols are all enabled by default. If you do not use all of these protocols for printing you can disable the unused protocols to reduce network traffic. See “Disabling Network Protocols” on page 261.
- ___ 13. If you have a large NetWare network, consult the suggestions provided in “Improving Network Traffic on Large Networks” on page 76.
- ___ 14. If you want to customize your NIC, see “Chapter 24. Customizing the NIC” on page 261.
- ___ 15. For more information about monitoring your printer, see “Chapter 25. Monitoring Network Printers” on page 267.

Default NIC Parameter Values

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

Table 2. Principal NIC Default Parameters and Conditions

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
<p>Note: Refer to “Logging into a NIC using TCP/IP Telnet” on page 290 and “Logging into a NIC using NetWare IPX” on page 287.</p>		
lpd queue (plain text)	<p>TEXT (upper case only)</p> <p>Unformatted ASCII files with carriage returns (CR) or carriage returns and line feeds (CRLF)</p>	<ul style="list-style-type: none"> • AIX/UNIX for formatted files • AS/400 • OS/2 • Windows NT/95 for TCP/IP
<p>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.</p>		
lpd queue (PostScript or PCL)	<p>PASS (upper case only)</p> <p>Either binary files or files formatted for PCL or PostScript using an IBM printer driver</p>	<ul style="list-style-type: none"> • AIX/UNIX for formatted files • AS/400 • OS/2 • Windows NT/95 for TCP/IP
<p>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.</p>		
lpd service	TCP port 515	LPR printing
NIC name (node name)	<ul style="list-style-type: none"> • NCEnnnnnn (10BaseT/10Base2 NIC or 100BaseTx NIC) • NCTnnnnnn (Token Ring) <p>nnnnnn is the last six digits of the MAC address.</p>	<ul style="list-style-type: none"> • NetBIOS • NetWare • TES/Kermit

Table 2. Principal NIC Default Parameters and Conditions (continued)

Parameter/Limit	Values	Affected Area
Printer service name	<ul style="list-style-type: none"> • NCE$nnnnnn$_1 (10BaseT/10Base2 NIC or 100BaseTx NIC) • NCT$nnnnnn$_1 (Token Ring) $nnnnnn$ is the last six digits of the MAC address.	<ul style="list-style-type: none"> • NetBIOS • NetWare
Printer service name	IBM Network Printer nn	AppleTalk
SNMP community name	<ul style="list-style-type: none"> • ibmpsc_admin (Read/Write) • ibmpsc_job (Read/Write) • public (Read) 	Monitoring (for example, NPM, IBM TCP/IP Network Port Monitor)
SNMP packet size	482 bytes	<ul style="list-style-type: none"> • Ethernet • Token Ring
TCP port for printing	2501	TCP/IP, LAN Server Printer Utility, LAN Manager Printer Utility, IBM TCP/IP Network Port Monitor
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: 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 “Disabling DEC/LAT and MOP Announcements” on page 262.

Ethernet and Token Ring Frame Types on IBM NICs

The IBM NIC supports only one default frame type per protocol. The default NetWare frame type is “auto”, which means that the IBM NIC selects the first frame type discovered as the frame type.

To change the default frame type:

- For IBM InfoPrint printers, change the NW FRAME item on the TOKEN RING Menu or ETHERNET Menu on the printer console.
- For other printers, see “Frame” on page 300.

The supported frame types are:

- AppleTalk: Ethernet_SNAP, Token Ring_SNAP
- IPX/SPX: Ethernet_802.2, Ethernet_802.3, Ethernet_II, Ethernet_SNAP, Token Ring_802.2, Token Ring_SNAP
- NetBIOS: Ethernet_802.2, Token Ring_802.2
- TCP/IP: Ethernet_II, Token Ring_SNAP

Printing the Printer Configuration Page

To print a printer configuration page:

1. Turn the printer on.
2. When the printer has warmed up and displays READY, press the **Online** key to take the printer offline.
3. Press the **Menu** key.
4. Press the **Item** key to display the CONFIG PAGE item.
5. Press the **Enter** key to print the configuration page.
6. When the configuration page has printed, press **Online** to put the printer back online.

The following figure shows a sample printer configuration page:

IBM Network Printer 24 Configuration Page

TEST MENU ①

- CONFIG PAGE
- PRINT PS FONTS
- PRINT PCL FONTS
- PRINT PS DEMO
- CONTINUOUS TEST
- RESET PRINTER
- FACTORY DEFAULT
- FORMAT DISK
- ONLINE HEX PRT

PAPER MENU

- SOURCE = TRAY 2
- OUTPUT = MAIN
- TRAY SWITCH = OFF
- MANUAL = OFF
- AUXSIZE = LETTER
- ENVSIZE = COM10
- DUPLEX = ON
- BINDING = LONG
- TRAY RENUM = OFF

CONFIG MENU

- JAMRECOVERY = OFF
- AUTOCONTINU = ON
- DENSITY = 15
- PWRSAV=30 MIN
- QUALITY = REFINE

MEMCONFIG MENU

- PCL SAVE = OFF
- PS2 SAVE = OFF

PARALLEL MENU

- PERSONALTY = AUTO
- Bi-DI = ON
- PORT TIMEOUT = 15

PCL MENU

- PAGEPROT = AUTO
- COPIES = 1
- PAGESIZE = LETTER
- ORIENTAION = P
- FORM = 60 LINES
- FNTSCR = INTERNAL
- FONTNUM = 0
- PT.SIZE = 12.00
- PITCH = 10.00
- SYMSET = ROMAN-8

PS MENU

- PAGEPROT = AUTO
- COPIES = 1
- PRINT ERRS = OFF

ETHERNET MENU

- PERSONALTY = AUTO
- PORT TMEOUT = 15

MACHINE INFO

- PAGE COUNT
- ERROR LOG
- TONER CTR
- FUSER CTR

LANGUAGE MENU

- LANG = ENGLISH

INSTALLED OPTIONS ②

- DUPLEX
- ENVELOPE FEEDER
- PS
- ETHERNET
- DISK
- 32 MB Extra Memory
- TOTAL MEMORY = 36 MB

AUTOSENSED PAPER ③

- TRAY 1= LETTER
- TRAY 2 = 11 X 17

PRINTER DETAILS ④

- PAGE COUNT = 3330
- TONER CTR = 1741
- FUSER CTR = 1741
- CODE LEVELS
 - CTL 1.04
 - PCL 1.3.1
 - PS 1.06
 - EN 5.16

c9pu241

Description of the Printer Configuration Page

1. **Menus**—All of the menu settings currently active for your printer. Note that the list of menus you see is determined by the options you have installed; for example, you see the Ethernet Menu only when you have the Ethernet attachment installed.
2. **Installed Options**—The options and memory you have installed.
3. **Autosensed Paper**—The paper loaded in various trays. In this example, letter size paper is loaded in Tray 1 and 11 by 17 inch paper is loaded in Tray 2.
4. **Printer Details**—Page counts for the printer, the toner cartridge, the fuser, and printer program code levels.
 - A. **Page Count**—The number of pages printed on the printer.
 - B. **Toner CTR**—The number of pages printed with the toner cartridge. (You should reset the toner count whenever you replace the toner cartridge.)
 - C. **Fuser CTR**—The number of pages printed with the fuser. (You should reset the fuser counter whenever you replace the fuser.)
 - D. **Code Levels**—The printer program code version levels installed on the printer for the printer controller, data stream languages, and options (such as NIC code). You may need this number if you need to make code updates.
 - E. **CTL**—The printer controller program code level.
 - F. **PCL**—The PCL code level of the printer.
 - G. **PS**—The PostScript code level of the printer.
 - H. **EN**—The Ethernet code level of the printer.
 - TR** (not shown) -- The Token Ring code level of the printer.
 - IPDS** (not shown) -- The IPDS code level of the printer.

Note: The actual code levels you see depend on what options you have installed.

The NIC Configuration Page

NPM

You can obtain a NIC configuration page in the following ways:

- Using the printer while disconnected from the LAN.
- Using the NIC command line or NPM while connected to the LAN.
- Using the printer operator panel on the IBM InfoPrint printers.
- Accessing the web pages embedded in the 100BaseTx NIC.

Note: The NIC configuration page can display different values depending on whether or not your printer is connected to the LAN. When the printer is disconnected from the LAN, the NIC configuration page displays the values that are permanently written in NIC storage. When the printer is connected from the LAN, the NIC configuration page displays the values that result from the network connection.

Getting a LAN-Independent Configuration Page

A LAN-independent configuration page displays values that are permanently written in NIC storage. To print a LAN-independent NIC configuration page:

1. Power off the printer.
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 power cord.
5. Power on the printer.
6. The NIC configuration page prints automatically within two minutes. Refer to “A Sample NIC Configuration Page” on page 13 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. Power off the printer.
8. Reconnect the printer to the LAN.
9. Wait a few seconds, then power on the printer.

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.

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 the following ways:

- Accessing the embedded web pages on a NIC: To access the embedded web pages, go the following location from your web browser:

http://n.n.n.n

where n.n.n.n is the IP address of the printer.

For detailed information about using the embedded web pages, view the online help directly from the embedded web pages.

Note: Embedded web pages are available on the 100BaseTx NIC. They are available on other NICs (Ethernet 10BaseT/10Base2 NIC and Token Ring) only when NIC microcode level 7.20 is installed. For information about installing new microcode, see “Updating the NIC Microcode” on page 345.

- Using NPM. See the NPM online help.
- From the printer operator panel (IBM InfoPrint printers only):
 1. Turn the printer on.
 2. When the printer has warmed up and displays READY, press the **Online** key to take the printer offline.
 3. Press the **Menu** key to display the Test Menu.
 4. Press the **Item** key to display the PRINT TR CONFIG or PRINT EN CONFIG item.
 5. Press the **Enter** key to send the configuration page to the internal print queue.
 6. If necessary, press the **Online** key to put the printer back online and print the configuration page.
- From the command line:
 1. Logon to the NIC. See “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.
 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
```

A Sample NIC Configuration Page

The following example shows the information contained on a Token Ring configuration page. It is almost identical to the Ethernet configuration page. The main exception is that Ethernet cards do not support changing the source routing or changing the MAC address to the LAA address.

Notes:

1. The actual format of a printed configuration page will be different.

2. The information shown in **bold** is not printed on the NIC configuration page; it is provided here for information.

Network Interface Configuration for Token Ring

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**)

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

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

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

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

AppleTalk Information

Zone: *
Network Address: 1F4.13
Flow Quantum: 8

Port Configuration

1 PSIO Rev. 3.0
Access: remote Queuing: disabled
TBCP: disabled Backspool: enabled
2 Serial - full modem
Type: softcopy
Access: virtual Queuing: 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

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

Installing a NIC in the Printer

IBM Network Printer 12 supports one network card; all the other printers can simultaneously support two network cards. If you do install two cards in a printer, they must be different types. You cannot, for example, install two Token Ring cards in the same printer; nor can you install two Ethernet cards, even if they are different speeds.

To install the NIC:

1. Turn printer 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 thumbscrews on the NIC to secure it in place.
6. Reattach the power cord.
7. Print a printer configuration page (refer to “Printing the Printer Configuration Page” on page 9) 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 the printer.

Physically Connecting a NIC to a LAN



DANGER

<1-13> Do not connect or disconnect a communication port, a teleport, or any other connector during an electrical storm.

hcsf0113



DANGER

<1-14> Switch off printer power and unplug the printer power cord before connecting or disconnecting a communication port, a teleport, or any other attachment connector.

hcsf0114

Connecting to an Ethernet LAN (10BASE-T/100Base-Tx NIC)

To connect the 10BASE-T/100Base-Tx NIC to an Ethernet LAN, use one of the following:

- For a 10BASE-T Ethernet LAN, use a 10BASE-T (UTP, Unshielded Twisted Pair) cable with an RJ-45 connector (Category 3, 4, or 5 cabling).
- For a 100BASE-Tx Ethernet LAN, use a 100BASE-T (UTP, Unshielded Twisted Pair) cable with an RJ-45 connector (Category 5 cabling).

Cables attach to the card at the location in the following illustration:

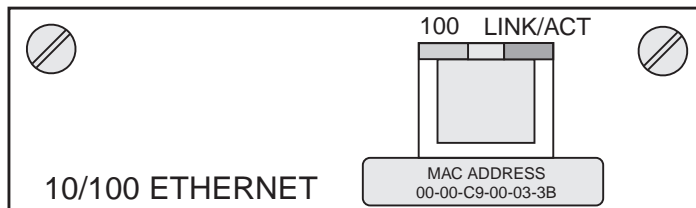


Figure 1. 10BASE-T/100Base-Tx NIC Ethernet Cable Connections

Connecting to an Ethernet LAN (10BASE-T/10Base2 NIC)

To connect the 10BASE-T/10Base2 NIC to an Ethernet LAN, use one of the following:

- For a 10BASE-T Ethernet LAN, use a 10BASE-T (UTP, Unshielded Twisted Pair) cable with an RJ-45 connector (Category 3, 4, or 5 cabling).
- For a 10BASE2 Ethernet LAN, use a 10BASE2 (BNC) thin wire cable with a BNC T-adapter

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

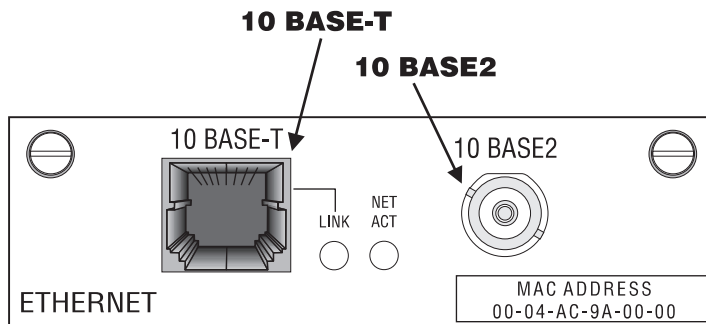


Figure 2. Ethernet Cable Connections

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.

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-adaptor. To connect the NIC to the end of a cable segment, attach the LAN cable to one side of the 10BASE2 T-adaptor 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.

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

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.

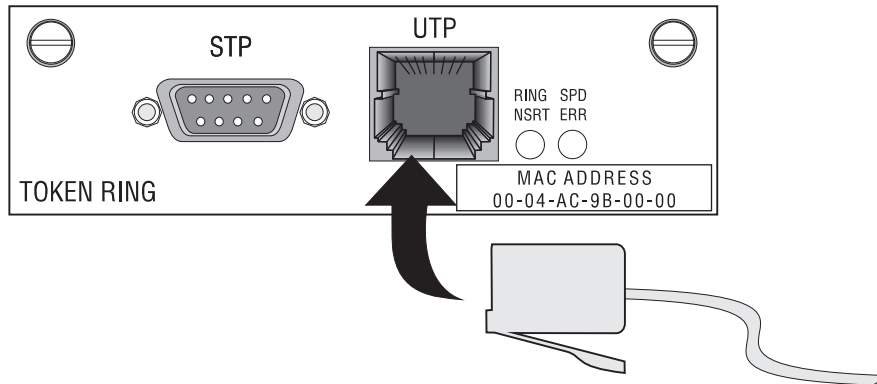


Figure 3. Token Ring UTP Connection

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.

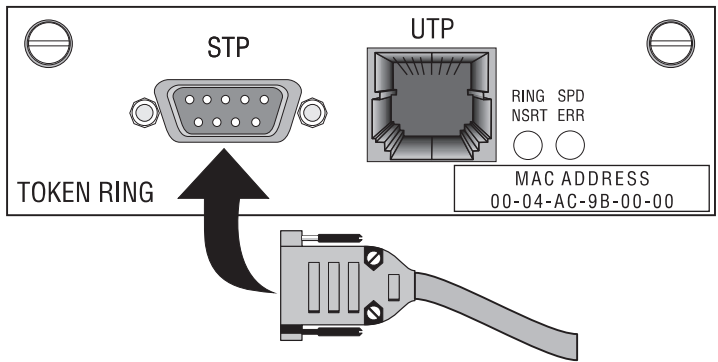


Figure 4. Token Ring STP Connection

Verifying a Physical NIC-to-LAN Connection

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

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

Table 3. Lights for a Properly Connected NIC

Token Ring	<ul style="list-style-type: none"> • The RING NSRT light is On • The SPD ERR light is Off
Ethernet (10BaseT/10Base2 NIC)	<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.

Table 3. Lights for a Properly Connected NIC (continued)

Ethernet (100BaseTx NIC)	<ul style="list-style-type: none"> • For a 10BaseT connection: <ul style="list-style-type: none"> - The 100 light is Off - The LINK/ACT light flashes intermittently. • For a 100BaseTx connection: <ul style="list-style-type: none"> - The 100 light is On - The LINK/ACT light flashes intermittently.
<p>Note: Refer to Table 4, Table 5 on page 22, or Table 6 on page 23 for a description of what the lights show if a NIC is not connected properly.</p>	

The following sections describe the lights in more detail.

Token Ring NIC Lights

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

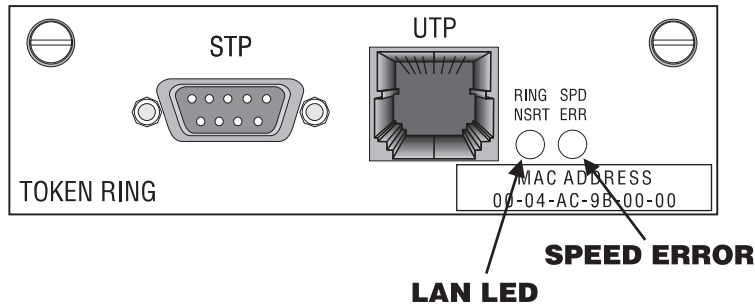


Figure 5. Token Ring Lights

Table 4 shows the Token Ring NIC's light settings.

Table 4. Token Ring NIC Light Settings

Condition	RING NSRT	SPD ERR
Power off	Off	Off
Power on (not connected to LAN)	Blinking	Off
Power on (connected to LAN)	On	Off
Power on (connected at wrong speed)	On	On

Ethernet 10BaseT/10Base2 NIC Lights

The Ethernet 10BaseT/10Base2 NIC lights, labeled **LINK** and **NET ACT**, may light up, depending on the NIC condition.

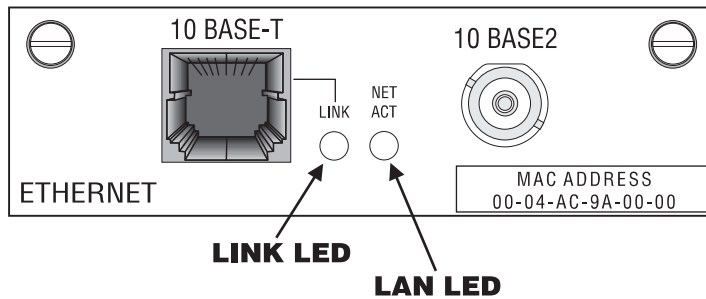


Figure 6. Ethernet 10BaseT/10Base2 NIC Lights

Table 5 shows the Ethernet NIC's light settings.

Table 5. Ethernet 10BaseT/10Base2 NIC Light Settings

Condition	LINK	NET ACT
Power Off	Off	Off
Power on (Not connected to LAN)	Off	Off
Power on (connected UTP)	On	On (Intermittent)
Power on (connected BNC)	Off	On (Intermittent)
Power on (connected Error)	On	Blinking

Ethernet 100BaseTx NIC Lights

The Ethernet 100BaseTx NIC lights, labeled **100** and **LINK/ACT**, may light up, depending on the NIC condition.

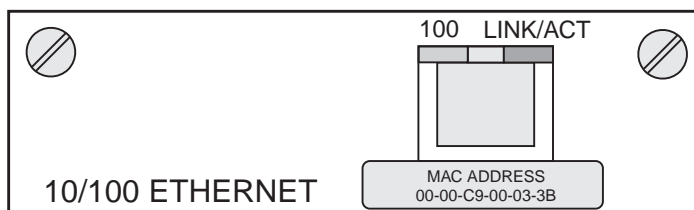


Figure 7. Ethernet 100BaseTx NIC Lights

Table 6 shows the Ethernet NIC's light settings.

Table 6. Ethernet NIC Light Settings

Condition	100	LINK ACT
Power Off	Off	Off
Power on (Not connected to LAN)	Off	Off
Power on (100 Mbit LAN)	On	Intermittent (Good connection to Ethernet)
Power on (10 Mbit LAN)	Off	Intermittent (Good connection to Ethernet)

Part 2. AppleTalk Configuration

Chapter 2. AppleTalk

NPM

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

Requirements

- 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
- PostScript installed on your printer. (If you don't know if PostScript is installed in your printer, print a configuration page. See "Printing the Printer Configuration Page" on page 9.

Configuration Checklist

- ___ 1. If you have not already done so, set up the printer and install the NIC. See "Chapter 1. Start Here—Install the Network Interface Card (NIC)" on page 3.
- ___ 2. Install the IBM Network Printer driver. See "Installing the IBM PostScript Printer Driver".
- ___ 3. Configure your printer. See "Configuring AppleTalk to Print to IBM Network Printers" on page 29.
- ___ 4. Verify the configuration by sending a print job to the printer.
- ___ 5. Change the AppleTalk name of your printer. See "Changing the Name of the Printer on AppleTalk" on page 30.
- ___ 6. Optionally, change the AppleTalk zone of your printer. See "Changing the AppleTalk Zone on Ethernet NICs" on page 30.

Installing the IBM PostScript Printer Driver

The printer driver for AppleTalk is located on the CD-ROM and on the IBM printers web site. Visit the home page at <http://www.printers.ibm.com>.

Installing from the Web

Drivers and Utilities on the Web

To obtain a current version of a printer driver, program, or utility:

1. Access the IBM Printing Systems Company home page:

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

2. Navigate to the printer driver, utility, or program you need and follow the instructions to download it

1. Read the README file to find out what you have to do to use the driver.
2. Download the printer driver to the Macintosh.
3. If necessary, obtain the conversion utility, also from the web.
4. If necessary, run the conversion utility to convert the "Hqx" file on the Macintosh. Once decoded, you will see an icon labeled "IBM Network Printer Installer".
5. Select **IBM Network Printer Installer**.
6. A dialog box with the IBM logo displays. Click **Drive** to select the drive to install to. Click **Install** to install the driver and other software.
7. When done, click **Quit** to exit the Installer program.

Installing from the CD-ROM (LCD4-0816-05 or Lower)

1. Insert the CD-ROM into the appropriate drive. An Icon called NPSETUP (Network Printer Setup CD) will appear on the desktop.
2. Double click on the NPSETUP icon to open it.
3. Double click on the folder for the language that you want to use.
4. Double click on the IBM Network Printer Installer icon.
5. A dialog box with the IBM logo displays. Click **Drive** to select the drive to install to. Click **Install** to install the driver and other software.
6. When done, click **Quit** to exit the Installer program.

Installing from the CD-ROM (LCD4-0816-06 or Higher)

1. Insert the CD-ROM into the appropriate drive. An Icon called NPSETUP (Network Printer Setup CD) will appear on the desktop.
2. Double click on the NPSETUP icon to open it.
3. Double click on the MAC folder to open it.
4. Double click on the folder for the language that you want to use.
5. Double click on the PS folder to open it.
6. Drag and drop the .Hqx file from the CD to the desktop.
7. Drag and drop the .Hqx file from the desktop to the Stuffit Expander. An icon for the IBM Network Printer Installer will appear on the desktop.

8. Select **IBM Network Printer Installer**.
9. A dialog box with the IBM logo displays. Click **Drive** to select the drive to install to. Click **Install** to install the driver and other software.
10. When done, click **Quit** to exit the Installer program.

Configuring AppleTalk to Print to IBM Network Printers

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> or IBM InfoPrint <i>nn</i>	

Configuration Procedure

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, print a NIC configuration page and look for “AppleTalk” under the Network Information section. See “The NIC Configuration Page” on page 11.
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 PSpriinter printer driver icon. The right side of the Chooser Window displays a list of printers with which you can associate the driver.
7. In the list of AppleTalk printers, select the IBM network printer to associate the driver with.
8. Click the **Setup** button.
9. Select **Auto Setup**.
10. Select the PPD with the same name as the printer.
11. In the next window, choose the installable options which match your printer’s installed options. Click **OK**. The original Setup window displays; click **OK**.
12. The PPD is now compiled automatically. When completed, a small icon displays to the left of the printer name in the Chooser.
13. Set background printing on or off.

14. Quit the Chooser, and click **OK** on the Page Setup message if it appears. The printer will now appear on the desktop.

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. The reason for this recommendation is that when multiple IBM network printers of the same model (for example, two or more Network Printer 17s) are connected to the LAN, the default printer name changes each time a printer is powered up or connected to the network. When the first Network Printer 17 on the network is turned on, it is listed as 17, the second Network Printer 17 is listed as 171; the third is listed as 172; and so on.

To change the name of the printer using the IBM Printer Utility:

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, click **OK**, and then click **Done**.
7. The printer, with its new name, will now show up in the **IBM Printer Utility** dialog, and the Chooser.

Changing the AppleTalk Zone on Ethernet NICs

In order to organize AppleTalk resources, you may want to specify the zone where a printer will show up. Initially, the printer's AppleTalk name will show up in the default zone of your network. On Ethernet NICs **only**, the zone where the AppleTalk name shows up can be changed. The IBM Printer Utility or Macintosh LaserWriter Utility can be used to change the AppleTalk zone on NICs with a code level of 6.2 or above.

To change the name of the printer using the IBM Printer Utility:

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, select **Rezone**.
6. From the **Printer Type** list, select **Laser Writer**.

7. From the **Available Zones** list, select the desired zone, then click **Set Zone**. The printer NIC's AppleTalk name will now show up in the selected zone.

Changing the AppleTalk Zone Using Embedded Web Pages

If your NIC supports embedded web pages, you can use your web browser to display various AppleTalk settings and specify the AppleTalk zone.

To access AppleTalk information on the embedded web pages:

1. Use your web browser to go to the following location:

`http://n.n.n.n`

where n.n.n.n is the IP address of the printer.

2. Click **Configure Printer**.
3. Click **Protocol Setup**.
4. Click **AppleTalk settings**.
5. In the **Desired Zone** field, type the name of the AppleTalk zone you want. Then click **Change**.

For information about requirements for embedded web pages, see “Chapter 27. Embedded Web Pages” on page 279. For detailed information about using the embedded web pages, view the online help directly from the web pages.

Note: Embedded web pages are available on the 100BaseTx NIC. They are available on other NICs (Ethernet 10BaseT/10Base2 NIC and Token Ring) only when NIC microcode level 7.20 is installed. For information about installing new microcode, see “Updating the NIC Microcode” on page 345.

Part 3. NetBIOS Configuration

Chapter 3. OS/2 NetBIOS

NPM

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.

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.

Configuration Checklist

Authority Level Required

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

- ___ 1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. You need the following data to configure the NIC:

Table 7. NetBIOS Configuration Data

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 . 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 NC X9a1234_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 and check for a service that lists NetBIOS as a supported protocol. The service name is used to send print jobs to the printer.	

- ___ 3. Install the driver for OS/2. See “Installing the Printer Driver” on page 37.
- ___ 4. Install the LAN Manager or LAN Server printer utility. See “Installing OS/2 Utilities” on page 37.
- ___ 5. Use the LAN Server or LAN Manager printer utility to install the printer. See “Installing the Printer on OS/2 using NetBIOS” on page 38.
- ___ 6. Create a printer alias. See “Sharing the Printer by Creating the Printer Alias” on page 39 as an example.
- ___ 7. Configure print requesters. See “Configuring Print Requesters on OS/2” on page 40.

- ___ 8. Verify the configuration. See “Verifying the NetBIOS Configuration” on page 43 to print from NetBIOS.
- ___ 9. If you have problems, refer to “Handling NetBIOS Problems” on page 45.

Installing the Printer Driver

Drivers and Utilities on the Web

To obtain a current version of a printer driver, program, or utility:

1. Access the IBM Printing Systems Company home page:
<http://www.printers.ibm.com>
2. Navigate to the printer driver, utility, or program you need and follow the instructions to download it

1. Obtain the driver from the CD-ROM or the web.
2. Read the README file for installation instructions.
3. Install the printer driver using a temporary name, such as TEMP, for the queue.
4. Select the temporary printer queue icon.
5. Delete the temporary icon.

Installing OS/2 Utilities

Drivers and Utilities on the Web

To obtain a current version of a printer driver, program, or utility:

1. Access the IBM Printing Systems Company home page:
<http://www.printers.ibm.com>
2. Navigate to the printer driver, utility, or program you need and follow the instructions to download it

Use this procedure to install the LAN Manager Printer Utility or LAN Server Printer Utility on the server system.

1. Place the CD-ROM with the LAN Server Printer Utility or LAN Manager Printer Utility into the appropriate drive.
2. Enter:
`d:\LAN\name\install`

where *d* is the drive letter of your CD drive and *name* is either LANMAN or LANSRV.

3. Click **Continue** and then click **OK**.
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.

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 **Add NetBIOS printer**. The **Add NetBIOS Printer** window displays.
5. Fill in the fields with the following information:

Printer Name

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

Comment

Optional comments.

Driver Select the printer driver for the printer being installed.

Server (Node) Name

The NIC name: `NCEnnnnnn` for Ethernet (10BaseT/10Base2 NIC or 100BaseTx NIC) or `NCTnnnnnn` for token ring, where *nnnnnn* is the last six digits of the MAC address.

Service Name

The name of the NetBIOS printer service on the IBM NIC. Use the default service name of the printer: `NCEnnnnnn` for Ethernet (10BaseT/10Base2 NIC or 100BaseTx NIC) or `NCTnnnnnn` for token ring, where *nnnnnn* is the last six digits of the MAC address. For example, `NCT0000DA_1` or `NCE0000DA_1`.

6. Click on **Add**. A printer queue is created on the OS/2 desktop.
7. Right click the printer object icon, select **Properties**, then select **Queue Options**. Verify that **PM Print** is selected.

8. Optionally, move the printer queue icon that you just created to the printer queue folder.

Sharing the Printer by Creating the Printer Alias

The following example uses LAN Server Version 4.0.

Data Requirements

Table 8. NetBIOS Printer Sharing Data

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, printer service, or object. This was assigned during one of the two following procedures: <ul style="list-style-type: none"> • Step 6 on page 156 of "Installing the Printer using Standard OS/2 TCP/IP" on page 154 • Step 5 on page 38 of "Installing the Printer on OS/2 using NetBIOS" on page 38 	

Configuration Procedure

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

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**. If this option is not visible, you did not logon as administrator.
5. Drag and drop the **Printer Template** to a convenient location in the Resource Definitions window. The **Printer Alias - Create** window opens.
6. Fill in the fields:
 - a. Type an alias name in the **Alias** field. This name must be unique to your domain.
 - b. Optionally, type a description in the **Description** field.
 - c. 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.

- d. 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 38 or 7 on page 153.
- e. 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.
- f. If you wish to limit the maximum concurrent connections to the printer resource, enter that number in the **Number of connections** field.
7. Select the **General** tab to continue configuring your printer alias.
8. Type in the name of your alias in the **Title** section.
9. Select **Create** to save your settings and install your alias in the **Resource Definitions** folder.
10. 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.
11. Select the **Permissions** tab to define access permissions for your users and groups.
12. 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.
13. After you have completed the permissions section, click the **Auditing** tab to open the Audit settings view.
14. Decide which level of auditing you wish to have on this printer resource.
15. Click the **Create** button to create the access control profile for your printer resource.
16. Verify that your printer resource is shared by issuing the following command in an OS/2 command line window:
net share

Configuring Print Requesters on OS/2

This section describes:

- “Setting up a Shared Printer on an OS/2 Requester” on page 41
- “Setting up a Shared Printer on a DOS Requester” on page 42
- “Setting up a Shared Printer on a WIN-OS/2 Requester” on page 42

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.

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 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 share.
3. Create a directory alias named NPMDRV for the C:\DRIVERS directory. See "Sharing the Printer by Creating the Printer Alias" on page 39 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.

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 (see “Installing the Printer Driver” on page 37), 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 “Verifying the LAN Server Configuration” on page 157.

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 that 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 “Chapter 23. Handling TCP/IP Problems” on page 255 or “Handling NetBIOS Problems” on page 45.

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-OS/2 requester:

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

Setting Up the OS/2 Connection

1. Install the Windows 3.1 x driver using the **Printers** applet under **Control Panel** in WIN-OS/2. Connect this printer to the parallel port, LPT x.OS2. If you intend to use multiple network-attached printers, connect each of them to a different LPT x.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. To send a print job to the printer from the OS/2 command line, enter a command like:

```
copy filename lpt2
```

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.

Problems?

If you have problems printing, refer to “Chapter 23. Handling TCP/IP Problems” on page 255 or “Handling NetBIOS Problems” on page 45.

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.**

Note: The 3.0 version of the LAN Server Printer Utility automatically selects PMPRINT as the OS/2 print queue option. If you are using LAN Server Printer Utility or LAN Manager Printer Utility version 3.0 or greater, you do **not** have to have either the LAN Server Printer Utility or the LAN Requester started, and you do not have to be logged onto the network. You can skip to step 4 on page 44.

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 command:

```
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
```
8. When finished, delete the net use LPT assignment from the spooler with the command:

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

Changing the Workgroup Name Using Embedded Web Pages

If your NIC supports embedded web pages, you can use your web browser to display various NetBIOS settings and specify the NetBIOS workgroup name.

To access NetBIOS information on the embedded web pages:

1. Use your web browser to go to the following location:

```
http://n.n.n.n
```


where *n.n.n.n* is the IP address of the printer.
2. Click **Configure Printer**.
3. Click **Protocol Setup**.
4. Click **NetBIOS settings**.
5. In the **Workgroup name** field, type the name of the workgroup you want. Then click **Change**.

For information about requirements for embedded web pages, see “Chapter 27. Embedded Web Pages” on page 279. For detailed information about using the embedded web pages, view the online help directly from the web pages.

Note: Embedded web pages are available on the 100BaseTx NIC. They are available on other NICs (Ethernet 10BaseT/10Base2 NIC and Token Ring) only when NIC microcode level 7.20 is installed. For information about installing new microcode, see “Updating the NIC Microcode” on page 345.

Handling NetBIOS Problems

- Make sure that NetBIOS is enabled on the NIC. To do that, obtain a NIC configuration page (refer to “The NIC Configuration Page” on page 11).
- If NetBIOS is enabled on the NIC, verify that the correct data was entered during the configuration process. Make sure the printer service name ends with an “_1”. The name is case-sensitive.
- For versions of the LAN Server Printer Utility or LAN Manager Printer Utility earlier than Version 3.0, make sure that (a) you are logged on to either LAN Server or LAN Manager and (b) LAN Server Printer Utility or LAN Manager Printer Utility are running. If the printer utility is not running, you will not be able to print.

Part 4. NetWare Configuration

Chapter 4. NetWare 3.X

NPM

Use this chapter to configure the IBM NIC under NetWare 3.X as a print server or remote printer using the NetWare command line. NPM can perform the command line procedures described here with a minimum of input from you. See “Configuring for NetWare using IBM NPM for Windows NT and 95” on page 52.

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: File servers and workstations that submit print jobs to the printer must support the IPX/SPX protocol (Novell NetWare Shell Version 3.26 and above).

Configuration Checklist

Authority Level Required

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

- ___ 1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. If you have a network with multiple servers, see “Configuring NetWare on a Large Network” on page 50.
- ___ 3. Determine whether you want to use the NIC as a print server or a remote printer. See “Choosing Print Server or Remote Printer” on page 50.
- ___ 4. Optionally, change the default frame type. See “Ethernet and Token Ring Frame Types on IBM NICs” on page 9.
- ___ 5. Configure your printer:

- **NPM:** If you use NPM, see “Configuring for NetWare using IBM NPM for Windows NT and 95” on page 52.
 - **PConsole:** If you use PConsole, see one of the following:
 - “Configuring under NetWare 3 as a Print Server using PConsole” on page 52.
 - “Configuring under NetWare 3 as a Remote Printer using PConsole” on page 54.
 - **Embedded web pages:** see “Changing NetWare Settings Using Embedded Web Pages” on page 57.
- ___ 6. Verify the configuration. See “Verifying the NetWare Configuration” on page 58.
- ___ 7. If you encounter problems, see “Handling NetWare/IPX Problems” on page 78.

Configuring NetWare on a Large Network

The following list includes several optional procedures you can perform if you run a large network.

1. Logon to the NIC. See “Logging into a NIC using NetWare IPX” on page 287.
2. Set the preferred server. See “Specifying a Preferred NetWare Server” on page 266.
3. Set the frame type. See “Specifying the NetWare Frame Type” on page 266. On the IBM InfoPrint printers, you can set this using the operator panel menus.
4. Set the required server. See “Specifying a Required NetWare Server” on page 266.
5. See “Improving Network Traffic on Large Networks” on page 76 for other considerations.

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 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) will take up one licensed connection.

Note: See “Determining NetWare File Server Licenses” on page 78 for information about estimating the number of licenses needed.

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

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 Remote Printer facility
- Supports encrypted or unencrypted passwords

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:

- “Disabling Remote Printer if You Are Using only Print Server” on page 77
- “Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode” on page 77
- “Disabling Print Server Mode if You Are Using only Remote Printer” on page 77

Configuring for NetWare using IBM NPM for Windows NT and 95

This procedure requires Windows NT 3.51 or 4.0 or Windows 95, and Novell Client 32 or later.

Data Requirements

You need a name for the queue to which the printer is to be assigned. The name can be anything you want.

Configuration Procedure

1. Turn on the printer.
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. Use the tools and features of the Novell Client for NetWare installed on your system. (See the README file that accompanies NPM for a list of supported NetWare client software.)
4. Start NPM for Windows NT and 95.
NPM automatically discovers the printers currently visible on the network.
5. Select a printer that is not configured for Netware, select Printer from the menu bar, and then click Configure New.
Online instructions guide you through the configuration process.
6. When complete, NPM asks if you want to reset the printer (if necessary).
7. For remote printer mode, restart the NetWare print server.

Configuring under NetWare 3 as a Print Server using PConsole

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

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.	

Parameter	Description	Your Value
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 "Chapter 24. Customizing the NIC" on page 261.	

Configuration Procedure

1. Turn on the printer.
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, NCTxxxxxx_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, NCTxxxxxx_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. Do not use the name of the NIC as the name of a PSERVER NLM running on your file server.

26. From the **Print Server Information** menu, select **Print Server Status/Control**.
 - This option appears only if the NIC is powered up and connected to the network and the configuration was successful.
 - If the procedure was not successful, return to step 8 on page 53 and make sure the correct names were entered at each step.
 - 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 print server function goes down, but the NIC brings it back up again automatically. (The NIC 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.

Configuring under NetWare 3 as a Remote Printer using PConsole

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

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.	

Parameter	Description	Your Value
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 NICs 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 "Chapter 24. Customizing the NIC" on page 261.	

Configuration Procedure

Is Remote Printer Disabled?

Some versions of the NIC microcode disable the remote printer by default. Before doing this procedure, obtain a NIC configuration page (refer to "The NIC Configuration Page" on page 11) 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 the remote printer is disabled, login to the NIC (refer to "Logging into a NIC using NetWare IPX" on page 287), then enter the command:

```
define server netware rprinter enable
```

Reboot the NIC with the command:

```
init delay 0
```

1. Turn on the printer.
2. Login to the NetWare file server as supervisor, for example:

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

```
P_CONSOLE
```

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.

- Run **PConsole**.
- Select **Print Server Information**.
- Select the NetWare print server to shut down.
- Select **Print Server Status and Control**.
- Select **Server Info**.
- Select **Running**.
- Select **Down** to perform an immediate shutdown. This step logs the print server user off.
- 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.
- From the print server workstation, enter:

```
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.

27. Optionally, define the print server (NLM or EXE) to the NIC. Refer to “Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode” on page 77.

Changing NetWare Settings Using Embedded Web Pages

If your NIC supports embedded web pages, you can use your web browser to display and change various NetWare settings.

To access NetWare information on the embedded web pages:

1. Use your web browser to go to the following location:

```
http://n.n.n.n
```

where *n.n.n.n* is the IP address of the printer.

2. Click **Configure Printer**.
3. Click **Protocol Setup**.
4. Click **Netware settings**.

5. Type the values you want, and then click **Change**.

For information about requirements for embedded web pages, see “Chapter 27. Embedded Web Pages” on page 279. For detailed information about using the embedded web pages, view the online help directly from the web pages.

Note: Embedded web pages are available on the 100BaseTx NIC. They are available on other NICs (Ethernet 10BaseT/10Base2 NIC and Token Ring) only when NIC microcode level 7.20 is installed. For information about installing new microcode, see “Updating the NIC Microcode” on page 345.

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

The following sections include 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.

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 for the printer driver has the installation instructions. You may want to open the Notepad program on Windows systems to display the README online while you work.

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 LPT n
```

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, wait ten seconds, and turn the printer on.

Problems?

If you have problems, refer to "Handling NetWare/IPX Problems" on page 78.

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.

Windows 3.1X

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.

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.

Windows 95 using Novell NetWare Client 32

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.

Printing a File: From an application, print a job to the printer just added.

OS/2

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.

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 "Handling NetWare/IPX Problems" on page 78 .

Chapter 5. NetWare 4.X

NPM

Use this chapter to configure NetWare 4.X using the NetWare command line. NPM can perform the command line procedures described here with a minimum of input from you. Refer to the NPM online help.

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 or Novell Client 32 for NDS-mode logins.
- 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 have Browse object rights from the [Root] down to the container which holds the printer-related objects. Otherwise, the NDS context where the printer objects are located must be defined on the NIC by using NPM. The NDS context where the printer objects are located can also be defined by logging into the NIC. After logging on, perform the commands in “Tree (NDS)” on page 303 and “Context (NDS)” on page 298.
 - 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 or Novell Client 32).
 - 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 “Assigning a NetWare File Server Name” on page 76 for how to do this.

Configuration Checklist

Authority Level Required

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

- ___ 1. If you have not already done so, set up the printer and install the NIC as described in “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. If you have a network with multiple servers, perform the procedure in “Configuring NetWare on a Large Network” on page 50.
- ___ 3. Determine whether you want to use the NIC as a print server or a remote printer. See “Choosing Print Server or Remote Printer” on page 50.
- ___ 4. Configure your printer:
 - If you use NPM, see “Configuring for NetWare using IBM NPM for Windows NT and 95” on page 52.
 - If you use embedded web pages, see “Changing NetWare Settings Using Embedded Web Pages” on page 75.
 - If you use standard NetWare tools, see one of the following:
 - “Configuring as a Print Server in NDS Mode using PConsole” on page 63
 - “Configuring as a Print Server in Bindery Mode using PConsole” on page 65
 - “Configuring as a Remote Printer in NDS Mode Using PConsole” on page 68
 - “Configuring as a Print Server in NDS Mode using NWAdmin” on page 70
 - “Configuring as a Remote Printer in NDS Mode using NWAdmin” on page 73
- ___ 5. Verify the configuration. See “Verifying the NetWare Configuration” on page 58.
- ___ 6. If you encounter problems, see “Handling NetWare/IPX Problems” on page 78.

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.

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 "Chapter 24. Customizing the NIC" on page 261.	

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 5 . If it is incorrect do the following:
 - a. From the **Available Options** menu, select **Change Context**.
 - b. Press **Insert** to go to the desired context.
 5. Select **Print Queues**.
 6. Press **Insert**.
 7. Enter any new queue name.
 8. Press **Insert** to locate the volume where the queue is to be located.
 9. Select the volume.
 10. From the **Available Options** menu, select **Printers**.
 11. Press **Insert**.
 12. Enter the IBM printer service name from the data requirements table. Use the **default** printer service name (for example, NCT xxxxxx_1) for your initial configuration of the card. Make sure the name ends with an “_1”.
 13. Select the newly defined printer.
 14. From the **Printer “*printer name*” Configuration** menu, select **Printer Type**.
 15. Select **Other/Unknown**.
 16. Select **Print Queues Assigned**.
 17. Press **Insert** to display a list of available print queues.
 18. Select the print queue, created in step 7.
 19. Press **Esc** until the “Save Changes” message appears.
 20. Select **Yes** to confirm the save.
 21. Press **Esc** until you return to the **Available Options** menu.
 22. Select **Print Servers**.
 23. Press **Insert**.
 24. Enter the IBM NIC name as the new print server name.
 25. From the **Available Options** menu, select **Print Servers**.
 26. Select the new NIC to link.
 27. Select **Printers**.
- Note:** Press **Enter** on the **Bindery Services** warning window if it displays.
28. Press **Insert**.
 29. Select the printer service name to link to the NIC. Use the **default** service name (for example, NCTxxxxxx_1) when you configure the card for the first time. Make sure the name ends with an “_1”.
 30. 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. Do not use the name of the NIC as the name of a PSERVER NLM running on your 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**.
 - This option appears only if the NIC is powered up and connected to the network and the configuration was successful.
 - If the procedure was not successful, return to step 7 on page 64 and make sure the correct names were entered at each step.
 - If that does not work, recycle power on the printer, wait about three minutes, then try step 30 on page 64 again.
- d. Select the **Current Server Status**.
- e. Select **Down**.

Note: The NIC 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.

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.

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.	

Parameter	Description	Your Value
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 "Chapter 24. Customizing the NIC" on page 261.	

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 continue.

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. Do not use the name of the NIC as the name of a PSERVER NLM running on your file server.

- a. From the **Print Server Information** menu, select **Information and Status**.
- b. Verify that the NIC is **Running**. This option appears only if the printer server is powered up and connected to the network and the configuration was successful.
 - If the procedure was not successful, return to step 13 on page 66 and make sure the correct names were entered at the correct steps.
 - 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 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.

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.

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 “Chapter 24. Customizing the NIC” on page 261.	
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.	

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 “The NIC Configuration Page” on page 11) 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 “Logging into a NIC using NetWare IPX” on page 287), then enter the command:

```
define server netware rprinter enable
```

Reboot the NIC with the command:

```
init delay 0
```

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 filesserver 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, NCTxxxxxx_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, NCTxxxxxx_1) when configuring the printer for the first time. Make sure the name ends with an “_1”. (See step 13.)
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
```

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.

32. Optionally, define the print server NLM to the NIC. Refer to "Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode" on page 77.

Configuring as a Print Server in NDS Mode using NWAdmin

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

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.	

Parameter	Description	Your Value
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 “Chapter 24. Customizing the NIC” on page 261.	

Configuration Procedure

1. Turn the printer on.
2. Login to the NDS tree as a user with the appropriate rights.
3. From Windows, start NetWare Administrator.
4. Check the current context on the Title bar. If it is correct, go to step 7.
5. Select the appropriate context from the window display or by selecting the **View** menu, then the **Set Context** menu item.
6. Using the right mouse button, click the container object in which the queue is to be created.
7. Select **Create** from the displayed menu.
8. Select **Print Queue**.
9. At the **Create Print Queue** window, enter the queue name in the **Print Queue Name** field.
10. Select the volume from the **Print Queue Volume** pull down list on the **Select Object** window.
11. Click **OK**.
12. Click the **Create** button on the **Create Print Queue** window.
13. Using the right mouse button, click the container object in which the printer is to be added.
14. Select **Create** from the displayed menu.
15. Select **Printer** object.
16. Enter the printer service name. Use the **default** printer service name (for example, NCTxxxxxx_1) when configuring the printer for the first time. Make sure the name ends with an “_1”.
17. Click the **Create** button.
18. Double-click the **Printer** icon for printer you just created.
19. Click the **Assignments** button.
20. Click the **Add...** button.
21. Select the Queue name, then click **OK**.
22. Click the **Configuration** button. Choose **Other/Unknown** for the **Printer Type**.

23. Click **OK**.
24. Using the right mouse button, click the container object to which the NIC is to be added as a print server.
25. Select **Create** from the displayed menu.
26. Select **Print Server**.
27. Type in the NIC name.
28. Click the **Create** button.
29. At the main NWAdmin screen, double-click the **Print Server** icon that has the NIC name.
30. Make sure the **Advertising name** is the same as the print server's name.
31. From the **Print Server** window, click the **Assignments** button.
32. Select **Add**.
33. Select the previously created printer object (with the printer service name).
34. Select **OK**.
35. 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**.
 - This option appears only if the printer server is powered up and connected to the network and the configuration was successful.
 - If the procedure was not successful, return to step 12 on page 71 and make sure the correct names were entered at the correct steps.
 - If that does not work, recycle power on the printer, wait about three minutes, then try step 35 again.
- 5) Select the **Current Server Status**.
- 6) Select **Down**.

Note: The NIC 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.

Configuring as a Remote Printer in NDS Mode using NWAdmin

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

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 "Chapter 24. Customizing the NIC" on page 261.	
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.	

Configuration Procedure

1. Turn the printer on.
2. Login to the NDS tree as a user with the appropriate rights.
3. From Windows, start NetWare Administrator.
4. Check the current context on the Title Bar. If it is correct, go to step 5 on page 74. If it is incorrect, do the following:
 - a. Select **View**, then **Set Context** to select the context.

- b. Using the right mouse button, click the container object in which the queue is to be created.
5. Select **Create** from the displayed menu.
6. Select **Print Queue**.
7. At the **Create Print Queue** window, enter the queue name in the **Print Queue Name** field.
8. Select the volume from the **Print Queue Volume** pull down list on the **Select Object** window.
9. Click **OK**.
10. Click the **Create** button on the **Create Print Queue** window.
11. Using the right mouse button, click the container object to which the printer is to be added.
12. Select **Create** from the displayed menu.
13. Select **Printer** object.
14. 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”.
15. Click the **Create** button.
16. Double-click the **Printer** icon for the printer you just created.
17. Click the **Configuration** button.
18. At the **Printer Type** item, select **Other/Unknown**.
19. Optionally, set the IPX/SPX network address, which is the NetWare network address of the NIC.
20. Click the **Assignments** button.
21. Click the **Add...** button.
22. Select the Queue name. This name becomes the selected object.

Note: The selected printer is automatically set as the default.
23. Click **OK**.
24. Click **OK**.
25. 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 one does not exist, create one now.
26. From the **Print Server** window, click the **Assignments** button.
27. Select **Add**.
28. Select the previously created printer object (with the printer service name).
29. Select **OK**.

30. Select **OK** at the Print Server window.
31. Select **Yes** at the Exit Confirmation box.
32. 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.

33. Optionally, define the print server NLM to the NIC. Refer to “Assigning a NetWare Print Server if You Are using Remote Printer (RPrinter) Mode” on page 77.

Changing NetWare Settings Using Embedded Web Pages

If your NIC supports embedded web pages, you can use your web browser to display and change various NetWare settings.

To access NetWare information on the embedded web pages:

1. Use your web browser to go to the following location:

```
http://n.n.n.n
```

where n.n.n.n is the IP address of the printer.

2. Click **Configure Printer**.
3. Click **Protocol Setup**.
4. Click **Netware settings**.
5. Type the values you want, and then click **Change**.

For information about requirements for embedded web pages, see “Chapter 27. Embedded Web Pages” on page 279. For detailed information about using the embedded web pages, view the online help directly from the web pages.

Note: Embedded web pages are available on the 100BaseTx NIC. They are available on other NICs (Ethernet 10BaseT/10Base2 NIC and Token Ring) only when NIC microcode level 7.20 is installed. For information about installing new microcode, see “Updating the NIC Microcode” on page 345.

Improving Network Traffic on Large Networks

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.

Reducing Network Inefficiencies

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

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. Use one of the procedures described in “Logging into a NIC using NetWare IPX” on page 287.
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
```

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. Use one of the procedures described in “Logging into a NIC using NetWare IPX” on page 287.
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.

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. Use one of the procedures described in “Logging into a NIC using NetWare IPX” on page 287.
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.

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. Use one of the procedures described in “Logging into a NIC using NetWare IPX” on page 287.
2. Entering the command:

```
define server netware pserver disable
```
3. Reboot the NIC with the command:

init delay 0

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

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

Network Setup

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 name. See, for example, step 30 on page 72.
- For NDS, make sure that the NIC can browse the tree, by giving browse rights to the [Root] object of the tree to the [Public] trustee. Alternatively, you can use NIC commands to specify the context where the print server object is located. The NIC can then attach directly to that context without browsing the tree. For more information on NIC commands, see “Chapter 31. NetWare Commands” on page 297.

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. Use the procedure in "Logging into a NIC using NetWare IPX" on page 287.
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.

Hardware Problems

When printing problems occur, the first task is to check the physical condition of the printer and related hardware, including the physical connection of the hardware to the network (10BASE2, 10BASE-T), the cabling system (Ethernet or token ring), and 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 operator panel.
2. Verify that the printer is Ready.
3. Print a printer configuration page to verify that the NIC is installed. See "Printing the Printer Configuration Page" on page 9.
4. Verify that the NIC is connected to the network. Refer to "Physically Connecting a NIC to a LAN" on page 16.

Note: If the printer operator panel displays the message "41 Network Option Error" or "42 Network Option Error" contact IBM Support.

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 netware protocol is enabled on the NIC by printing a NIC configuration page (see “The NIC Configuration Page” on page 11). Check under the Network Information section.
- Verify that the required protocol is enabled on the system from which a print job is being sent.
- Verify that the correct NetWare frame type is being used by the printer and the host. Use NPM to check the frame type, or print a NIC configuration page (see “The NIC Configuration Page” on page 11). On the configuration page, check the NetWare Information/Frame Selected value.

From the NetWare client workstation, enter the following command:

```
nprint filename q=print_queue
```

where *filename* is the name of the file to print and *print_queue* is the name of the printer’s queue.

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 printer configuration page and check for the proper settings. See “Printing the Printer Configuration Page” on page 9 for instructions.

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 configuration 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

where:

- *n* is the port number to which the print job is to be sent. The default is 1.
 - *queue_name* is the name of the NetWare queue to which to send the print file.
 - *server_name* is the 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 on page 80.

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.

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=queue_name l=n`

to redirect the LPT *n* port to the specified queue name.

```
C:\WINDOWS          9:21 Thu 01-01-97
C:\WINDOWS>capture q=test1 Device LPT1 has been re-routed to print queue Q1.
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.

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".

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.

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.

NetWare AppleTalk Printing Service

This section describes the use of AppleTalk Print Services (ATPS) on a NetWare 4.1x server. The setup creates a NetWare queue which is tied to a Macintosh-like spooler on the NetWare server. Data is sent from the spooler to the destination printer using AppleTalk protocol, not the IPX/SPX protocol. Clients including Macintosh, Windows, and others should be able to send PostScript jobs to this queue, from which the job is sent to the printer.

Installation and Configuration of ATPS

Follow these instructions to install and configure NetWare for Macintosh on the NetWare server.

Install NetWare for Macintosh on the NetWare Server

1. Install NetWare for Macintosh using the *Novell NetWare for Macintosh File and Print Services* manual. The instructions, *Installing NetWare for Macintosh*, are in Chapter 1 of that manual.
 - The AppleTalk protocol will be configured on the server.
 - Choose to install at least the AppleTalk Print Services.

Note: After all the NetWare for Macintosh files have been installed and the NetWare server has been rebooted, you will use ATPSCON.NLM to configure the AppleTalk Print Services for the setup described here. The associated module, ATPS.NLM, will perform the printing redirection. A similar setup to that described in the NetWare manual (Chapter 6, "Using ATPS to Access a LaserWriter II on Ethernet") will be performed here.

2. Type

```
LOAD ATPSCON
```

at the server console to start the ATPS configuration utility. Enter the name and password of the administrator who has the necessary rights to create this setup.

3. Choose **Change Context** to set the context where the NetWare queue will be created.
4. Next, you need to define your printer model to the NetWare server. Choose **Define Printer Models**, then press **Insert** to get to the **Printer Model Parameters** screen.

5. For **Printer Model Name**, enter any descriptive name for your printer, such as 'IBM InfoPrint 20 PS'.
6. For **AppleTalk Type**, leave it as **LaserWriter**, unless you are certain you want a different choice.
7. For **Supports PJI**, enter **Yes**.
8. For **PostScript Printer**, enter **Yes**.
9. For **Support TrueType Fonts**, enter **Yes**.
10. For the **Model PPD File**, press Enter and select the appropriate PPD file for your printer (for example, 'IBM4320.PPD' for the InfoPrint 20). If your PPD file doesn't show up here, copy the correct PPD file from the CD to the 'SYS:\SYSTEM\NetWare-MAC\PPDS' directory, then perform this step again. The next screen will show the contents of the PPD file. Press Esc to close this screen and select this PPD file.
11. At the **Printer Model Parameters** screen, press Esc to save changes. The Available Printer Models list now has the printer defined. Press Esc until you return to the main menu.
12. Select **Quick Configuration** and the **Lookup Parameters** screen is displayed.
13. For **Printer Model**, press Enter and select your printer model (created in steps 4-11 above) from the list.
14. For **Printer Type**, you may or may not be able to change this parameter. **LaserWriter** should work.
15. For **Printer Zone**, select the AppleTalk zone where your printer's AppleTalk name will show up (see the AppleTalk Information section on the NIC configuration page).
16. For **Proceed**, select (perform lookup) and NetWare will look for the printers in the chosen zone. Select your printer's AppleTalk name from the Available Printers list.
17. On the **Quick Configuration Parameters** screen, only the Spooler's AppleTalk Name can be changed here. This name will be the NetWare queue name servicing the Macintosh-type spooler being run on this server, and will be placed in the NDS context specified previously; it also will show up in the Macintosh Chooser under the zone in which the NetWare server is located. Leave the default name, or type in any name of your choice.
18. Press Esc to enable changes, and the basic configuration is complete.

Printing from Clients

To print from Macintosh clients:

1. Open the Macintosh Chooser.
2. Select a type of printer.

3. Select the appropriate zone where the NetWare queue name will show up. Again, this name is the equivalent Macintosh spooler name for the queue as advertised by NetWare's ATPS.
4. Select this name and perform a Setup, and now you can print from your applications using this printer and its associated queue.

To print from non-Macintosh clients:

1. Send a PostScript job from a client (for example, Windows) to the NetWare queue (via IPX or maybe IP) created during this setup. The job will be handled by ATPS and will be sent to the printer using AppleTalk protocol.

Configuring Advanced Options

See the NetWare manual (Chapters 4 through 7) for more information on setting the parameters for this setup in ATPSCON. Peruse the menus in this utility and use the F1 (Help) key to familiarize yourself with the available options.

Chapter 6. Windows NT using NetWare Services

NPM

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.

Table 9. NetWare Services

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

Requirements

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

- IBM printer driver for NT
- 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.

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. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. Configure the printer on your NetWare system. See the appropriate chapter:
 - “Chapter 4. NetWare 3.X” on page 49
 - “Chapter 5. NetWare 4.X” on page 61
- ___ 3. Make sure the user has sufficient rights to use the desired NetWare printing services. Refer to the Microsoft or Novell NT documentation.
- ___ 4. Perform one of the following procedures:
 - “Configuring Windows NT 3.51 using a NetWare Service”
 - “Configuring Windows NT 4.0 using a NetWare Service” on page 89
- ___ 5. Verify the configuration. From within an application, select the **Print Setup** menu to select the printer; then use the **Print** menu item to print a job.

Configuring Windows NT 3.51 using a NetWare Service

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

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.	

Parameter	Description	Your Value
printer driver name	Name of the IBM printer driver for NT. The default name is IBM Network Printer <i>nn</i> .	

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 2 on page 88.)
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". Note that the IBM InfoPrint 20 and IBM InfoPrint 32 are not supported under NT 3.51.
9. When the **Printer Setup** window displays, select the options to use, then click **OK**.
10. To share the printer on the NT network, select the **Printer** menu, then click **Properties**. On the **Printer Properties** panel:
 - a. Click the **Share this printer on the network** button.
 - b. Enter a name (of your selection) for the shared printer.
 - c. Enter a location description.
 - d. Click **OK**.

Configuring Windows NT 4.0 using a NetWare Service

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

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.	
Printer driver name	Name of the IBM printer driver for NT. The default name is IBM Network Printer <i>nn</i> or IBM InfoPrint <i>nn</i> .	

Configuration Procedure

1. Logon to the NT 4.0 server as administrator.
2. From the Windows NT desktop, 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.
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. On the NT desktop, 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 **Other OS Support** in the **Alternate Drivers** list.
 - g. Click **OK**.
 - h. Respond to additional instructions.

Part 5. TCP/IP Configuration

Chapter 7. Configuring on AS/400 as an ASCII Printer

Use this chapter to configure your IBM network printer on AS/400 as an ASCII printer. Once configured as an ASCII printer, the printer can print AFPDS, SCS, and PostScript files, but see the information in **Printing AFP, SCS, and PostScript Files**, that follows.

To configure your IBM network printer on AS/400 as an IPDS printer, see “Chapter 8. Configuring on AS/400 as an IPDS Printer” on page 109.

Printing AFP, SCS, and PostScript Files

AFP and SCS files cannot be printed directly over the network to IBM network printers that are configured in ASCII mode. However, if the printer is defined on AS/400 using either a remote output queue or as an IBM PJI Driver device, then AFP and SCS files will be transformed by Host Print Transform (a component of the OS/400 print writer) to PCL and then sent to the printer. There are performance considerations involved in this transform process. An alternative method of printing AFP and SCS files is to define the IBM network printer as an IPDS printer. For details, see “Chapter 8. Configuring on AS/400 as an IPDS Printer” on page 109. Also, refer to *IBM Network Printers: IPDS and SCS Technical Reference*, S544-5312.

PostScript files can be printed transparently as USERASCII spooled data. In V4R2, PostScript Level 1 can be transformed to PCL.

Note: If you are using V3R7 and want support for page ranges, printer status, and other features which are not supported by Manual LPR or Automatic Remote Output Queue, see “Using IBM PJI (V3R7/V4R1 or higher only)” on page 104. You will also need to obtain the latest PTF for APAR SA61661 including any co-requisite and pre-requisite PTFs (as of this writing, PTF SF38640).

Requirements

AS/400 and Related Software Levels

IBM recommends that you apply the latest cumulative fix package for AS/400 or a related software feature.

- If you do have a support line contract, visit the AS/400 web site at <http://www.as400service.ibm.com>
- If you do not have a support line contract, please contact your software service provider. If you do not have a software service provider, you can contact IBM software support services at 1-800-237-5511.

Host Print Transforms

The following table indicates the valid options for the Host Print Transform Manufacturer Type and Model, for various releases of OS/400.

V3R1	V3R2	V3R6	V3R7 and V4R1
<ul style="list-style-type: none">• *HP4	<ul style="list-style-type: none">• *IBM43nn or• *WSCSTLETTER	<ul style="list-style-type: none">• *HP4	<ul style="list-style-type: none">• *IBM43nn or• *WSCSTLETTER

Host Print Transform transforms non-ASCII spool files into PCL using the Manufacturer Type and Model or WSC object. ASCII spool files (for example, *USERASCII) 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 *USERASCII spool files would be the virtual print function in Client Access/400.

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 PCL data streams to the IBM network printers. To do this, you must use either a generic printer type like *HP4, or use a Workstation Customization Object (WSCST). You can obtain a WSCST from the CD-ROM shipped with the NIC or 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 WSCST for these releases.

Configuration Checklist

Authority Level Required

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

- 1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3. **Optionally**, disconnect the printer from the LAN cable until directed to re-attach it.
- 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- 3. 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. See “Configuring a Route Definition with ADDTCP RTE” on page 100.
- 4. If you have not yet done so, create a line description for your Ethernet or Token Ring IBM NIC. See “Developing Line Descriptions with CRTLINETH or CRTLINTRN” on page 96.
- 5. Set up AS/400 for TCP/IP. See “Configuring AS/400 for TCP/IP” on page 99 .
- 6. Attach the printer to the LAN cable.



DANGER

<1-13> Do not connect or disconnect a communication port, a teleport, or any other connector during an electrical storm.

hcsf0113



DANGER

<1-14> Switch off printer power and unplug the printer power cord before connecting or disconnecting a communication port, a teleport, or any other attachment connector.

hcsf0114

- ___ 7. Obtain the name of the Workstation Customization Object (WSCST) for use when configuring the printer (during the next step). Refer to “Host Print Transforms” on page 94 for information about the WSCST to use. On rare occasions, you may desire to upload and create a workstation customization object (WSCST) using the CRTWSCST command. You may use either a generic WSCST like *HP4 or the specific WSCST created for network printers.
- ___ 8. Configure your printer on the AS/400. See “Configuring AS/400 for Printing” on page 101.
- ___ 9. Verify the configuration. See “Verifying PCL Printing on AS/400” on page 106.
- ___ 10. If you have problems, see “Resolving AS/400 Problems” on page 127.

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.

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: Vary the line off before making changes. After making the changes, vary the line back on.

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(ETHLAN) 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 . . . . . : 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 . . . . . : AUTOCRTCTL *NO
Recovery limits . . . . . : CMNRCYLMT
Count limit . . . . . : 2
Time interval . . . . . : 5

```

Specify the following parameters:

Line description name (LIND)

The user’s name for the line description. This name must be identical to the name entered when you configure TCP/IP on the AS/400 (“Configuring AS/400 for TCP/IP” on page 99).

Resource name (RSRCNAME)

System-assigned name for the LAN adapter (for example, LIN041).

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.

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:

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      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 parameters:

Line description name (LIND)

The user's name for the line description. This name must be identical to the name entered when you configure TCP/IP on the AS/400 ("Configuring AS/400 for TCP/IP" on page 99).

Resource name (RSRCNAME)

System-assigned name for the LAN adapter (for example, LIN031).

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

Configuring 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.

Configuring an AS/400 TCP/IP Interface with ADDTCPIFC

Configuring an Interface for Ethernet

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:  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
```

3. Specify the following parameters:

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 “Developing Line Descriptions with CRTLINETH or CRTLINTRN” on page 96. Each AS/400 LAN adapter will have its own line description.

Configuring an Interface for Token Ring:

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: BL DD60
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. Specify the following parameters:

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 “Developing Line Descriptions with CRTLINETH or CRTLINTRN” on page 96. Each AS/400 network LAN adapter will have its own line description.

Configuring a Route Definition with ADDTCP RTE

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

Configuring a Local Domain and Hostname

The AS/400 print commands (described in “Setting up Printing for PCL Files” on page 102) 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 are 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.rsox.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 (see “Configuring a TCP/IP Host Table Entry”).

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.

Configuring a TCP/IP Host Table Entry

Although optional, IBM recommends that you create a TCP/IP host table entry. Add the AS/400 name and the IP address of the LAN adapter to the “Host Table Entries”.

Configuring AS/400 for Printing

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. You cannot use any other names.)	
IP address	IP address of the NIC.	

Configuration Procedure

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

- “Setting up Printing for PCL Files” on page 102
 - Specify LPR for **manual** submissions.
 - Configure a remote output queue for **automatic** submissions.
 - Use the IBM-PJL, which is supplied on PTF SF38640 (for V3R7 only).
- “Verifying PCL Printing on AS/400” on page 106

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

Setting up Printing for PCL Files

The next step in configuring the AS/400 for IBM Network Printers is to set up the remote printing capability. There are three 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.
- Use the IBM-PJL, which is supplied on PTF SF38640 (for V3R7 only).

Using Manual LPR

To use LPR manually:

1. To start TCP/IP, enter STRTCP.
2. At the AS/400 command line, enter LPR.
3. The following example displays 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 . . . . . MFRTYPMDL > *IBM4317
Internet address . . . . . INTNETADR > '9.99.2.3'
```

4. Specify the following parameters:

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 (MFRTYPMDL)

Select a manufacturer type and model. This is the name of the WSCST. Select *IBM4312, *IBM4317, *IBM4320, 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 WSCST name should also have been specified in step 7 on page 96.

Important: Envelope Printing
 To print envelopes on IBM network printers correctly, you must use Manufacturing Type and Model *IBM4312, *IBM4317, *IBM4320, or *IBM4324, or use a WSCST 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 added the printer to the host table entry in “Configuring a TCP/IP Host Table Entry” on page 101).

Creating an Automatic Remote Output Queue

1. From the AS/400 command line, enter CRTOUTQ.
2. You see a screen similar to the following:

```

                                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 . . . . . RMTPRQ > 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. Specify 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. Specify **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)

Specify **1**. This will start Remote Writer when the queue is created, after each IPL of the AS/400, and whenever STRTCP is started.

Connection type (CNNTYPE)

Specify ***IP**.

Destination type (DESTTYPE)

Specify ***OTHER**.

Transform (TRANSFORM)

Specify ***YES**.

Manufacturer type (MFRTYPMDL)

Select ***IBM4312**, ***IBM4317**, ***IBM4320**, 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.

Important Envelope Printing

To print envelopes on IBM network printers correctly, you must use Manufacturing Type and Model ***IBM4312**, ***IBM4317**, ***IBM4320**, or ***IBM4324**, or use a Workstation Customizing Object (WSCST).

Internet address (INTNETADR)

Specify the IP address of the printer.

Using IBM PJI (V3R7/V4R1 or higher only)

The IBM Printer Job Language (PJI) driver is an alternative method of attaching PCL LAN-attached printers to your AS/400 system (from V3R7 and higher). It offers improved functions and better performance than the Remote

Output Queue. IBM PJI is the recommended method of attachment for PCL printing on Network Printers at V3R7 and higher.

1. To start TCP/IP, enter STRTCP.
2. Enter CRTDEVPRT (or CHGDEVPRT) at the command line and enter the required parameters. You see a screen similar to the following:

```
Device Description      : P4324
Device class           : *LAN
Device type            : 3812
Device Model          : 1
Lan attachment        : *IP
Port Number           : 2501
Font                  : 011
Activation timer      : 170
Inactivity timer      : *SEC15
Host print transform   : *YES
Manufacturer type/model : *HP4 (or *IBM43nn)
Remote Location:
  Name/Address         : 9.99.99.99
System driver program  : *IBMPJLDRV
& Lib
```

3. Specify the following parameters:

Device class (DRVCLS)

Specify *LAN.

Device type (TYPE)

Specify 3812.

Lan attachment (LANATTACH)

Specify *IP.

Activation timer (ACTTMR)

The value specifies the number of seconds that OS/400 waits for a printer to respond to an activation request. If only one system will use the printer, use the default value (170 seconds). If more than one system will share the printer, set the value to *NOMAX, which will cause OS/400 to wait indefinitely for a response to an activation request.

Inactivity timer (INACTTMR)

Set this parameter to a value at least equal to the TIMEOUT value on the printer Ethernet Menu or Token Ring Menu. IBM recommends *SEC15. This value specifies the length of time OS/400 will maintain a session with the printer while there are no spooled files with a status of RDY.

Host print transform (HPT)

Specify *YES for all non-IPDS printers. HPT transforms SCS or AFPDS data into PCL before sending the job to the printer.

Manufacturer type and model

Specify *IBM43nn

Remote location (RMTLOCNAM)

Specify the IP address or hostname of the printer.

System driver program (SYSDRVPGM)

Specify *IBMPJLDRV

Verifying PCL Printing on AS/400

To test printing, do the following:

1. To start TCP/IP, enter STRTCP.
2. Turn the printer on.
3. To verify that the printer is connected to AS/400, ping the printer from an AS/400 workstation with one of the following commands:

```
PING 'ip_address'
```

or

```
PING hostname
```

where *ip_address* is the Internet address of the remote system printer (the NIC), and *hostname* is the hostname you defined for the printer, if any.

4. If you are able to ping the printer, go to step 5. If you are unable to ping the printer, see “Printer Cannot be PINGed” on page 128.
5. Send a spooled file to the printer. There are three ways of doing this:

- You can use Manual LPR (see “Using Manual LPR” on page 102).
- Use the following command if using an Automatic Remote Output Queue:

```
STRRTWTR name
```

where *name* is the name of the AS/400 remote output queue (not the printer’s internal queue), as described in “Creating an Automatic Remote Output Queue” on page 103.

- If you are using PJI driver support (V3R7/V4R1 or higher), use the following command:

```
STRPRTWTR name
```

where *name* is the name of the AS/400 remote output queue (not the printer’s internal queue), as described in “Creating an Automatic Remote Output Queue” on page 103.

Note: To print PCL files, you must have specified PASS in the Remote Printer queue name for CRTOUTQ. See “Creating an Automatic Remote Output Queue” on page 103.

Trouble Printing?

If you encounter problems with any of the procedures described in section “Configuring AS/400 for Printing” on page 101 refer to “Resolving AS/400 Problems” on page 127 for help.

Chapter 8. Configuring on AS/400 as an IPDS Printer

Use this chapter to configure your IBM network printer on AS/400 as an IPDS printer. To print IPDS, you must install the IPDS option on your printer. Once configured as an IPDS printer, the printer can also print AFP, SCS and PostScript Level 1 (V4R2 and later), but these datastreams must be converted to IPDS first. See “Printing AFP, IPDS, SCS, and PostScript Files”.

To configure AS/400 to format and print ASCII, PCL, or PostScript files, see “Chapter 7. Configuring on AS/400 as an ASCII Printer” on page 93.

Printing AFP, IPDS, SCS, and PostScript Files

IBM network printers configured as IPDS will print only IPDS files. AFPDS, SCS, and PostScript Level 1 (V4R2 and later) files can be printed, but they must be transformed to IPDS before printing.

- AFP files are transformed directly by Print Services Facility (PSF/400 -- an integrated feature of OS/400), which then sends the transformed file to the printer.
- SCS files are transformed into IPDS by one of two different conversion paths. The path recommended by IBM -- a straight SCS to device-independent IPDS transform -- is controlled by setting the IPDSPASTHR parameter to YES (see step 1 on page 116, step 1 on page 119, or step 1 on page 123). This path yields the best performance by sending IPDS files directly to the printer with no transform.
- In V4R2 and higher, PostScript Level 1 can be printed by converting the file to AFP using Host Print Transform. PSF/400 then converts the AFP file to IPDS, and sends it to the printer. There may be performance considerations with this process.

For more information, refer to *IBM Network Printers: IPDS and SCS Technical Reference*, S544-5312.

Requirements

Verify that you have at least the following software:

Table 10. 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)• SF24140 IPDS pass through
Sockets related	PTF SF30018	
Network Printer Support	PTF SF32911	
WRKAFP2	PTF SF40039	

Table 11. AS/400 V3R2

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

Table 12. AS/400 V3R6

General	Cumulative tape C5346360 or later	Order only the cover letters for the following PTF: <ul style="list-style-type: none">• SF45620 (TCP/IP for PSF/400)
WRKAFP2	PTF SF31461	
IPDS Pass Thru	PTF SF45624	
Sockets related	PTF SF30508	
Network Printer support	PTF SF33118	

Table 13. AS/400 V3R7

General	No PTFs are required	Standard V3R7 documentation
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Table 14. 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.

Configuration Checklist

Authority Level Required

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

- 1. If you are installing the printer on AS/400 V3R1 or V3R6, obtain the PTF containing WRKAFP2 for PSF/400. Follow the instructions in the cover letter to install the PTF.
- 2. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. 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 parameters and values shown in the following table.

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	43xx
IPDS	FONTSUB	ON
IPDS	IPDS PORT	TRING, ETHER

- 4. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- 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. If necessary, use the ADDTCP RTE command to create a route definition. You need this if your printer is somewhere other than on a local segment.
- 6. You need the IP address of the NIC to configure the NIC.
- 7. If you have not yet done so, create a line description for your Ethernet or Token Ring IBM NIC. See “Developing Line Descriptions with CRTLINETH or CRTLINTRN” on page 96.
- 8. Create or verify the existence of an AS/400 TCP/IP interface for Token Ring or Ethernet. See “Configuring an AS/400 TCP/IP Interface” on page 112.
- 9. The next step depends on your AS/400 release. Configure your printer with one of these procedures:
 - “Configuring PSF/400 for IPDS on V3R1 or V3R6” on page 114

- “Configuring PSF/400 for IPDS on V3R2” on page 117
 - “Configuring PSF/400 for IPDS on V3R7 and Above” on page 120
- ___ 10. Vary the printer ON using the VFYCFG command.
 - ___ 11. Verify that TCP/IP has been started using the STRTCP command.
 - ___ 12. Test your configuration. See “Verifying the IPDS Configuration on AS/400” on page 124.
 - ___ 13. To share the printer on the network, verify that the necessary parameters have been set correctly. See “Sharing the AS/400 Printer on the Network” on page 125.
 - ___ 14. If you have problems, refer to “Resolving AS/400 Problems” on page 127.

Configuring an AS/400 TCP/IP Interface

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.

Configuring the AS/400 Interface with ADDTCPIFC

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 are required:

Internet Address

Internet address of the AS/400 Ethernet 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 “Developing Line Descriptions with CRTLINETH or CRTLINTRN” on page 96. Each AS/400 LAN adapter will have its own line description.

Configuring an Interface for Token Ring

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('9.99.12.188') 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 are required:

Internet Address

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

Note: Do **not** enter the IP address of 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 “Developing Line Descriptions with CRTLINETH or CRTLINTRN” on page 96. Each AS/400 network LAN adapter will have its own line description.

Configuring a TCP/IP Host Table Entry

Although optional, IBM recommends that you create a TCP/IP host table entry. 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 option 10 from the menu.

You can 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.

Configuring PSF/400 for IPDS on V3R1 or V3R6

To configure IPDS printing on AS/400 V3R1 or V3R6, you must use two commands:

- CRTDEVPRT
- WRKAFP2

Configuring PSF with CRTDEVPRT on V3R1 or 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(P4324) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
          AFPATTACH(*APPC) FONT(11) RMTLOCNAME(TCPIP) FORMFEED(*AUTOCUT)
          TEXT('IBM Network Printer Model 24')
```

2. A completed screen looks like the following example:

Display Device Description		Page 1	
5763SS1 V3R1M0 940909		BLSYS1	09/11/96 11:15:40
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 (V3R1)	MSGQ	QSYSOPR	
Shadowing message queue (V3R6)	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	
Text	TEXT	IBM Network Printer Model 24	

3. Values must be entered for the following parameters:

Device Description (DEVD)

The device description or name. This value must match the value entered for the “DEVD” parameter in “Configuring AFP with WRKAFP2 on V3R1 or V3R6” on page 116.

Device Class (DEVCLS)

Specify *RMT.

Device Type (TYPE)

Specify *IPDS.

Device Model (MODEL)

Specify 0.

Advanced Function Printing (AFP)

Specify *YES.

AFP Attachment (AFPATTACH)

Specify *APPC. WRKAFP2 overrides this value.

Font (FONT)

Enter an appropriate value.

Form Feed (FORMFEED)
Specify *AUTOCUT.

Remote Location (RMTLOCNAME)
Enter the remote location name. This required parameter is ignored for TCP/IP configurations.

Configuring AFP with WRKAFF2 on V3R1 or V3R6

WRKAFF2

WRKAFF2 is contained in a PTF. To find the PTF that contains WRKAFF2, see “Requirements” on page 110.

Note: WRKAFF2 creates a data area in library QGPL. This data area must have the same name as the printer device description.

1.

- On V3R1, at the AS/400 command line, enter a command in the form:
WRKAFF2 DEVD(P4324) IPDSPASTHR(*YES) TCPIP(*YES) RMTSYS('128.9.12.134')
PORT(5001) INACTTMR(*SEC15)
- On V3R6, at the AS/400 command line, enter a command in the form:
WRKAFF2 DEVD(P4324) IPDSPASTHR(*YES) TCPIP(*YES) RMTSYS('128.9.12.134')
PORT(5001) RLSTMR(*SEC15)

2. A printout should look like the following:

```
QPQXWAFP
-----
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 “Configuring PSF with CRTDEVPRT on V3R1 or V3R6” on page 114.

IPDS pass through (IPDSPASTHR)

To print SCS files, specify *YES. PSF/400 transforms SCS into IPDS before printing.

TCP/IP support (TCPIP)

Specify ***YES**.

Remote system (RMTSYS)

Enter the IP address or hostname of the printer.

Port (PORT)

Specify **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 system is going to use the printer, use the default value (170 seconds). If more than one system will be using the printer, set the value to ***NOMAX**, which will cause PSF/400 to wait indefinitely for a response to an activation request.

Inactivity timer (INACTTMR) or Release Timer (RLSTMR)

Use **INACTTMR** on V3R1, and **RLSTMR** on V3R6. 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 **WRKAFF2** parameters. You can display the values by running **WRKAFF2** and specifying **PRINTONLY(*YES)** 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.

Configuring PSF/400 for IPDS on V3R2

To configure IPDS on AS/400 V3R2, you use the following commands:

- **CRTDEVPRT**
- **CRTPSFCFG**

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) FORMFEED(*AUTOCUT)
TEXT('IBM Network Printer Model 17')
```

2. A completed screen looks like this:

```

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 . . . . . : PRTERMSG *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 description must be identical to the name entered for the "PSFCFG" parameter in "Configuring AFP with CRTPSFCFG on V3R2" on page 119.

Device Class (DEVCLS)

Specify *RMT.

Device Type (TYPE)

Specify *IPDS.

Device Model (MODEL)

Specify 0.

Advanced Function Printing (AFP)

Specify *YES.

AFP Attachment (AFPATTACH)

Specify *APPC. CRTPSFCFG overwrites this value.

Font (FONT)

Enter an appropriate value.

Form Feed (FORMFEED)
Specify *AUTOCUT.

Remote Location (RMTLOCNAME)
Enter the remote location name.

Configuring AFP with CRTPSFCFG on V3R2

Optional

In V3R1, WRKAFF2 was used to specify RMTLOCNAME, PORT, and ACTTMR, 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.

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:

```
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 (PSFCFG)

The name of the printer device you are configuring.

Library

Specify **QGPL**.

IPDS pass through (IPDSPASTHR)

To print SCS files, specify ***YES**. PSF/400 transforms SCS into IPDS before printing.

Activate release timer (ACTRLSTMR)

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 (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: 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 (PORT)

Specify **5001**.

TCP/IP 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 system is going to use the printer, use the default value (170 seconds). If more than one system will be using the printer, specify ***NOMAX**, which will cause PSF/400 to wait indefinitely for a response to an activation request.

Configuring PSF/400 for IPDS on V3R7 and Above

To configure IPDS on AS/400 V3R7 and above, you use the following commands:

- CRTDEVPRT
- CRTPSFCFG (Optional)

Configuring PSF with CRTDEVPRT on V3R7 and Above

This section describes how to set up a device description on AS/400.

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) FORMFEED(*AUTOCUT)
  RMTLOCNAME('128.9.12.134') USRDFNOBJ(AFP/NETWRKPRT *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 NETWRKPRT
  Library . . . . . : AFP
  Object type . . . . . : *PSFCFG
Data transform program . . . . . : USRDATFM *NONE
User-defined driver program . . . . . : USRDVPGM *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 . . . . . : PRTERMSG *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 FIC10110
  Library . . . . . : *LIBL
Remote location . . . . . : RMTLOCNAME
  Name or address . . . . . : 128.9.12.134
Dependent location name . . . . . : DEPLOCLNAME *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)

The device description or name.

Device Class (DEVCLS)

Specify *LAN.

Device Type (TYPE)

Specify *IPDS.

Device Model (MODEL)

Specify **0**.

LAN attachment (LANATTACH)

Specify ***IP**.

Port Number (PORT)

Specify **5001**.

Font (FONT)

Enter an appropriate value.

Form Feed (FORMFEED)

Specify ***AUTOCUT**.

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 system will be using the printer, use the default value (170 seconds). If more than one system will be using the printer, specify ***NOMAX**, which will cause PSF/400 to wait indefinitely for a response to an activation request.

Remote Location (RMTLOCNAME)

Enter the IP address or hostname of the printer.

User-Defined Object (USRDFNOBJ)

To use a PSF configuration object, specify its name and library here. The object type must be ***PSFCFG**. For V3R7 and higher, a single PSF configuration object may be referenced by multiple device descriptions, if required.

Configuring AFP with CRTPSFCFG on V3R7 or V4R1

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 and higher, these three parameters are ignored when specified in a PSF configuration object, 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 or V4R1:

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

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 device description screen.

3. The following parameters are recommended:

PSF configuration (PSFCFG)

The name used for this PSF configuration object. The name must match the user-defined object name (USRDFNOBJ) in the printer DEVD.

IPDS pass through (IPDSPASTHR)

To print SCS files, specify ***YES**. PSF/400 transforms SCS into IPDS before printing.

Activate release timer (ACTRLSTMR)

Specifies the point at which the release timer (RLSTMR) is activated. Set to ***NORDYF**.

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.

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. To start TCP/IP, enter STRTCP.
3. Verify that the AS/400 TCP/IP interface is active. Use the command
WRKTCPSTS

and then select option 1.

4. Turn the printer on and wait until the printer operator panel displays READY.
5. To verify that the printer is connected to AS/400, ping the printer from an AS/400 workstation with one of the following commands:

```
PING 'ip_address'
```

or

```
PING hostname
```

where *ip_address* is the Internet address of the remote system printer (the NIC), and *hostname* is the hostname you defined for the printer, if any.

6. If the pings are not successful, refer to “Printer Cannot be PINGed” on page 128 .
7. If pings are successful, vary on the printer device description with the command:

```
VRFCFG (printer-device) CFGTYPE(*DEV) STATUS(*ON)
```
8. To use PSF/400 to send an IPDS file to the printer, enter:

```
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 “The NIC Configuration Page” on page 11.
- Verify that port number 5001 is being used.

If you are still unable to print IPDS files, contact IBM Support.

Sharing the AS/400 Printer on the Network

To support printer sharing, IBM network printers automatically switch among all attached ports (parallel port, the twinax or coax port, or the LAN network port). Basically, the printer prints jobs for one port until no new jobs appear and the port “times out”. The printer then switches to the next port and does the same thing.

To change the default “time out” value for a port, update the TMEOUT value for the port on the appropriate menu (Parallel, Ethernet, Token Ring, Twinax Setup, or Coax Setup).

To set up AS/400 for printer sharing, set the following parameters.

AS/400 Version	Where Set	Parameter	Recommended Value	Description
V3R1	WRKAFP2	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 system will be using the printer, use the default value (170 seconds). If more than one system will be using the printer, set the value to *NOMAX, which will cause PSF/400 to wait indefinitely for a response to an activation request.

AS/400 Version	Where Set	Parameter	Recommended Value	Description
V3R1	WRKAFP2	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 system will be using the printer, use the default value (170 seconds). If more than one system will be using the printer, set the value to *NOMAX, which will cause PSF/400 to wait indefinitely for a response to an activation request.
V3R6	WRKAFP2	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 system will be using the printer, use the default value (170). If more than one system will be using the printer, set the value to *NOMAX, which will cause PSF/400 to wait indefinitely for a response to an activation request.

AS/400 Version	Where Set	Parameter	Recommended Value	Description
V3R6	WRKAFP2	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 and V4R1	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 are printed before releasing the session (which does not terminate the writer, however).
V3R7 and V4R1	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.
V3R7 and V4R1	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 system will be using the printer, use the default value (170 seconds). If more than one system will be using the printer, set the value to *NOMAX, which will cause PSF/400 to wait indefinitely for a response to an activation request.

Resolving AS/400 Problems

Use this section to resolve problems configuring AS/400 on TCP/IP networks.

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.

If PSF/400 Terminates When Initialized

If PSF/400 terminates when you initialize it for IPDS printing and issues message PQT3603, check for the following error codes.

- **10** means an incorrect RMTSYS (V3R1 or V3R6) or RMTLOCNAME (V3R2, V3R7, or V4R1) 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 WRKAFFP2 (V3R1 or V3R6), CRTPSFCFG (V3R2), or CRTDEVPRT (V3R7 or V4R1).
- Codes **20-39** indicate a general communications failure. Make sure all of the components in your network are operational, such as routers. If necessary, call IBM Technical Support.
- Codes **40-59** indicate a logic error between PSF and the printer control unit. Contact IBM support.

Spoiled 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. Make sure that the printer is online and in READY status and that all network connections (for example, routers) between the AS/400 and the printer are active.

Spoiled Files Disappear Without Printing

To resolve this problem:

- Check that the correct printer queue name and correct IP address have been used.

- Ping the IP address. If the ping is successful, disconnect the the network cable from the printer/print server, and ping the address again. If the ping is still successful, there is another printer with that IP address on the network.

Data is Being Clipped

To resolve this problem, you may want to set the PSC (Page Size Control) parameter to *YES in the WRKAFP2 (V3R1 and V3R6) command or in the CRTSF CFG command (V3R2, V3R7, or V4R1).

Chapter 9. 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.

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 xiv).

Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on MVS require appropriate **RACF** authority.

1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. 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 parameters and values shown in the following table.

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

Menu	Item	Setting
IPDS	IPDS PORT	TRING, ETHER

- ___ 3. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 4. Configure the host environment. See “Configuring PSF for MVS to Print IPDS Files”.
- ___ 5. Verify the configuration. See “Verifying a TCP/IP-Attached Printer on MVS” on page 139
- ___ 6. If you want to share the printer, do the procedure in “Sharing IBM Network Printers on MVS” on page 140.
- ___ 7. If you have problems, refer to “Handling MVS Connectivity Problems” on page 141.

Configuring PSF for MVS to Print IPDS Files

Data Requirements

You need the IP address of the NIC.

Configuration Procedure

Configuring PSF/MVS to print IPDS files includes the following steps:

1. Define the MVS communications control unit to MVS. See “Define the Communications Control Unit to MVS” on page 133.
2. Modify the TCP/IP profile on your MVS system, if necessary. See “Modify the TCP/IP Profile in MVS” on page 133.
3. Ping the printer. See “Verify the Printer Connection” on page 135.
4. Define the printer as a writer-controlled printer to JES. See “Define the Printer to JES” on page 136.
5. Define the printer to PSF/MVS with a PRINTDEV statement, including the IP address. See “Define the Printer to PSF/MVS” on page 136.

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.

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*

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 the following example:

```

ACBPOOLSIZE          1000
ADDRESSTRANSLATIONPOOLSIZE  1500
CCBPOOLSIZE          150
DATABUFFERPOOLSIZE      160 32768
ENVELOPEPOOLSIZE     750
IPROUTEPOOLSIZE      300
LARGEENVELOPEPOOLSIZE  50
RCBPOOLSIZE          50
SCBPOOLSIZE          256
SKCBPOOLSIZE         256
SMALLDATABUFFERPOOLSIZE  256
TCBPOOLSIZE          512
TINYDATABUFFERPOOLSIZE  256
UCBPOOLSIZE          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

```

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.

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 8 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 8. Examples of Responses to a ping Command:

Note: If you have problems pinging a printer, refer to “Handling MVS Connectivity Problems” on page 141.

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.

JES2 Printer Definitions: Figure 9 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,NOSEPS,CKPTPAGE=100,
        DRAIN,MARK,TRKCELL=YES
```

Figure 9. 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.

JES3 Printer Definitions: Figure 10 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 10. PSF/MVS JES3 Printer Definition

Notes:

1. The value you specify for the JNAME parameter must match the name of the printer in the PSF/MVS Startup procedure.
2. The value you specify for the PNAME parameter must match the name on the PSF/MVS Startup procedure.

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 proc 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. (IBM network printers are 600-pel devices that appear to PSF/MVS as 300-pel devices.)

```
//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
//* ***** */
//* 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 */
//          DATAK=BLOCK,               /* 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

```

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 “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.

Verifying a TCP/IP-Attached Printer on MVS

To operate a TCP/IP-attached printer, you use JES operator commands.

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.
 - On **JES2**, the command is:
`$printer-name`
 - On **JES3**, the command is:
`*VARY printer-name,ON`

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`

Resolving IPDS Printing Problems

If you have problems printing, do the following:

- Print a NIC configuration page. Refer to “The NIC Configuration Page” on page 11.
- 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.

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

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 in the PSF Startup Proc.

```
MGMTMODE=OUTAVAIL  
FAILURE=WCONNECT  
TIMEOUT=REDRIVE  
DISCINTV=nn
```

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.

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.

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.

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.

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.

Port Switching Printer Sharing

To support printer sharing, IBM network printers automatically switch among all attached ports (parallel port, the twinax or coax port, or the LAN network port). Basically, the printer prints jobs for one port until no new jobs appear and the port “times out”. The printer then switches to the next port and does the same thing.

To change the default “time out” value for a port, update the TMEOUT value for the port on the appropriate menu (Parallel, Ethernet, Token Ring, Twinax Setup, or Coax Setup).

Handling MVS Connectivity Problems

If you encounter problems when pinging a network printer from MVS, here is how to resolve them.

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 “Modify the TCP/IP Profile in MVS” on page 133.
 - 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.

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. (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*.)
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.

Chapter 10. OS/390 to Print S/390 Line Data, PCL, and PostScript Files

Use this chapter to configure OS/390 to use IP PrintWay to print S/390 line data (EBCDIC data), PCL data, or PostScript data on your IBM network printer. IP PrintWay is a stand-alone feature of PSF/MVS, a component of the IP PrintWay/NetSpool feature of OS/390 V1R3 and V2R4, and a component of the OS/390 Print Server feature of OS/390 V2R5. You can use IP PrintWay to transmit output data sets from an MVS or OS/390 system to printers or servers in an IBM TCP/IP network.

Requirements

You can use IP PrintWay on your MVS or OS/390 system to send an S/390 line data, PCL, or PostScript file to the printer. See the IBM IP PrintWay Guide, S544-5379, for the software requirements.

Configuration Checklist

- ___ 1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. Configure IP PrintWay on your OS/390 system as described in the IBM IP PrintWay Guide, S544-5379.

When you configure IP PrintWay, you can optionally create a routing entry for the network printer in the IP PrintWay routing data set. If you do not create a routing entry for the network printer, the job submitter must specify the transmission information in the OUTPUT JCL statement when printing a file. (See 143.

In the routing entry, specify:

- The output class (CLASS), destination name (DEST), and forms name (FORMS) that the job submitter can use on the OUTPUT JCL statement when printing a file.
- The IP address of the network printer.
- Either the name of the print queue or the port number on the network printer. (See Notes 4.a on page 144 and 4.b on page 144.)

- The name of an IP PrintWay options entry. (See Note 4.b)
- ___ 4. Use one of the following methods to send a file with S/390 line data, PCL data, or PostScript data to the network printer. Refer to the IBM IP PrintWay Guide, S544-5379, for more information about JCL parameters.
- If you have not created a routing entry for the network printer, on the OUTPUT JCL statement for the job, specify:
 - The IP address of the network printer
 - Either the name of the print queue or the port number on the network printer. (See Notes 4.a and 4.b.)
 - The name of an IP PrintWay options entry. (See Note 4.a.)

For example, use one of the following JCL statements:

```
//name OUTPUT DEST='IP:nnn.nnn.nnn',PRTQUEUE=TEXT,PRTOPTNS=myoptions...
```

```
//name OUTPUT DEST='IP:nnn.nnn.nnn',PRTQUEUE=PASS,PRTOPTNS=myoptions...
```

```
//name OUTPUT DEST='IP:nnn.nnn.nnn',PORTNO=2501,PRTOPTNS=myoptions...
```

where nnn.nnn.nnn is the IP address of the network printer, and myoptions is the name of the IP PrintWay options entry.

- If you have created a routing entry for the network printer: On the OUTPUT JCL statement for the job, specify the CLASS, DEST, and FORMS parameters using the same values as in the routing entry. For example, use this JCL statement:

```
//name OUTPUT CLASS=class,DEST=destination,FORMS=formname....
```

You can also override information in the routing entry. For example, if you specified a port number in the routing entry, you can specify a print queue name on the OUTPUT JCL statement. This causes IP PrintWay to transmit the file to the LPD on the network printer instead of to the port. For example, use this JCL statement:

```
//name OUTPUT CLASS=class,DEST=destination,FORMS=formname,PRTQUEUE=TEXT....
```

Notes:

- a. On the JCL statement or in an IP PrintWay routing entry, you must specify either a print queue name or a port number for the network printer. Use a print queue name (PASS or TEXT) to send data to the LPD on the printer; use port number 2501 to send data directly to a port on the network printer.
- b. Select the print queue name or port number and the IP PrintWay options entry depending on the type of data in the file you want to print:

- If the file contains S/390 line data, specify TEXT as the name of the print queue, and specify the NOBINARY option in the options entry. If you specify PASS as the name of the print queue or if you specify 2501 as the port number, also specify the LINETERM option in the options entry.
- If the file contains PCL data, specify TEXT as the name of the print queue, and specify an options entry that contains the BINARY option. Specifying PASS as the print queue or 2501 as the port number might cause formatting problems.
- If the file contains PostScript data, specify PASS or TEXT as the name of the print queue or specify 2501 as the port number, and specify an options file that contains the NOBINARY option.

Chapter 11. InfoPrintManager

Use this chapter to configure InfoPrint Manager to print using your IBM network printer.

Requirements

For IBM Network Printers 12, 17, and 24, and for InfoPrint 20, you require InfoPrint Manager Version 2.1 with PTF UR50032 installed. For IBM InfoPrint 32, you require InfoPrint Manager Version 3.1.

Configuration Checklist

- ___ 1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. Define the printer to InfoPrint Manager as described in the next section, “Defining Printers to InfoPrint Manager”.

Defining Printers to InfoPrint Manager

The configuration procedure to use depends on what data stream you want to send.

- To send IPDS to the printer, configure it as a PSF TCP/IP-attached physical printer. See “Configuring Network Printers as PSF TCP/IP-Attached Physical Printers” on page 148.
- To send PCL to the printer, you can configure it as a PSF direct-attached physical printer. This will allow you to submit jobs containing any data stream that PSF accepts and print them as PCL. See “Configuring Network Printers as PSF Direct-Attached Physical Printers” on page 148. You can also configure the printer as an AIX-attached physical printer, but you will only be able to send PCL jobs to the printer if it is defined this way.
- To send PostScript to the printer, configure it as an AIX-attached physical printer. See “Configuring the Network Printer to InfoPrint as an AIX Physical Printer” on page 149.

Note: PCL is standard on all printers. PostScript is standard on the InfoPrint 20 and InfoPrint 32. PostScript requires the optional PostScript feature on Network Printer 12, Network Printer 17, and Network Printer 24. IPDS requires the optional IPDS feature on all printers.

Configuring Network Printers as PSF TCP/IP-Attached Physical Printers

To configure a printer with the IPDS feature as a PSF TCP/IP-attached physical printer:

1. In the InfoPrint GUI, open a physical printers well or a window with a physical printers pane.
2. Select the **Physical Printer Template Type** icon from the Types column of the Templates area. If you do not see a template for PSF TCP/IP-attached physical printers, select the **Preferences** button at the bottom of the window to change the template types that the GUI displays.
3. Drag and drop a PSF TCP/IP-attached physical printer template into the physical printers well or pane.
This step displays the **Add Physical Printer** dialog.
4. In the **Model** field, enter a model name, such as InfoPrint20 or InfoPrint32 (do not put in a space).
5. Fill in the other fields as you prefer. For information about these fields, see the GUI online help or the or the **pd_att_phy_ptr** man page.
6. Select the **OK** button.
InfoPrint closes the dialog and displays an icon representing the new physical printer in the physical printers well or pane. No further configuration is necessary; but if you wish, you can modify the attributes of the new physical printer in the same way as any other physical printer.
7. For good halftone printing quality, use the operator panel or the Network Printer Management program to set QUALITY to REFINE. (The QUALITY item is on the printer CONFIG Menu.)
8. If you plan to create similar physical printers for other network printers, you can create a template by dragging the new physical printer to the template area.

Configuring Network Printers as PSF Direct-Attached Physical Printers

To configure a network printer as a PSF direct-attached physical printer:

1. Install the InfoPrint 20 PCL driver on your AIX system from the CD-ROM shipped with the InfoPrint 20 (LCD4-0816). Follow the instructions in the README file on the CD-ROM.

Be sure to create an AIX print queue. Although InfoPrint will not use this queue to send jobs to the new physical printer, it will make configuration easier. It also allows you to verify that you installed the device driver and connected the printer device correctly.

2. In the InfoPrint GUI, open a physical printers well or a window with a physical printers pane.
3. Select the **Physical Printer Template Type** icon from the Types column of the Templates area. If you do not see a template for PSF direct-attached physical printers, select the **Preferences** button at the bottom of the window to change the template types that the GUI displays.
4. Drag and drop a PSF direct-attached physical printer template into the physical printers well or pane.
This step displays the **Add Physical Printer** dialog.
5. In the **Model** field, enter a printer model, such as ibm4317, ibm4320, or ibm4332.
6. In the **Device** field, enter the value for the AIX print queue that you created when you installed the device driver. This value appears in the **file=** field of the **/etc/qconfig** file.
7. Fill in the other fields as you prefer. For information about these fields, see the GUI online help or the
8. Select the **OK** button.
InfoPrint closes the dialog and displays an icon representing the new physical printer in the physical printers well or pane. No further configuration is necessary; but if you wish, you can modify the attributes of the new physical printer in the same way as any other physical printer.
9. If you plan to create similar physical printers for other IBM network printers, you can create a template by dragging the new physical printer to the template area.

Configuring the Network Printer to InfoPrint as an AIX Physical Printer

To configure a network printer to print PCL, PostScript, and ASCII, define the printer as an AIX physical printer:

1. Install the appropriate PostScript and PCL drivers on your AIX system from the CD-ROM shipped with the printer (LCD4-0816). Follow the instructions in the README file on the CD-ROM.
Be sure to create an AIX print queue. Although InfoPrint will not use this queue to send jobs to the new physical printer, you will need it for migration. It also allows you to verify that you installed the device driver and connected the printer device correctly.
2. Use the InfoPrint SMIT migration utility provided with InfoPrint Manager to migrate the AIX printer to InfoPrint.

Chapter 12. OS/2 TCP/IP to Print PCL and PostScript Files

NPM

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 “Chapter 13. OS/2 TCP/IP to Print IPDS Files” on page 161.

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)

Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on OS/2 may require **administrative** authority.

- ___ 1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. 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:**
 - a. Install the printer driver for OS/2. See “Installing the Printer Driver” on page 37.
 - b. Install the printer utility (LSPU or LMPU) from IBM. See “Installing OS/2 Utilities” on page 37.
 - c. Install the printer. See “Installing the Printer for OS/2 using IBM Utilities” on page 153.
 - d. Optionally, you can create aliases for the printers. See “Sharing the Printer by Creating the Printer Alias” on page 39.
 - **Using Standard OS/2 TCP/IP:**
 - a. Define a printer object. See “Installing the Printer using Standard OS/2 TCP/IP” on page 154.
 - b. Optionally, you can create aliases for the printers. See “Sharing the Printer by Creating the Printer Alias” on page 39.
- ___ 4. Configure print requesters. See “Configuring Print Requesters on OS/2” on page 40.
- ___ 5. Verify the configuration. See “Verifying the LAN Server Configuration” on page 157.

- ___ 6. If you have problems, see “Chapter 23. Handling TCP/IP Problems” on page 255 .

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 “Installing the Printer using Standard OS/2 TCP/IP” on page 154.

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.)	

Configuration Procedure

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 “Installing the Printer Driver” on page 37.
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 TCP/IP Printer** option. The **Add TCP/IP Printer** window for TCP/IP displays.
7. Fill in the fields with the following information:

Printer

Enter the name you want to use for the OS/2 queue name.

Comment

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

Driver Select the printer driver for the printer being installed.

IP address

The IP address of the NIC installed in the network printer.

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 by referring to the procedures in “Chapter 24. Customizing the NIC” on page 261.

Port number

The TCP/IP port number of the service selected above. The default TCP port number is 2501.

8. Click the **More>>>** button if you want to make other entries.
9. 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 on page 153.
10. Right-click the printer icon, select **Properties**, and then select **Queue Options**. Verify that **PMPrint** is displayed as the selected queue driver.
11. If desired, move the printer queue icon that you have just created to the printer queue folder.

Installing the Printer using Standard OS/2 TCP/IP

Printer Utility procedure

Use this procedure 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 “Installing the Printer for OS/2 using IBM Utilities” on page 153.

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.)	

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 156.

- a. Logon to the LAN Server (or LAN Manager) with administrative authority.
- b. Obtain the printer driver for OS/2.
- c. Read the README file contained on the 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. Start the LPR Port 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 **lprportd**.
 - 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 to open the **Templates - Icon View** window.

5. Drag and drop the **Printer** template icon to a folder/desktop. The **Create a Printer** window opens.
6. Type in the name of your printer object in the **Name** field.
7. Select the IBM network printer driver that you installed at step 2 on page 155 as the default printer driver for this printer object.

Note: If you did not install the printer driver at step 2 on page 155, click the “Install new printer driver...” tab and install the driver.

8. 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:

- a. Right click on any existing port in the **Output port** window.
- b. Select **Install** from the pop-up menu.
- c. Click **OK** when you see a message about ports already installed.
- d. The **Install New Port** window opens. Select **New port drivers** and type the directory name and drive, for example:

c:\TCP/IP\DLL

in the **Directory** field and press **Enter**.

- e. 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.
- f. After the installation is complete, you can select one of the LPR ports in the **Create a Printer** window.

9. Double-click the icon to open the **LPD Port** icon.
10. Complete the **LPD server** section with the IP address of the printer, for example: 9.99.12.185.
11. Complete the **LPD printer** section with the default 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.)
12. Click **OK** to save your settings. You are returned to the **Create a Printer** window.
13. Verify your selections, then click the **Create** button. An icon (printer object) appears on your desktop with the name you have chosen.

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.

Note: With the 3.0 version of the LAN Server Printer Utility, PMPRINT is automatically selected as the OS/2 print queue option. **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`

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

Note: You may also use the LAN Server Printer Utility to configure your printers under OS/2. Refer to the README file for the LAN Server Printer Utility.

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

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.

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 “Chapter 1. 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 “Chapter 21. TCP/IP Addresses” on page 221.
3. Install the printer driver for OS/2. (Refer to “Installing the Printer Driver” on page 37.)
4. Create a printer object on the OS/2 desktop. Define the Output port for that printer as port LPD x. (Refer to “Installing the Printer using Standard OS/2 TCP/IP” on page 154.)

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.

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 “Chapter 1. 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 “Chapter 21. TCP/IP Addresses” on page 221.
3. Install the Windows 3.1 x 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 LPT n
```

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.

Chapter 13. OS/2 TCP/IP to Print IPDS Files

NPM

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 “Chapter 12. OS/2 TCP/IP to Print PCL and PostScript Files” on page 151.

To print IPDS files on the network printers, you must install the IPDS option for the printer.

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.

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. See “Chapter 1. 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 parameters and values shown in the following table.

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. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 4. Configure the printer for IPDS. See “Configuring PSF/2 to Print IPDS Files”.
- ___ 5. Optionally, set up printer sharing. See “Configuring PSF/2 for Printer Sharing” on page 163.
- ___ 6. Verify the PSF/2 configuration by sending a print job to the printer. See “Verifying the PSF/2 Configuration” on page 164.
- ___ 7. If you have problems, refer to “Chapter 23. Handling TCP/IP Problems” on page 255.

Configuring PSF/2 to Print IPDS Files

Use this section to configure IBM network printers for IPDS printing.

Data Requirements

Parameter	Description	Your Value
IP address	IP address of the NIC	
Queue name	Name of the queue to use for IPDS printing	

Configuration Procedure for PSF/2

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 “Printer Sharing on the PSF/2 Server” on page 164.
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**.

Configuring PSF/2 for Printer Sharing

To support printer sharing, IBM network printers automatically switch among all attached ports (parallel port, the twinax or coax port, or the LAN network port). Basically, the printer prints jobs for one port until no new jobs appear and the port “times out”. The printer then switches to the next port and does the same thing.

To change the default “time out” value for a port, update the TMEOUT value for the port on the appropriate menu (Parallel, Ethernet, Token Ring, Twinax Setup, or Coax Setup).

Setting up PSF/2 for Printer Sharing

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.

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. The recommended value is 30 seconds. Do not use the default value of 9999 (infinite).
7. Select **Change**.

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”.

1. Access the PSF/2 folder on the desktop.
2. Select **PSF/2 PSF Direct**.
3. Select **Receiver**.
4. Select **Change**.
5. Set the value for the 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).
6. Select **Device**.
7. Select **OK**.

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 “The NIC Configuration Page” on page 11 .
- 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.

Chapter 14. 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.

- To configure AIX to print already-formatted files, see “Chapter 15. AIX to Print Formatted PCL and PostScript Files” on page 175.
- To configure AIX to print IPDS files, see “Chapter 16. AIX to Print IPDS Files” on page 179.

Requirements

You need:

AIX 3.2.5	AIX 4.1.x	AIX 4.2.x
APAR IX56644 and IX62977 applied on the RS/6000 server	APAR IX56699 and IX63248 applied on the RS/6000 server	APAR IX63260 applied on the RS/6000 server

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

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.

Configuration Checklist

Authority Level Required

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

1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.

- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. Install the printer drivers and utilities. See “Installing AIX Printer Driver and Utilities”.
- ___ 4. Configure your printer with one of these procedures:
 - “Configuring AIX 3.2.5 to Format and Print Files” on page 170
 - “Configuring AIX 4.1.x or 4.2.x to Format and Print Files” on page 172
- ___ 5. Verify the configuration. See “Verifying an AIX Configuration” on page 174.
- ___ 6. If you have problems, see “Chapter 23. Handling TCP/IP Problems” on page 255.

Installing AIX Printer Driver and Utilities

Drivers and Utilities on the Web

To obtain a current version of a printer driver, program, or utility:

1. Access the IBM Printing Systems Company home page:

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

2. Navigate to the printer driver, utility, or program you need and follow the instructions to download it

1. Logon to an AIX machine as root.
2. Place the 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. There are three ways to continue, depending on the media you are using:
 - If you are using DOS-formatted diskettes, continue at “DOS-Formatted Files” on page 169.
 - If you are using TAR-formatted diskettes, continue at “TAR-Formatted Files” on page 170.
 - If you are using a CD-ROM, continue at “Using the CD-ROM” on page 170.

DOS-Formatted Files

You need to get the readme, license, and printer files from the diskettes. First, get the readme and license files by entering two of the following commands, corresponding to your language:

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

To get the printer files, enter the appropriate command from the table below.

Command to Enter	Description
<code>dosread aix325.tar aix325.tar</code>	AIX 3.2.5 Printer files
<code>dosread aix41.tar aix41.tar</code>	AIX 4.1+ Printer files

Note: Select the appropriate README file to finish the installation procedures. The README file gives you up-to-date instructions on new features, hints, and tips about the printer drivers.

TAR-Formatted Files

Enter the command from the table below that is appropriate to your version of AIX.

Command to Enter	Description
<code>tar -xf ax3aa_ml.tar</code>	AIX 3.X.X Printer files
<code>tar -xf ax4aa_ml.tar</code>	AIX 4.X.X Printer files

Note: Select the appropriate README file to finish the installation procedures. The README file gives you up-to-date instructions on new features, hints, and tips about the printer drivers.

Using the CD-ROM

Follow the instructions below to continue installation from a CD-ROM.

1. Mount the CD-ROM with the following command (assumes the path is /dev/cd0).

```
mount -o ro -v cdrfs /dev/cd0 /cdrom
```

2. Enter one of the following commands to copy the CD-ROM contents:

For AIX 3.2.5:

```
cp /cdrom/drivers/aix/ax3aa_ml.tar /tmp/npdriv
```

For AIX 4.X.X:

```
cp /cdrom/drivers/aix/ax4aa_ml.tar /tmp/npdriv
```

3. Unpack the contents of the tar file with one of the commands:

For AIX 3.X.X:

```
tar -xf ax3aa_ml.tar
```

For AIX 4.X.X:

```
tar -xf ax4aa_ml.tar
```

Note: Select the appropriate README file to finish the installation procedures. The README file gives you up-to-date instructions on new features, hints, and tips about the printer drivers.

Configuring AIX 3.2.5 to Format and Print Files

This section describes how to configure AIX 3.2.5 to format print files before printing them.

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.	

Configuration Procedure

1. Type `smitty mkvirprt` on the command line and press Enter. The **Printer Attachment** window is displayed.
2. Select **IBM Network Printer**.
3. Type the printer hostname (or IP address) and press Enter. The **BOOTP/TFTP** window is displayed:
 - Select **1** if you have not already set up BOOTP. See "Starting the BOOTP Daemon on AIX Systems" on page 229.
 - If you select 2, skip to step 9.
4. Type the MAC address of the NIC, and press Enter.
5. Enter the hardware type (**ether** for Ethernet or **tr** for Token Ring) and press Enter.
6. Type a gateway IP address and press Enter. (Just press Enter if you do not want to enter a gateway address.)
7. Type a subnet mask and press Enter. (Just press Enter if you do not want to enter a subnet mask.)
8. Turn the printer off, wait ten seconds, then turn it back on.

Beware of Beaconing on Token Rings

When you turn the printer off, wait ten seconds 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 "Starting the BOOTP Daemon on AIX Systems" on page 229.

9. The **Select a Printer** window is displayed.
10. From the displayed list, select the **IBM Network Printer *mn***.

11. 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.
12. 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.
13. 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.
14. Enter **Y** if you want one of the queues (PS or PCL) to be the default queue. Otherwise, enter **N**.
15. Exit smitty.

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.

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.	

Configuration Procedure

1. Type `smitty mkvirprt` on the command line and press Enter. The **Add a Print Queue** window is displayed.
2. Select **ibmNetPrinter** (IBM Network Printer) and press Enter.

3. From the **Printer Type** window, select **IBM**.
4. From the refreshed **Printer Type** window, select **ibm43nn**, where *nn* is the IBM network printer type number, for example 17.
5. The **BOOTP/TFTP Server** window is displayed:
 - Select 1, if you have not already run BOOTP. Skip to “Using BOOTP” step 1.
 - If you select 2 (non-BOOTP), skip to step 1 of “The Non-BOOTP Way”.

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 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. Type a gateway IP address and press Enter. (Just press Enter if you do not want to enter a gateway address.)
8. Type a subnet mask and press Enter. (Just press Enter if you do not want to enter a subnet mask.)
9. Turn the printer off, wait ten seconds, then turn it back on.

Beware of Beaconing on Token Ring

When you turn the printer off, wait ten seconds 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 “Using BOOTP”.

10. Exit smitty.

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.

Verifying an AIX Configuration

To verify the connection, send a print job to the printer using 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.

Chapter 15. AIX to Print Formatted PCL and PostScript Files

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

- To configure AIX to format and then print your files, see “Chapter 14. AIX to Format and Print PCL and PostScript Files” on page 167.
- To configure AIX to print IPDS files, see “Chapter 16. AIX to Print IPDS Files” on page 179.

Requirements

You need:

AIX 3.2.5	AIX 4.1.x	AIX 4.2. x
APAR IX56644 and IX62977 applied on the RS/6000 server	APAR IX56699 and IX63248 applied on the RS/6000 server	APAR IX63260 applied on the RS/6000 server

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

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.

Configuration Checklist

Authority Level Required

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

1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.

- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. Configure your printer with one of these procedures:
 - “Configure AIX 3.2.5 to Print Formatted Files”
 - “Configure AIX 4.1.X or 4.2.X to Print Formatted Files” on page 177
- ___ 4. Verify the configuration. See “Verifying an AIX Configuration” on page 178.
- ___ 5. If you have problems, refer to “Chapter 23. Handling TCP/IP Problems” on page 255.

Configure AIX 3.2.5 to Print Formatted Files

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 host name of the NIC.	

Configuration Procedure

1. Type `smitty mkque` on the command line and press Enter. The **Add a Queue** window is displayed.
2. Select **Add a Remote Queue**. The **Add a Remote Queue** window is displayed.
3. Enter values for all required fields. Here are examples:

Table 15. Add a Remote Queue Fields

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.

Table 15. Add a Remote Queue Fields (continued)

Field	Sample Value	Source
DESTINATION HOST for remote jobs	NETONE	If you enter an optional host name, this is the destination host name from the data requirements table. Otherwise, the host name 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.

4. When you complete the panel, the **Command Status** window displays.
5. Exit smitty.

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

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.	
Host name	Host name 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.)	

Configuration Procedure

1. Type `smitty mkvirprt` on the command line and press Enter. The **Add a Print Queue** window is displayed.

2. Select **remote (Printer Attached to Remote Host)** and press Enter. The **Type of Remote Printing** window is displayed.
3. Select **Standard Processing** and press Enter. The **Add a Standard Remote Print Queue** window is displayed.
4. Complete the panel. Here are sample entries:

Table 16. Add a Standard Remote Print Queue Fields

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 host name, 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.

5. When you complete the panel, the **Command Status** window displays.
6. Exit smitty.

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.

Chapter 16. 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.

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	None

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

Configuration Checklist

Authority Level Required

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

1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. 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, specify this if you to print IPDS and other data streams• IPDS, for IPDS only
IPDS	EMULATION	4028

Menu	Item	Setting
IPDS	FONTSUB	ON
IPDS	IPDS PORT	TRING, ETHER

- ___ 3. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 4. Configure PSF for AIX. See “Configuring AIX to Print IPDS Files”.
- ___ 5. Configure the printer for sharing. See “Configuring PSF for AIX for Printer Sharing” on page 181.
- ___ 6. Verify the configuration by sending a print job to the printer using any of the commands in “Verifying an AIX Configuration for IPDS” on page 182.
- ___ 7. If you have problems, see “Chapter 23. Handling TCP/IP Problems” on page 255.

Configuring AIX to Print IPDS Files

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.	

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. Type `smitty` at the command line and press Enter.
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**. The **Add a TCP/IP Attached Printer** screen displays.
8. 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

Accept 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.

Configuring PSF for AIX for Printer Sharing

To support printer sharing, IBM network printers automatically switch among all attached ports (parallel port, the twinax or coax port, or the LAN network port). Basically, the printer prints jobs for one port until no new jobs appear and the port “times out”. The printer then switches to the next port and does the same thing.

To change the default “time out” value for a port, update the TMEOUT value for the port on the appropriate menu (Parallel, Ethernet, Token Ring, Twinax Setup, or Coax Setup).

Setting up PSF for AIX for Printer Sharing

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.

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. IBM recommends a value of 30. Do **not** use the default value of 9999 (infinite).
8. Press Enter to save the value.

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”.

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. IBM recommends a value of 30. Do **not** specify the default, 9999 (infinite).

Verifying an AIX Configuration for IPDS

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

```
qpri -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 “The NIC Configuration Page” on page 11.

- 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.

Chapter 17. HP-UX to Format and Print PCL and PostScript Files

Use this chapter to configure an IBM network printer to work in the HP-UX environment.

Requirements

You need HP-UX Version 9 or 10.

Clients or submitters need TCP/IP or Telnet.

Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on the HP-UX server require **root** authority.

- ___ 1. If you have not already done so, setup the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. Install the printer driver and utilities. See “Installing the HP-UX Printer Driver” on page 186.
- ___ 4. Configure the host environment. See “Configuring HP-UX” on page 186.
- ___ 5. Verify the configuration. See “Verifying an HP-UX Configuration” on page 187.
- ___ 6. If you have problems, refer to “Chapter 23. Handling TCP/IP Problems” on page 255.

Installing the HP-UX Printer Driver

Drivers and Utilities on the Web

To obtain a current version of a printer driver, program, or utility:

1. Access the IBM Printing Systems Company home page:
`http://www.printers.ibm.com`
2. Navigate to the printer driver, utility, or program you need and follow the instructions to download it

1. Logon to an HP-UX machine as root.
2. Place the CD-ROM with the HP-UX 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. Mount the CD-ROM.
 - On HP 9.0, with a path of `/dev/dsk/c201d2s0`, the command is:
`mount /dev/dsk/c201d2s0 /cdrom -o ro -t cdfs`
 - On HP 10.0, with a path of `/dev/dsk/c0t5d0`, the command is:
`mount /dev/dsk/c0t5d0 /cdrom -o ro -F cdfs`
5. Copy the contents of the CD-ROM with the command:
`cp /cdrom/drivers/hpux/hp9aa_ml.tar /tmp/npdriv (for version 9.0)`
or
`cp /cdrom/drivers/hpux/hp0aa_ml.tar /tmp/npdriv (for version 10.0)`
6. Install the files into the appropriate directories by entering the command:
`tar xf hp9aa_ml.tar (for version 9.0)`
or
`tar xf hp0aa_ml.tar (for version 10.0)`
7. Select the appropriate README file to finish the installation procedures. The README file gives you up to date instructions on new features, hints, and tips about the printer drivers.

Configuring HP-UX

Data Requirements

You need the following data for HP-UX 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.	

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
```

Note: Do not use the HP-UX SAM utility to set up the network printer queues. The SAM utility does not configure the TCP/IP port correctly for IBM network printers, and jobs will not print. Use only the IBM-provided utility to setup the queues.

3. Follow the menu selections to configure your network printer.

Verifying an HP-UX Configuration

Verify an HP-UX 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 "Chapter 23. Handling TCP/IP Problems" on page 255.

Chapter 18. SCO to Format and Print PCL and PostScript Files

Use this chapter to configure an IBM network printer to work in the SCO environment.

Requirements

You need one of the following SCO Versions:

- ODT 3.0
- 3.2 Version 4.1
- OpenServer 5.0

Clients or submitters need TCP/IP or Telnet.

Configuration Checklist

Authority Level Required

All of the following configuration steps carried out on the SCO server require root authority.

Required Steps

- 1. If you have not already done so, setup the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- 3. Install the printer driver and utilities. See “Installing the SCO Printer Driver” on page 190.
- 4. Configure the SCO system. See “Configuring SCO” on page 190.
- 5. Verify the configuration. See “Verifying an SCO Configuration” on page 191.
- 6. If you have problems, refer to “Chapter 23. Handling TCP/IP Problems” on page 255.

Installing the SCO Printer Driver

Drivers and Utilities on the Web

To obtain a current version of a printer driver, program, or utility:

1. Access the IBM Printing Systems Company home page:
`http://www.printers.ibm.com`
2. Navigate to the printer driver, utility, or program you need and follow the instructions to download it

1. Logon to an SCO machine as root.
2. Place the CD-ROM with the SCO 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. Assuming the path is `/dev/cd0`, mount the CD-ROM with the command:
`mount -f HS,lower -r /dev/cd0 /cdrom`

Note: If you get an error saying that HS is an unknown file system format, you need to add the HS file system to the operating system with the following command:

```
mkdev high-sierra
```

Copy the contents of the CD-ROM with the command:

```
cp /cdrom/drivers/sco/scoaa_ml.tar /tmp/npdriv
```

5. Install the files into the appropriate directories by entering the command:
`tar xf scoaa_ml.tar`
6. Select the appropriate README file to finish the installation procedures. The README file gives you up-to-date instructions on new features, hints and tips about the printer drivers.

Configuring SCO

Data Requirements

You need the following data for SCO 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.	

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.

Verifying an SCO Configuration

To verify as SCO configuration, enter this command to send a print job to the printer:

```
lp -d queuename file
```

where *queuename* is the name specified earlier.

If you have problems printing, refer to "Chapter 23. Handling TCP/IP Problems" on page 255.

Chapter 19. 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.

Requirements

You need SUN Solaris 2.3, 2.4, 2.5, or 2.6.

Clients or submitters need TCP/IP or Telnet.

Configuration Checklist

Authority Level Required

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

- ___ 1. If you have not already done so, setup the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. Install the printer driver and utilities. See “Installing the SUN Solaris Printer Driver” on page 194.
- ___ 4. Configure the SUN system. See “Configuring SUN Solaris” on page 194.
- ___ 5. Verify the configuration. See “Verifying a SUN Solaris Configuration” on page 195.
- ___ 6. If you have problems, refer to “Chapter 23. Handling TCP/IP Problems” on page 255.

Installing the SUN Solaris Printer Driver

Drivers and Utilities on the Web

To obtain a current version of a printer driver, program, or utility:

1. Access the IBM Printing Systems Company home page:
`http://www.printers.ibm.com`
2. Navigate to the printer driver, utility, or program you need and follow the instructions to download it

1. Logon to an SUN Solaris machine as root.
2. Place the 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. Assuming the path is `/dev/dsk/c0t6d0s2`, mount the CD-ROM with the command:
`mount -f hspc -o ro /dev/dsk/c0t6d0s2 /cdrom`

OR if you are running Volume Manager, enter the command:

`volcheck`

5. Copy the contents of the CD-ROM with the command:
`cp /cdrom/drivers/solaris/solaa_ml.tar /tmp/npdriv`
6. Install the files into the appropriate directories by entering the command:
`tar xf solaa_ml.tar`
7. Select the appropriate README file to finish the installation procedures. The README file gives you up-to-date instructions on new features, hints and tips about the printer drivers.

Configuring SUN Solaris

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.	

Parameter	Description	Your Value
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.	

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.

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 “Chapter 23. Handling TCP/IP Problems” on page 255.

Chapter 20. Windows Platforms on TCP/IP Networks

Use this chapter to configure Windows platforms (Windows NT 4.0, Windows NT 3.51, Windows 95, or Windows for Workgroups) to print over a TCP/IP network to your IBM network printers.

Note: There are different ways of configuring Windows platforms on TCP/IP networks. This chapter provides guidance on some of those ways.

Requirements

Verify that you have the required software available:

- IBM printer drivers for the desired operating system(s)
- TCP/IP protocol

The following software is required in some configurations:

- IBM LPR Remote Printing Client or other LPR client (Windows 95 only)
- IBM TCP/IP Network Port Monitor (in some configurations of Windows NT 4.0 only)

Configuration Checklist

- ___ 1. If you have not already done so, set up the printer and install the NIC. See “Chapter 1. Start Here—Install the Network Interface Card (NIC)” on page 3.
- ___ 2. Set TCP/IP addresses for the printer, such as an IP address, gateway address, or subnet mask. See “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
- ___ 3. Read the section “Recommendations for Your Print Configuration” on page 198. This section describes the various ways of configuring printers on Windows networks, and the merits of each. When you have decided on the best configuration for your network, continue at the next step.
- ___ 4. If you have decided on a peer-to-peer configuration for your network, do the following procedure for each machine that you want to be able to use the printer:
 - “Configuring Windows on TCP/IP Networks to Print Direct” on page 199

If you have decided on a client-server approach, do the following steps:

- a. Set up the machine that is going to be the print server to print directly to the print device. For this, follow the instructions in section “Configuring Windows on TCP/IP Networks to Print Direct” on page 199 for the operating system the print server will run on.
 - b. Share the printer set up in the previous step to the network. Follow the instructions in section “Configuring a Windows Print Server on TCP/IP Networks” on page 208.
 - c. On each client, create a printer icon that uses the shared printer set up in the previous step. To do this, follow the instructions in “Configuring Windows Print Clients on TCP/IP Networks” on page 212 for the operating system the print client uses.
- ___ 5. If you have any problems, refer to “Chapter 23. Handling TCP/IP Problems” on page 255.

Recommendations for Your Print Configuration

There are two main configurations that you can choose between when setting up printers and Windows machines on TCP/IP networks. Those configurations are:

1. A “peer-to-peer” configuration where each machine prints directly to each printer.
2. A “client-server” configuration where one or more machines act as print servers and the other machines print through these print servers.

Client-server has the following advantages.

- Installing a client of a shared printer is simpler than installing a machine to print directly to a printer. The installation effort over the whole network is significantly reduced.
- The printer queue as seen by each client is the full queue, not just the queue of jobs on their own machine. That is, all clients using a shared printer see all jobs being submitted to that printer. The client can see that there is a queue of 10 jobs waiting on that printer, instead of seeing (as they would in a peer-to-peer configuration) that the print queue is empty, when in fact other jobs from other machines are queued on the printer.
- Communication from the clients to the server is by Microsoft Networking, so only the print server requires TCP/IP to be installed and configured.

IBM provides the TCP/IP Network Port Monitor, which can be used instead of the standard LPR port monitor on a Windows NT 4.0 print server. The Network Port Monitor can be used in both client-server and peer-to-peer configurations. This provides the following advantages:

- On the IBM Network Printers 12, 17, and 24, clients will receive printer status information. On the IBM InfoPrint printers, clients will receive both printer status and job status, including true end-of-job indication (the job disappears from the queue only when fully **printed**, not fully **sent**).
- If the Windows NT 4.0 print server has been installed correctly, the client has its printer drivers downloaded and installed automatically.

Peer-to-peer configurations have the following advantage:

- Clients are not dependent on the server for printing. Only the client and the printer need to be ready for printing to occur.

Supported Windows Print Server Platforms

A print server can be a machine running any of the following:

- Windows NT 4.0 (Server or Workstation)
- Windows NT 3.51 (Server or Workstation)
- Windows 95
- Windows for Workgroups

Note: Some operating systems may have restrictions on the number of print clients they can serve. For example, a printer created on Windows NT 4.0 Workstation can be shared by no more than 10 clients.

Supported Windows Client Platforms

Clients of shared printers can be running:

- Windows NT 4.0 (Server or Workstation)
- Windows NT 3.51 (Server or Workstation)
- Windows 95
- Windows for Workgroups

One single print server can serve clients on all of these operating systems simultaneously.

Configuring Windows on TCP/IP Networks to Print Direct

This section explains how to set up to print directly to the print device on the operating systems listed below.

- Windows NT 4.0 (Server or Workstation). See “Configuring Windows NT 4.0 to Print Directly to the Printer” on page 200.
- Windows NT 3.51 (Server or Workstation). See “Configuring Windows NT 3.51 to Print Directly to the Printer” on page 204.

- Windows 95. See “Configuring Windows 95 to Print Directly to the Printer” on page 206.

Note: Although direct printing can be set up on Windows for Workgroups, this procedure is not documented in this book -- see the printer driver readme and the help for the operating system.

Configuring Windows NT 4.0 to Print Directly to the Printer

You have two choices:

- To use the IBM TCP/IP Network Port Monitor, see “Using the IBM TCP/IP Network Port Monitor”.
- To use the Windows LPR Port Monitor, see “Using the Windows NT LPR Port Monitor” on page 202.

Using the IBM TCP/IP Network Port Monitor

Use this procedure to use the IBM TCP/IP Network Port Monitor to set up a Windows NT 4.0 machine to print directly to a printer. This procedure is also the first step of setting up a Windows NT 4.0 print server.

Data Requirements: The following table lists the data requirements for setting up to print directly to the printer.

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> ” or “IBM InfoPrinter <i>nn</i> ”.	
IP address	IP address of the NIC.	

Configuration Procedure:

Authority Level Required

Some of the following configuration steps carried out on Windows NT 4.0 may require **administrative** authority.

1. Logon to the Windows NT 4.0 machine as an administrator.
2. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
3. Double-click on the **Add Printer** icon.

4. In the **Add Printer Wizard** window, click the **My Computer** radio button, then click **Next**.
5. Click **Add Port**.
6. If you have already installed the IBM TCP/IP Network Port Monitor, the list in the **Printer Ports** window will contain the entry **IBM TCP/IP Network Port**.
If this entry is in the list, continue to the next step. Otherwise, you must install the IBM TCP/IP Network Port Monitor, as follows:
 - a. Select **New Monitor...**
 - b. In the **Installing Print Monitor** window, type the appropriate drive and path of the port monitor files to be installed. These files can be found on the CD-ROM that came with your printer, as well as on the IBM Printing Systems Company web page.
 - c. Click **OK**.
7. In the **Printer Ports** Window, select **IBM TCP/IP Network Port** from the list of available printer ports.
8. Click **New Port...**
9. Enter the network address of the printer. Optionally you may also enter a name for the port you are creating.

Note: Selecting **Help** displays the help for the port monitor. The help includes information about the port monitor, including a section on Frequently Asked Questions. Access the **Help Contents** to see what information is available.
10. Click **OK**.
11. Click **Close** on the **Printer Ports** window.
12. Verify that the new 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.
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 desired, then click the radio button if you want the printer to be the default printer.
19. Click **Next**.
20. Click **Not shared**.
21. Print a test page by clicking the appropriate button, then click **Finish**.

22. If you want to share this printer, continue at “Configuring a Windows NT 4.0 Print Server” on page 208.

Verifying the Configuration: Test the Windows NT 4.0 configuration for TCP/IP by printing a test page (the final step in this configuration procedure above). If you wish to print a test page at some time other than during installation:

1. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
2. Right-click on the printer and select **Properties**.
3. Select **Print Test Page**.

Using the Windows NT LPR Port Monitor

Use this procedure to use the Windows NT LPR Port Monitor to set up a Windows NT 4.0 machine to print directly to a printer. This procedure is also the first step of setting up a Windows NT 4.0 print server.

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> ” or “IBM InfoPrint <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.)	

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.

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 **Properties**.
 - c. 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 **Printers** folder from the **All Folders** list.
5. From the **Contents of 'Printers'** list, run **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**.

Verifying the Configuration: Test the NT configuration for TCP/IP by sending a print job from the command line or an application:

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 9.b on page 203.

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.

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.

Configuring Windows NT 3.51 to Print Directly to the Printer

Use this procedure to set up a Windows NT 3.51 machine to print directly to a printer. This procedure is also the first step of setting up a Windows NT 3.51 print server.

Note: IBM InfoPrint 20 and IBM InfoPrint 32 are not supported on Windows NT 3.51.

Data Requirements

The following table lists the data requirements for setting up to print directly to the printer.

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.)	

Configuration Procedure

Authority Level Required

Some of the following configuration steps carried out on Windows NT 3.51 may require **administrative** authority.

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 on page 205.
12. Click **OK**, then in the **Printer Setup** window select any desired printer driver options and click **OK**.

Verifying the Configuration

Test the Windows NT 3.51 configuration for TCP/IP by sending a print job from the command line or an application.

From the Command Line: Send a print job from the command line by entering the command:

```
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.

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.

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.

Configuring Windows 95 to Print Directly to the Printer

Use this procedure to set up a Windows 95 machine to print directly to a printer. This procedure is also the first step of setting up a Windows 95 print server.

Data Requirements

The following table lists the data requirements for setting up to print directly to the printer.

Parameter	Description	Your Value
Printer name	User-assigned name of the printer.	
Printer driver name	Name of the printer driver for Windows 95. The default name of the driver is "IBM Network Printer <i>nn</i> " or "IBM InfoPrint <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.)	

IBM LPR Remote Printing Client

Before installing the printer on Windows 95 you **must** install the IBM LPR Remote Printing Client utility. This can be found on the CD-ROM that came with your printer, as well as on the IBM Printing Systems Company web page. Follow the instructions in the utility's README.TXT file to install it. The installation program should start automatically; if it does not, run INSTLPR.EXE.

Verifying the Configuration

Test the Windows 95 configuration for TCP/IP by printing a test page (the final step in the configuration procedure above). If you wish to print a test page at some time other than during installation:

1. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
2. Right-click on the printer and select **Properties**.
3. Select **Print Test Page**.

Configuring a Windows Print Server on TCP/IP Networks

This section explains how to set up a print server on the operating systems listed below.

- Windows NT 4.0 (Server or Workstation). See “Configuring a Windows NT 4.0 Print Server”.
- Windows NT 3.51 (Server or Workstation). See “Configuring a Windows NT 3.51 Print Server” on page 209.
- Windows 95. See “Configuring a Windows 95 Print Server” on page 211.

Note: Although a print server can be set up on Windows for Workgroups, this procedure is not documented in this book—see the printer driver readme and the help for the operating system.

Configuring a Windows NT 4.0 Print Server

Data Requirements

The following table lists the data requirements for setting up a print server.

Parameter	Description	Your Value
Printer name	User-assigned name of the printer	
Printer share name	User-assigned name of the printer as it will appear to network clients. This can be the same as the printer name if you want. Due to client limitations, this name should be limited to 8 characters.	
List of client operating systems	To facilitate automatic download of drivers from the server to the client, you must know in advance the clients that are going to be using the shared printer.	

Configuration Procedure

Authority Level Required

Some of the following configuration steps carried out on Windows NT 4.0 may require **administrative** authority.

1. The first step in setting up a print server is to set the machine up to print directly to the printer. If you have not already done so, do the procedure “Configuring Windows NT 4.0 to Print Directly to the Printer” on page 200, and return here when done.
2. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
3. Right-click on the printer and select **Sharing...**
4. Click the **Shared** radio button, then enter the printer’s share name.
5. In the **Alternate Drivers** list, select all operating systems for which there will be clients using this shared printer.
6. Click **OK**.
If you selected any operating systems, you will be prompted to install the printer drivers for those systems. Follow the instructions on the subsequent windows to do this.
7. Inform the clients that will be using the printer of the share name of the printer.

Verifying the Configuration

You will test the shared printer by installing a client of the printer and printing a test page from that client. To install a print client, see “Configuring Windows Print Clients on TCP/IP Networks” on page 212.

Configuring a Windows NT 3.51 Print Server

Note: IBM InfoPrint 20 and IBM InfoPrint 32 are not supported on Windows NT 3.51.

Data Requirements

The following table lists the data requirements for setting up a print server.

Parameter	Description	Your Value
Printer name	User-assigned name of the printer.	

Parameter	Description	Your Value
Printer share name	User-assigned name of the printer as it will appear to network clients. This can be the same as the printer name if you want. Due to client limitations, this name should be limited to 8 characters.	

Configuration Procedure

Authority Level Required

Some of the following configuration steps carried out on Windows NT 3.51 may require **administrative** authority.

1. The first step in setting up a print server is to set the machine up to print directly to the printer. If you have not already done so, do the procedure "Configuring Windows NT 3.51 to Print Directly to the Printer" on page 204, and return here when done.
2. From the Program Manager window, select **Main**.
3. Select **Print Manager**.
4. Select the printer you want to share to the network.
5. Select **Properties**.
6. Check the box **Share this printer on the network**.
7. Change the share name if you want.
8. Optionally, enter a text string for the printer's location.
9. Click **OK**.
10. Inform the clients that will be using the printer of the share name of the printer.

Verifying the Configuration

You will test the shared printer by installing a client of the printer and printing a test page from that client. To install a print client, see "Configuring Windows Print Clients on TCP/IP Networks" on page 212.

Configuring a Windows 95 Print Server

Data Requirements

The following table lists the data requirements for setting up a print server.

Parameter	Description	Your Value
Printer name	User-assigned name of the printer.	
Printer share name	User-assigned name of the printer as it will appear to network clients. This can be the same as the printer name if you want. Due to client limitations, this name should be limited to 8 characters.	

Configuration Procedure

1. The first step in setting up a print server is to set the machine up to print directly to the printer. If you have not already done so, do the procedure “Configuring Windows 95 to Print Directly to the Printer” on page 206, and return here when done.
2. Verify that all necessary network components have been installed:
 - a. Select **Start**, then **Settings**, then **Control Panel**.
 - b. Double-click on the **Network** icon.
 - c. If the following network components are not already installed, install them by clicking **Add**:
 - Client for Microsoft Networks
 - An appropriate protocol for the other devices in your workgroup (for example, NetBEUI is the default for Microsoft networking)
 - File and printer sharing for Microsoft Networks
3. Back on the desktop, select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
4. Right-click on the printer to be shared and select **Properties**.
5. Select the **Sharing** tab.
6. Click the **Shared As** radio button, then enter the printer’s share name. Optionally, enter a comment or password.
7. Click **OK**.
8. Inform the clients that will be using the printer of the share name of the printer.

Verifying the Configuration

You will test the shared printer by installing a client of the printer and printing a test page from that client. To install a print client, see “Configuring Windows Print Clients on TCP/IP Networks”.

Configuring Windows Print Clients on TCP/IP Networks

This section explains how to set up print clients on the following operating systems:

- Windows NT 4.0 (Server or Workstation)
- Windows NT 3.51 (Server or Workstation)
- Windows 95
- Windows for Workgroups

A print client uses a printer shared to the network by a print server. Therefore, before setting up a print client, you must set up a shared printer on a print server. For instructions on how to do this, see “Configuring a Windows Print Server on TCP/IP Networks” on page 208.

Authority Level Required

In connecting a print client to a print server, some level of authority might be necessary. Depending on the configuration of the print server and on the operating systems involved, one or more of the following might be required:

1. The user creating the print client might need a logon on the print server.
2. The logon on the print server might require an authority level greater than the default.
3. A password might be required to link to the shared printer.

Configuring a Windows NT 4.0 Print Client

Data Requirements

Parameter	Description	Your Value
Printer name	User-assigned name of the printer on the local machine.	
Printer driver name	Name of the printer driver for Windows NT 4.0. The default name of the driver is "IBM Network Printer nn" or "IBM InfoPrinter nn". Note that if the shared printer you are going to use is on Windows NT 4.0 and was installed correctly, your printer drivers will be downloaded automatically for you, and you do not need to know this name.	
Share name of the printer	This is the name assigned to the shared printer when it was shared to the network. It is also useful, though not mandatory, to know the name of the machine where the shared printer is installed.	

Configuration Procedure

Authority Level Required

Some of the following configuration steps carried out on Windows NT 4.0 may require **administrative** authority.

1. Logon to the Windows NT 4.0 print client as an administrator.
2. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
3. Double-click on the **Add Printer** icon.
4. In the **Add Printer Wizard**, click the **Network printer server** radio button, then click **Next**.
5. In the **Printer** entry field, type the name of the shared printer as follows:
`\\machinename\printersharename`
You may also use the **Shared Printers** area to browse the network for the printer you want to share.
6. Click **OK**.
7. In the unlikely event that your printer drivers are not downloaded automatically from the print server, you will be asked if you want to install the printer drivers on the print client.
If this happens, click **OK** and follow the instructions to install your printer driver.
8. Click the radio button if you want the printer to be the default printer, then click **Next**.
9. Click **Finish**.

Verifying the Configuration

Test the NT 4.0 client configuration for TCP/IP by printing a test page as follows.

1. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
2. Right-click on the printer and select **Properties**.
3. Select **Print Test Page**.

Configuring a Windows NT 3.51 Print Client

Note: IBM InfoPrint 20 and IBM InfoPrint 32 are not supported on Windows NT 3.51.

Data Requirements

Parameter	Description	Your Value
Printer name	User-assigned name of the printer on the local machine.	
Printer driver name	Name of the printer driver for Windows NT 3.51. The default name of the driver is "IBM Network Printer nn". Note that if the shared printer you are going to use is on Windows NT 4.0 and was installed correctly, your printer drivers will be downloaded automatically for you, and you do not need to know this name.	
Share name of the printer	This is the name assigned to the shared printer when it was shared to the network. It is also useful, though not mandatory, to know the name of the machine where the shared printer is installed.	

Configuration Procedure

Authority Level Required

Some of the following configuration steps carried out on Windows NT 3.51 may require **administrative** authority.

1. Logon to the Windows NT 3.51 print client as an administrator.
2. From the Program Manager window, select **Main**.
3. Select **Print Manager**.
4. Select the **Printer** menu.
5. Select **Connect to Printer**.
6. In the **Printer** entry field, type the name of the shared printer as follows:
`\\machinename\printersharename`
You may also use the **Shared Printers** area to browse the network for the printer you want to share.
7. Click **OK**.

8. If you need to install a printer driver (remember that if the print server is on Windows NT 4.0 and was installed correctly, you do not need to install the printer driver, since it will be installed for you), you will be prompted for the drive and path of the files for the driver. Enter these and click **OK**.

Verifying the Configuration

Test the Windows NT 3.51 client configuration for TCP/IP by sending a job to the printer from any Windows application, as follows.

1. Select **Print Setup** from the **File** menu, then select the printer to be verified.
2. Click **OK**, then select **Print** from the **File** menu.

Configuring a Windows 95 Print Client

Data Requirements

Parameter	Description	Your Value
Printer name	User-assigned name of the printer on the local machine.	
Printer driver name	Name of the printer driver for Windows 95. The default name of the driver is "IBM Network Printer nn" or "IBM InfoPrinter nn". Note that if the shared printer you are going to use is on Windows NT 4.0 and was installed correctly, your printer drivers will be downloaded automatically for you, and you do not need to know this name.	
Share name of the printer	This is the name assigned to the shared printer when it was shared to the network. It is also useful, though not mandatory, to know the name of the machine where the shared printer is installed.	

Configuration Procedure

1. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
2. Double-click on the **Add Printer** icon. You see the **Add Printer Wizard**.
3. Select **Next**.

4. Select **Network printer**.
5. Select **Next**.
6. In the entry field, type the name of the shared printer as follows:
`\\machinename\printersharename`
You may also select **Browse** to browse the network for the printer you want to share.
7. Select **Next**.
8. If you need to install a printer driver (remember that if the print server is on Windows NT 4.0 and was installed correctly, you do not need to install the printer driver, since it will be installed for you), the **Add Printer Wizard** now asks you for the manufacturer and model of your printer.
If this happens:
 - a. Select **Have disk**. You see the **Install from Disk** dialog box.
 - b. Type the appropriate drive and path in the box. From the CD-ROM, the Windows 95 drivers are in the following directory:
`\\DRIVERS\WIN95\language` where language is ENGLISH, FRENCH, GERMAN, and so on.
 - c. Select **OK**.

Note: If you have trouble installing the driver from your disk drive:
 - 1) Create a temporary directory on your hard drive (for example, c:\temp).
 - 2) Copy the files on the diskette to the temporary directory on your hard drive.
 - 3) When prompted for the location of the printer driver you are installing, change "a:\" to the path for your temporary directory.
 - d. Select the appropriate IBM network printer in the list of printers.
 - e. Select **Next**.

Note: If you are re-installing a printer driver, you may need to select **Replace existing driver** and then select **Next**.
9. Change the printer's name if you want.
10. Select **Yes** or **No** to indicate whether this printer should be the default.

Note: If this is the first printer you have created on your computer, it will automatically be made the default-you will not be given a choice.
11. Select **Finish**.

Verifying the Configuration

Test the Windows 95 client configuration for TCP/IP by printing a test page:

1. Select **Start**, then **Settings**, then **Printers**. You see the **Printers** dialog box.
2. Right-click on the printer and select **Properties**.
3. Select **Print Test Page**.

Configuring a Windows for Workgroups Print Client

Data Requirements

Parameter	Description	Your Value
Printer name	User-assigned name of the printer on the local machine.	
Printer driver name	Name of the printer driver for Windows for Workgroups. The default name of the driver is "IBM Network Printer nn" or "IBM InfoPrinter nn".	
Share name of the printer	This is the name assigned to the shared printer when it was shared to the network. It is also useful, though not mandatory, to know the name of the machine where the shared printer is installed.	

Configuration Procedure

1. From the Program Manager window, select **Main**.
2. Select **Control Panel**.
3. Select **Printers**.
4. Click **Add>>**.
5. Click **Install**.
6. Enter the drive and path of the printer driver files to install.
7. Click **OK**.
8. Select the appropriate IBM network printer in the list of printers.
9. Click **OK**.
10. Click **Connect**.
11. Click **Network**.
12. In the **Device Name** entry field, select an unused LPT port.

13. In the **Path** entry field, type the name of the shared printer as follows:
 `\\machinename\printersharename`
 You may also use the **Show Shared Printers on** and **Shared Printers** fields to browse the network for the printer you want to share.
14. Select **OK**.
15. In the **Ports** entry field, select the same LPT port that you selected above.
16. Select **OK**.
17. Select **Close**.

Verifying the Configuration

Test the Windows for Workgroups client configuration for TCP/IP by sending a job to the printer from any Windows application:

1. Select **Print Setup** from the **File** menu, then select the printer to be verified.
2. Click **OK**, then select **Print** from the **File** menu.

Chapter 21. TCP/IP Addresses

This chapter includes the following procedures:

- “Setting TCP/IP Addresses from the Printer Operator Panel”
- “Setting an IP Address on a Local Segment with ARP” on page 223
- “Setting Subnet Mask and Gateway Addresses from the Command Line” on page 225
- “Setting TCP/IP Addresses with BOOTP” on page 226
- “Setting a Symbolic Name for an IP Address” on page 232
- “Setting the LAA from the Printer Operator Panel” on page 233
- “Setting the LAA from the Command Line” on page 235
- “Resetting the LAA back to the MAC Address” on page 236

Setting TCP/IP Addresses

This section includes the following procedures:

- “Setting TCP/IP Addresses from the Printer Operator Panel”
- “Setting an IP Address on a Local Segment with ARP” on page 223
- “Setting Subnet Mask and Gateway Addresses from the Command Line” on page 225
- “Setting TCP/IP Addresses with BOOTP” on page 226
- “Setting TCP/IP Addresses Using Embedded Web Pages” on page 237

Setting TCP/IP Addresses from the Printer Operator Panel

Notes

1. On the IBM InfoPrint printers, the TCP/IP protocol must be enabled at the operator panel before you can set the IP address using the operator panel. (The TCP/IP protocol is enabled by default.)
2. See the user documentation that accompanies your printer if you are unfamiliar with using the printer operator panel.

To set an IP, subnet mask, or gateway address for the printer, perform these steps:

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 address to change (IP ADDRESS, SUBNET MASK, or GATEWAY ADDRESS). This example shows how to change the IP ADDRESS.
4. Press the **Enter** key. For a new printer whose IP address has not yet been set, the operator panel displays:

IP ADDRESS 0<0.0.0 *

The "<" indicates the field whose value you can change at this point.

5. Press the **Value** key until the desired value is displayed. The range of the address values is zero to 255. To increment the value by 10, press and hold the **Value** key.
6. When the operator panel displays the value you want, press **Enter**. 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 four values have been set, then press the **Enter** key to set the address. The value has been set if an asterisk (*) displays to the right of the value, for example:
9.99.40.2 *
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.

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.

Setting an IP Address on a Local Segment with ARP

IP Address Format

TCP/IP addresses, called IP addresses, are written in dotted decimal notation, which means that each of their four byte quantities is written as a decimal number separated by dots. Because each piece of the IP address is one byte, the value of each piece must be between 0 and 255. Each byte must have a valid value. 9.9.9.9 is a valid IP address; 9.99.300.999 is not a valid address (both 300 and 999 are greater than 255).

Use this section to set the **initial** IP address for NICs. To set the subnet mask or gateway addresses, see “Setting Subnet Mask and Gateway Addresses from the Command Line” on page 225.

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, SUN Solaris, SCO, or HP-UX 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 by operating system, 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, HP-UX, and SUN Solaris:

On OS/2, HP-UX, 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, SCO, HP-UX, 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: “Setting Subnet Mask and Gateway Addresses from the Command Line”.

Setting Subnet Mask and Gateway Addresses from the Command Line

You can set Subnet Mask and Gateway Address from NPM (see the NPM README for details) or from the command line. In either case, you should initially set an IP address using “Setting an IP Address on a Local Segment with ARP” on page 223.

To set the set subnet mask and gateway addresses from the command line, do the following:

1. Login to the NIC. Use the procedure described in “Logging into a NIC using TCP/IP Telnet” on page 290.
2. At the Local> prompt, enter the commands to set the subnet mask and gateway addresses.

- 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).

- To set the gateway address:

```
define node ip ip_address gateway default
```

where *ip_address* is the IP address of the NIC.

3. 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.)

4. You may telnet back into the NIC and print a new NIC configuration page with the command:

```
show config 1
```

to see if the addresses were set correctly.

5. If you logged back into the NIC, logoff the NIC with the command:
logout

Setting TCP/IP Addresses with BOOTP

IP Address Format

TCP/IP addresses, called IP addresses, are written in dotted decimal notation, which means that each of their four byte quantities is written as a decimal number separated by dots. Because each piece of the IP address is one byte, the value of each piece must be between 0 and 255. Each byte must have a valid value. 9.9.9.9 is a valid IP address; 9.99.300.999 is not a valid address (both 300 and 999 are greater than 255).

Use this procedure if you are on a WAN and you do not use the printer operator panel (see “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221) or “Setting an IP Address on a Local Segment with ARP” on page 223 to set TCP/IP addresses.

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, HP-UX, SCO, SUN Solaris and OS/2 systems.

Notes:

1. Only one BOOTP daemon needs to be configured per LAN segment.
2. The IBM NIC will reset the **node name** if the DHCP or BOOTP server enables the HOSTNAME Tag 12.
3. If the BOOTP function is performed across routers, then routers need to be configured to forward BOOTP requests.
4. The default name of the NIC changes to the hostname on the BOOTPTAB entry. Refer to “Fields in the BOOTPTAB File” on page 228.
5. On the IBM InfoPrint printers, BOOTP requests from the printer can be turned ON, OFF, or set to IFNO ADDR from the printer operator panel. IFNO ADDR will send BOOTP requests only if no IP address is set.

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.

Setting up the BOOTPTAB File

The BOOTPTAB file contains a separate entry with configuration information for each NIC.

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. 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 “BOOTP” on page 239.

Editing the BOOTPTAB File: AIX, SUN Solaris, SCO, HP-UX and OS/2 use a BOOTPTAB file with **almost** the same format.

- On AIX, SUN Solaris, SCO, and HP-UX, the BOOTPTAB file is accessed under the /etc directory.
- In OS/2 using TCP/IP Version 3.0, the file is in the \mptn\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, SCO, HP-UX, 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, SCO, and HP-UX 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: vm=rfc1048:
```

Note: On OS/2, SUN Solaris, SCO, and HP-UX, each field is followed by a colon and a space, and the required line continuation character is a backslash (\).

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 and SCO UNIX, the types are **tr** for Token Ring and **ether** for Ethernet.
- For SUN Solaris and HP-UX, 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. To define TCP/IP addresses if you are using DHCP (and the DHCPD) on Windows NT, AIX, SUN Solaris, SCO, or HP-UX, you need to add this field to the file. Enter the field as "vm=rfc1048".

For information about DHCP, refer to "Industry Standards for Setting TCP/IP Addresses" on page 239.

After the BOOTPTAB file has been edited, the next task is to start the BOOTP daemon. Use one of the following procedures:

- "Starting the BOOTP Daemon on AIX Systems" on page 229
- "Starting the BOOTP Daemon on OS/2 Systems" on page 230
- "Starting the BOOTP Daemon on SUN Solaris, SCO, and HP-UX Systems" on page 231

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. Refresh the INETD 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. Refresh the INETD daemon with the command:

```
kill -1 inetd PID
```

Note: If neither of these command options work, refer to the prolog file in */etc/inetd.conf* for information on restarting INETD.

6. Power off the printer, wait ten seconds, then power 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.

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. Power off the printer, wait ten seconds, then power 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.

Starting the BOOTP Daemon on SUN Solaris, SCO, and HP-UX Systems

1. Login to the 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, corresponding to the appropriate operating system.

For SUN, add

```
bootps dgram udp wait root /usr/sbin/bootpd bootpd
```

and:

```
tftp dgram udp wait root /usr/sbin/in.tftpd in.tftpd -s /tftpboot
```

For SCO, add

```
bootps dgram udp wait root /etc/bootpd bootpd
```

and:

```
tftp dgram udp wait nouser /etc/tftpd tftpd
```

For HP-UX9, add

```
bootps dgram udp wait root /etc/bootpd bootpd
```

and:

```
tftp dgram udp wait root /etc/tftpd tftpd
```

For HP-UX10, add

```
bootps dgram udp wait root /usr/lbin/bootpd bootpd
```

and:

```
tftp dgram udp wait root /usr/sbin/tftpd tftpd
```

5. Refresh the INETD daemon by entering the following two commands:
 - a. This command returns the PID number for INETD:

```
ps -ef | grep inetd
```
 - b. Refresh the INETD daemon with the command:

```
kill -1 inetd PID
```

Note: If neither of these command options work, refer to the prolog file in `/etc/inetd.conf` for information on restarting INETD.

6. Power off the printer, wait ten seconds, then power 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.

Setting a Symbolic Name for an IP Address

For AS/400

For AS/400, refer to “Configuring a Local Domain and Hostname” on page 100 and “Configuring a TCP/IP Host Table Entry” on page 101.

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, SUN Solaris, SCO, or HP-UX host as root or begin from the OS/2 or Windows NT workstation.
2. From the command line:
 - For AIX, SUN Solaris, SCO, or HP-UX, 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

Setting the LAA on Token-Ring NICs

This section describes two methods of setting the LAA:

- “Setting the LAA from the Printer Operator Panel”
- “Setting the LAA from the Command Line” on page 235

Setting the LAA from the Printer Operator Panel

Notes

1. 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.
2. Early releases of the IBM Network Printer 12 and IBM Network Printer 17 did not allow users to set the LAA from the printer operator panel. (The MAC ADDRESS menu item did not exist.) If you have one of these printers, you need to reference “Setting the LAA from the Command Line” on page 235.
3. To reset the LAA back to the NIC factory default, see “Resetting the LAA back to the MAC Address” on page 236.
4. See your network administrator before changing the MAC address because each LAA must be unique on the network.
5. See the user documentation that accompanies your printer if you are unfamiliar with using the printer operator panel.

To use the printer operator panel to change the MAC address for a Token Ring NIC to a Locally Administered Address (LAA), do the following:

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 MAC ADDRESS.

4. Press the **Enter*** key. The operator panel displays the MAC address, 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 until the desired value is displayed, then press **Enter** to set the new value. (Press and hold the **Value** key to increment the value by tens instead of ones. Press the **Value** key and the **Shift** key to decrement the value.)

The “<” moves to the next value, for example:

```
04<AC-9A-00-00
```

6. Repeat step 5 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 *
```

7. 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.
8. When the READY message is displayed, turn off the printer, wait ten seconds, then turn the printer 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.

Setting the LAA from the Command Line**Notes**

1. To reset the LAA back to the NIC factory default, see “Resetting the LAA back to the MAC Address” on page 236.
2. See your network administrator before changing the MAC address because each LAA must be unique on the network.

To use the command line to change the MAC address for a Token Ring NIC to a Locally Administered Address (LAA), do the following:

1. Login to the NIC. Use the procedure described in “Logging into a NIC using TCP/IP Telnet” on page 290.
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. See “Clear Out ARP Table Entries” on page 245.

Resetting the LAA back to the MAC Address**Note!**

Do not reset the LAA unless explicitly directed to do so by your network administrator.

Resetting the LAA to the MAC Address from the Operator Panel**Notes**

1. Early releases of the IBM Network Printer 12 and IBM Network Printer 17 did not allow users to set the LAA from the printer operator panel. (The MAC ADDRESS menu item did not exist.) If you have one of these printers, you need to reference “Resetting the LAA to the MAC Address from the Command Line” on page 237.
 2. If you have problems setting the LAA address, reset the ARP table. See “Clear Out ARP Table Entries” on page 245.
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 MAC ADDRESS. The panel displays the currently assigned LAA address.
 4. 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**.
 5. As soon as you press **Enter**, the printer will read the MAC address and display it.
 6. Press the **Online** key to display the READY message, The panel displays the message I/O INITIALIZING and writes the new address to memory. (This process takes a few minutes.) **Do not power off the printer** while the I/O INITIALIZING message is displayed.
 7. When the READY message is re-displayed, turn the printer off, wait ten seconds, 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.

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. Use the procedure described in “Logging into a NIC using TCP/IP Telnet” on page 290.
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. See “Clear Out ARP Table Entries” on page 245.

Setting TCP/IP Addresses Using Embedded Web Pages

If your NIC supports embedded web pages, you can use your web browser to display and change various TCP/IP addresses including the IP address, subnet mask, and gateway address.

To access TCP/IP information on the embedded web pages:

1. Use your web browser to go to the following location:
`http://n.n.n.n`

where n.n.n.n is the IP address of the printer.
2. Click **Configure Printer**.
3. Click **Protocol Setup**.
4. Click **TCP/IP settings**.
5. Type the values you want, and then click **Change**.

For information about requirements for embedded web pages, see “Chapter 27. Embedded Web Pages” on page 279. For detailed information about using the embedded web pages, view the online help directly from the web pages.

Note: Embedded web pages are available on the 100BaseTx NIC. They are available on other NICs (Ethernet 10BaseT/10Base2 NIC and Token

Ring) only when NIC microcode level 7.20 is installed. For information about installing new microcode, see “Updating the NIC Microcode” on page 345.

Chapter 22. 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 on your BOOTP or DHCP server if you do not want to change the NIC Node Name.

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 in order:

- BOOTP
- DHCP
- RARP

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 11 on page 241 shows the network flow of this transaction for a new IBM network printer.

On the IBM InfoPrint printers, BOOTP requests from the printer can be turned ON, OFF, or set to IFNO ADDR from the printer operator panel. IFNO ADDR will send a BOOTP request only if no IP address has been set. IFNO ADDR is the default.

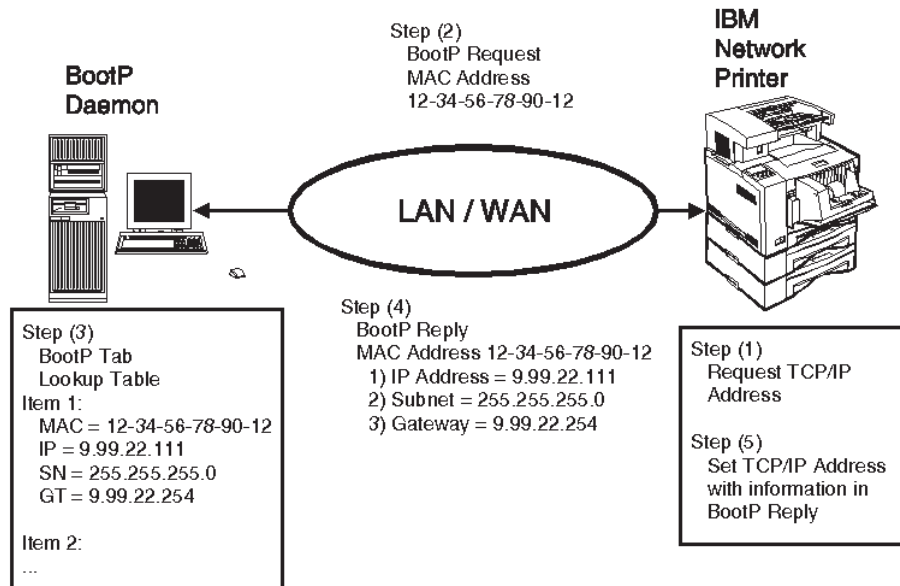


Figure 11. Network Printer BOOTP Model

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.

Notes:

1. Network administrators can set up their routers to enable forwarding of DHCP requests and replies across the entire enterprise. Figure 12 shows the network transaction of a DHCP request between a new IBM network printer and a DHCP server.
2. On the IBM InfoPrint printers, DHCP requests from the printer can be turned ON, OFF, or set to IFNO ADDR from the printer operator panel. IFNO ADDR will send a DHCP request only if no IP address has been set. IFNO ADDR is the default.

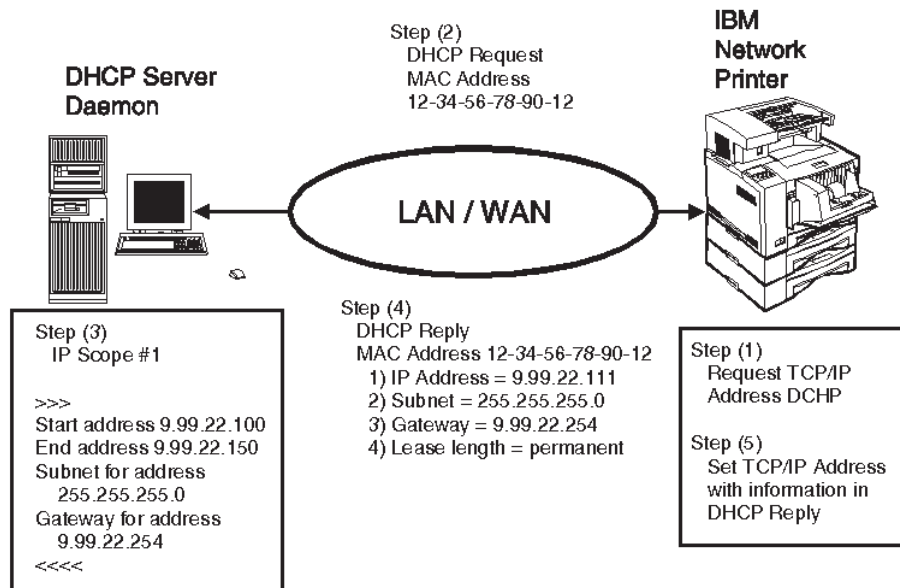


Figure 12. Network Printer DHCP Model

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 "Installing and Configuring DHCP for OS/2" on page 249 and "Installing and Configuring DHCP on Windows NT" on page 253.

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.

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.

The IBM InfoPrint printers let you change the BOOTP and DHCP values from the printer control panel.

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. See "Printing the Printer Configuration Page" on page 9.

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.

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.**

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.

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.

Table 17. Manufactured Default Settings for IP Address Controls

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

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.

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.

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 “Configuring 5.13, 5.16, and 5.17 NICs for DHCP Environments” on page 247.
Pre 5.18	Update Earlier NICs with 5.18 Microcode	If you want to update your existing NICs with 5.18 or later microcode, you must still do the procedure in “Configuring Upgraded 5.13, 5.16, and 5.17 NICs” on page 249 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 . “Installing and Configuring a 5.18 (or later) NIC” on page 246 describes how to install a new 5.18 NIC to take advantage of the new default settings.

Microcode Level	What You Want	What You Should Do
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 “Configuring 5.18 (or later) NICs for BOOTP Environments” on page 248.

Installing and Configuring a 5.18 (or later) NIC

With microcode level 5.18 or greater, you can use either local or remote modes to set the IP address.

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 “Setting TCP/IP Addresses from the Printer Operator Panel” on page 221.
3. Turn the printer off, attach the printer to the LAN cable, then turn the power back on.

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. To assign an IP address from the command line, refer to “IP Address” on page 314.

- Map the address assigned by DHCP to the range of reservation addresses in DHCP to make the address a permanent one. Refer to “Making a DHCP Address Permanent” for a procedure on how to do this.

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:

- “Installing and Configuring DHCP for OS/2” on page 249
- “Installing and Configuring DHCP on Windows NT” on page 253

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 “Logging into a NIC using TCP/IP Telnet” on page 290.
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.

Configuring 5.18 (or later) 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 “Making a DHCP Address Permanent” on page 247 or “Configuring 5.13, 5.16, and 5.17 NICs for DHCP Environments” on page 247.

1. Login to the NIC using the procedure in “Logging into a NIC using TCP/IP Telnet” on page 290.
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 in “Configuring 5.13, 5.16, and 5.17 NICs for DHCP Environments” on page 247 to verify, reboot, and logoff the NIC.

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 "Resetting NIC Parameters from the Command Line" on page 341
- **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:
 - "Resetting Ethernet NICs Using Hardware Pin Jumpers" on page 342
 - "Resetting Token Ring NICs using Hardware Pin Jumpers" on page 343

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, go to "Setting Dynamic IP Addresses with DHCP".

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 "Industry Standards for Setting TCP/IP Addresses" on page 239.

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.

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.

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.

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.

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.
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.
4. Drag "Network" from **Predefined Resources** to the **Current Configuration**. Double-click "Network" in the **Current Configuration** to open the 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**.
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.
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.

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\TCPIP\BIN\DHCPD name of configuration file
25. DHCP is now running.

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 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.
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.
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 DHCP Manager Window appears.
5. From the menu bar, select **Scope**, then **Local**. The Create Local Scope Window displays. 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**. The DHCP Global Options Window displays.
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.
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.

Chapter 23. 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

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.

Hardware Problems

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

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

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. Print a NIC configuration page to verify that the NIC is plugged into the printer correctly.
5. Verify that the NIC is connected to the network. Refer to “Physically Connecting a NIC to a LAN” on page 16.

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 “The NIC Configuration Page” on page 11).
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.

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.

Printing Problems

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/UNIX:

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 print_queue_name filename
```

ip_address

IP address of the NIC.

print_queue_name

The print queue name. Set to PASS. If you print plain text files without an IBM printer driver and you experience formatting problems, try using TEXT instead of PASS. PASS and TEXT must be in upper case.

filename

Name of the file to print.

From Windows NT:

```
lpr -S ip_address -P print_queue_name filename.ext
```

Note: The -S and -P flags **must** be in upper case.

ip_address

IP address of the NIC.

print_queue_name

The print queue name. Set to PASS. If you print plain text files without an IBM printer driver and you experience formatting problems, try using TEXT instead of PASS. PASS and TEXT must be in upper case.

filename.ext

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.

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. PASS and TEXT must be upper case. No other name can be used.
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.

Part 6. Administration

Chapter 24. Customizing the NIC

Before using any of the following commands, you should be familiar with the material in “Chapter 28. Command Syntax, Conventions, and Operations” on page 283. **Do not use any of the following commands until after you have configured your network printer for the first time.**

Also, NPM can be used to perform a few of the functions described in this chapter. See the NPM Help for more details.

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.

Disabling Network Protocols

Disabling network protocols that are not being used for printing on the NIC will reduce network traffic. On the InfoPrint printers you can disable the network protocols from the operator panel. If your printer does not support this function from the operator panel or if you want to do this remotely you can disable one or more network protocols on your NIC from the network:

- Logging into the NIC using one of the procedures described in “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290. Once you are logged on, enter the command:

```
define server authorize netware disable
```
- Enter one or more of the following commands according to what protocols you wish to disable:
 - ```
define server authorize netware disable
```
  - ```
define server authorize tcp disable
```
 - ```
define server authorize netbios disable
```
  - ```
define server authorize appletalk disable
```
- Verify that the settings are correct with the command:

```
list server network
```
- Re-initialize the NIC by entering the command:

```
init delay 0
```

Note: It is particularly important to perform this procedure 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.

Disabling 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 “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.
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. Reboot the NIC with the command:

```
init delay 0
```
5. Logout of the NIC.

Note: For additional information about the “Announcement” command, refer to “Announcement” on page 306.

Rebooting a NIC

When logged into the 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:¹

```
init delay 0
```

The command reboots (initializes) the NIC immediately (0 minute delay).

1. Refer to “Where Changes are Written” on page 284 for an explanation of the terms “temp” and “perm”.

Handling Services

This section describes the commands to add, delete, and enable services on a NIC. Refer to “Chapter 35. Services Commands” on page 331 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).

Note: Before using the following commands, login to the NIC. See “Logging into a NIC using NetWare IPX” on page 287, or “Logging into a NIC using TCP/IP Telnet” on page 290. After you are finished with the commands, reboot the NIC with the command:

```
init delay 0
```

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 [TCP port number]
```

Deleting a Service

To delete a service, use the command:

```
[clear|purge|delete] service  
service_name
```

Enabling a Protocol on a Service

To enable a service on the IBM InfoPrint printers, use the printer operator panel. To enable a service on the other printers, use the command:

```
define service service_name protocolprotocol_name enable
```

Valid protocol names are appletalk, netbios, netware, and tcp.

Disabling a Protocol on a Service

To disable a service on the IBM InfoPrint printers, use the printer operator panel. To disable a service on the other printers, use the command:

```
define service service_name protocolprotocol_name disable
```

Valid protocol names are appletalk, netbios, netware, and tcp.

Changing NIC Default Parameters

Refer to “Default NIC Parameter Values” on page 7 for a listing of NIC default parameters.

Note: Before using the following commands, login to the NIC. See “Logging into a NIC using NetWare IPX” on page 287, or “Logging into a NIC using TCP/IP Telnet” on page 290. After you are finished with the commands, reboot the NIC with the command:

```
init delay 0
```

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.

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"
```

TCP/IP Procedures

Refer to “Chapter 21. TCP/IP Addresses” on page 221 for information about the use of TCP/IP-related commands.

NetWare Procedures

You may use either native NetWare utilities or the NIC command line to change NIC parameters. Refer to “Chapter 31. NetWare Commands” on page 297 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.

Note: Before using the following commands, login to the NIC. See “Logging into a NIC using NetWare IPX” on page 287, or “Logging into a NIC using TCP/IP Telnet” on page 290. After you are finished with the commands, reboot the NIC with the command:

```
init delay 0
```

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]
```

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]
```

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 “Handling Services” on page 263.

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).

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 “File Server (Preferred)” on page 299 for details.

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 “File Server (Required)” on page 299 for details.

Specifying the NDS Tree and Context

To specify the NDS tree which the NIC will search, use the following command:

```
define server netware nds treename
```

It is necessary to specify the context if [Public] object does not have sufficient browse rights to the tree. To specify the NDS context the NIC will search, use the following command:

```
define server netware context context
```

See “Tree (NDS)” on page 303 and “Context (NDS)” on page 298 for more details.

Specifying the NetWare Frame Type

To specify the NetWare frame type that the NIC will use, use the following command:

```
define server netware frame_type
```

For details on what to use for *frame_tpe*, see “Ethernet and Token Ring Frame Types on IBM NICs” on page 9.

Chapter 25. 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

See the NPM online help for information about monitoring using NPM.

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.

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

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).

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.

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)

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

Information Provided by the MIB

The Printer MIB contains the following types of information about IBM network printers:

Descriptions

Printer configuration, location, and contact

Status Current operating status of printers

Alerts Reportable events from printers

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

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:

Internet:

`ftp.isi.edu\internet-drafts`

World Wide Web:

<http://www.ietf.cnri.reston.va.us/lid-abstracts.html>

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.

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.

OS/2 TCP/IP

To get SNMP.EXE to work correctly to browse MIB items, you may need to delete the following file:

d:\mptn\etc\mib2.tbl

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.

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

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 "Logging into a NIC using NetWare IPX" on page 287.
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.

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.

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:

```
show server ch
```

```
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.

Note: Changing SNMP community names or access rights may hinder or disable applications that are monitoring your printers, such as the IBM Network Printer Manager and the IBM TCP/IP Network Port Monitor.

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]
```

Note: Disabling SNMP sets may hinder or disable applications that are monitoring your printers, such as the IBM Network Printer Manager and the IBM TCP/IP Network Port Monitor.

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 “Logging into a NIC using NetWare IPX” on page 287.
2. Enter the command:
`monitor server status`

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.

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

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 “Logging into a NIC using TCP/IP Telnet” on page 290.
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 beconing.

Setting 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.

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 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.

Note: Changing SNMP community names or access rights may hinder or disable applications that are monitoring your printers, such as the IBM Network Printer Manager and the IBM TCP/IP Network Port Monitor.

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.

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]
```

Note: Disabling SNMP sets may hinder or disable applications that are monitoring your printers, such as the IBM Network Printer Manager and the IBM TCP/IP Network Port Monitor.

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 “Logging into a NIC using TCP/IP Telnet” on page 290.

2. Enter the command:

```
monitor server status
```

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.

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 “Configuring a Node for Syslog” on page 276 for information on how to configure Syslog for a node.

Setting up Syslog on AIX, SUN Solaris, SCO, and HP-UX

The following procedure sets up Syslog support on AIX, SUN Solaris, SCO, and HP-UX.

1. Logon to the operating system 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, SCO, and HP-UX:

```
*.err;*.info;*.debug TAB TAB /var/adm/messages
```

TAB Insert two tab spaces between the left and right arguments of the command.

Starting the Syslogd Daemon

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
```

SUN Solaris, SCO, HP-UX

To start the **syslogd** daemon under SUN Solaris, SCO, or HP-UX, 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 syslogd PID  
kill -1 syslogPID
```

Configuring a Node for Syslog

To configure a node to support Syslog:

1. Login to the NIC using the procedure described in “Logging into a NIC using TCP/IP Telnet” on page 290.

2. Enter a command in the form:

```
change node node_name ip ip_address syslog lpr
```

node_name

Name of the AIX, SUN Solaris, SCO, HP-UX machine.

ip_address

IP address of the AIX, SUN Solaris, SCO, or HP-UX machine.

3. Logout of the NIC.

Chapter 26. IBM Network Printer Manager (NPM)

IBM Network Printer Manager (NPM) lets network administrators monitor, control, and configure IBM network printers in various environments. NPM works with the IBM network printer family, including IBM InfoPrint 20 and 32 (except for NPM for OS/2), and IBM Network Printers 12, 17, and 24. For the Windows IP and Web versions, you can also use NPM with other manufacturer's network printers that comply with RFC 1759, such as the Hewlett-Packard LaserJet 5Si and the Lexmark Optra N.

Using NPM, administrators can:

- View the status of each printer, such as its alarm conditions
- View and change printer properties, such as the default input tray
- View and change printer network properties, such as the NetBIOS printer network workgroup name
- Add new network services to printers so you can customize the environment, such as creating high- and low-priority print services

For detailed information on how to use NPM, please refer to NPM online help.

NPM Environments

The following table shows the environments NPM supports:

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	<ul style="list-style-type: none">• TCP/IP• AppleTalk• NetBIOS	TCP/IP
NPM for Windows NT and 95 (IP version)	<ul style="list-style-type: none">• TCP/IP• AppleTalk• NetBIOS• Novell NetWare	TCP/IP

Table 18. NPM Environments (continued)

Using this version of NPM:	You can configure these network protocols in the printers:	And use this protocol to monitor the printers:
NPM for Windows NT and 95 (IPX version)	<ul style="list-style-type: none"> • TCP/IP • AppleTalk • NetBIOS • Novell NetWare 	NetWare IPX
NPM for the World Wide Web	<ul style="list-style-type: none"> • TCP/IP • AppleTalk • NetBIOS 	TCP/IP

Obtaining NPM

NPM comes on a CD-ROM included in the NIC box; it is also available on the World Wide Web. To obtain the latest version of NPM:

1. Access the IBM Printing Systems Home Page at
<http://www.printers.ibm.com>
2. Navigate to IBM Network Printer Manager.
3. Follow the instructions to download NPM. Installation instructions are in the README file.

Chapter 27. Embedded Web Pages

If your NIC supports embedded web pages, you can use your web browser to:

- Access status information about the printer
- Display current printer settings
- Display and print the NIC configuration page
- Configure the NIC
- Upgrade the NIC
- Restart the NIC
- Access the IBM Printing Systems Co. website
- View help that describes how to use the embedded web pages

To access the 100BaseTx NIC embedded web pages, go the following location from your web browser:

`http://n.n.n.n`

where `n.n.n.n` is the IP address of the printer.

For detailed information about using the 100BaseTx NIC embedded web pages, view the online help directly from the web pages.

Notes:

1. Embedded web pages are available on the 100BaseTx NIC. They are available on other NICs (Ethernet 10BaseT/10Base2 NIC and Token Ring) only when NIC microcode level 7.20 is installed. For information about installing new microcode, see “Updating the NIC Microcode” on page 345.
2. To use embedded web pages, you require:
 - One of the following browsers: NetScape Communicator 4.0, Microsoft Internet Explorer 4.0
 - Your printer to have a TCP/IP address, subnet mask, and gateway address assigned to it.

Part 7. NIC Command Reference

Chapter 28. 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:

- “Logging into a NIC using NetWare IPX” on page 287
- “Logging into a NIC using TCP/IP Telnet” on page 290

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).

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.

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”.

Command Operations

Command operations are one of the following:

[Set|Define|Change]

Set Modifies values temporarily in volatile memory. Stored values are restored when ports are logged on or when nodes or NICs are reinitialized.

Define

Modifies values permanently when ports are logged off or when nodes and NICs are reinitialized.

Change

Modifies values immediately in volatile memory and in non-volatile storage.

Note: 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.

[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).

[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.

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.

Chapter 29. 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:

- “Logging into a NIC using NetWare IPX”
- “Logging into a NIC using TCP/IP Telnet” on page 290

Logging into a NIC using NetWare IPX

Novell workstations require the TES protocol and the Kermit terminal emulation program 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.

Note: Because of the possible limitations of TES, TCP/IP Telnet is the preferred method of logging into the NIC.

Logging into a NetWare Workstation or Server

IPX/SPX Needed

You must be logged into a workstation attached to a NetWare server running IPX/SPX for the following procedures to work. A VLM client will work, while a Novell Client 32 might not work.

1. Login to a NetWare workstation or server.
2. Change to a DOS prompt.
3. Install TES and Kermit using the procedure described in “Installing TES and Kermit”. If TES and Kermit are already installed, go to “Connecting to the NIC” on page 288.

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.

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 tes_service_name
```

tes_service_name

The TES service name of the NIC. The default TES service name is NCE for Ethernet cards (100BaseTx NIC or 10BaseT/10Base2 NIC) or NCT for Token Ring cards concatenated to the first six characters in the MAC address, for example, NCE9B1234. The TES service name is displayed under the Service Information section of the NIC configuration page.

6. Connect to the NIC:

```
MS-Kermit>connect
```

Note: If you get the error message **?Cannot start the connection.**, make sure you typed the correct name in step 5 above. If you still get the error, see the Troubleshooting Note below.

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 l

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.
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.

Troubleshooting Note

If you get the message **?Cannot start the connection.**, you may have encountered the 50-item limit of TES. That is, TES can only hold 50 TES device names (printer NICs) in the internal table it creates when started. If your printer NIC doesn't get into this table, connection cannot occur. TES gets this device information from the server table on the nearest NetWare server it finds, and fills its 50-item table with the first 50 TES services it finds on the NetWare server. If your device comes too late in the table, TES won't pick it up and you won't be able to connect to your printer NIC. One way to remedy this situation is to enter 'reset router' at the server's console prompt. This causes the server to rebuild its server table, possibly allowing your printer NIC within the first 50 TES services. Then, try the above steps again starting from step 1 and you might be able to get a connection. If you still have problems, IBM recommends using TCP/IP Telnet to connect to the NIC.

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. "Chapter 21. TCP/IP Addresses" on page 221 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/UNIX:

```
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
```

Chapter 30. Global NIC Commands

This chapter describes general or global NIC commands. Use Table 19 to find the command corresponding to the function you want to perform.

To use these commands, you must be logged onto the NIC. See “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.

Table 19. 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.

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.

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, 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. (See “Dump” on page 313 for information about dump hosts and how to set one up.)

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.

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.

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

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**.

SYNC**Syntax**

SYNC

Purpose

SYNC synchronizes volatile and non-volatile memory by updating non-volatile memory with recently entered changes.

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.

Chapter 31. NetWare Commands

This chapter describes the NetWare-specific NIC commands. To use these commands, you must be logged onto the NIC. See “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.

Table 20. NetWare Commands Defined by Function

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.

Characteristics (NetWare)

Syntax

```
[show|list|monitor] server netware
```

Purpose

Use this command to display the NIC's NetWare characteristics.

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 "".

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.

File Server (Preferred)

Syntax

```
define node node_name nfserver
```

Purpose

Use this command to specify the preferred NetWare file server.

Parameters

node_name
Name of the preferred file server node.

nfserver
Specifies a file server as the preferred Novell file server.

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.

Forms

Syntax

```
define server netware forms [enable|disable]
```

Purpose

Use this command to enable or disable the NetWare forms function.

Parameters

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.

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 “Ethernet and Token Ring Frame Types on IBM NICs” on page 9.

Note: You can configure the NetWare frame type from the printer Operator Panel beginning with NIC microcode level 5.21.

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.

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 "".

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).

Parameters**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.

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.

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.

Remote Printer

Syntax

```
define server netware rprinter [enable|disable]
```

Purpose

Use this command to allow the NIC to emulate a NetWare remote printer.

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 "".

Chapter 32. NIC (Server) Commands

This chapter describes NIC commands. To use these commands, you must be logged onto the NIC. See “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.

Table 21. 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.

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.

Announcement

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 “Disabling DEC/LAT and MOP Announcements” on page 262.

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.

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.

Characteristics (Network Card)

Syntax

```
[show|list|monitor] server [ch]
```

Purpose

The show server command displays brief information about NIC hardware and software configuration. Use “Configuration” on page 308 to see detailed information.

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**.

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 “Debug Command Error Reporting” on page 309.

Parameters

None.

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.

Load Error Numeric Codes

The following table displays some of the load error numeric codes, what they mean, and what to do about them.

Table 22. Microcode Load Errors

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.

Table 22. Microcode Load Errors (continued)

Hex Code	Description	Remedial Action
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	Assure that the load file name is correctly set, that the load file is in a directory to which the TFTP server allows public access, then retry the download operation.
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.
0x2A	TFTP data packet error	Retry the download command. If the error persists, contact your local network administrator.

Table 22. Microcode Load Errors (continued)

Hex Code	Description	Remedial Action
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.
0x51	Timeout waiting for DHCP reply	This error indicates a failure during attempts to recover from other errors. Verify that the NIC download parameters (such as NIC IP address, load host IP address, load file name, and so on) are correct, then retry the 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.

Table 22. Microcode Load Errors (continued)

Hex Code	Description	Remedial Action
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.
FF	Successful download	

DHCP

Syntax

```
define server dhcp n m
```

Purpose

DHCP 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.

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).

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.

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.

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.

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.

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.

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.

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.

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 (100BaseTx NIC or 10BaseT/10Base2 NIC)
- 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.

Netbios

Syntax

```
[show|list] server netbios
```

Purpose

This command displays NetBIOS characteristics for the NIC.

Network

Syntax

```
[show|list] server network
```

Purpose

Use this command to display the NIC's network characteristics.

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".

Protocol

Syntax

```
[set|define|change] server authorize protocol [all|none] [p_nameenable|disable]
```

Purpose

This command allows individual protocols to be enabled or disabled.

Note: You can enable or disable these protocols from the printer Operator Panel beginning with NIC microcode release 5.21.

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**.

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 0.
- n** The number of requests to make (between 0 and 7; 0 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.

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.

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.

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.

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.

TCPIP

Syntax

```
[show|list] server tcpip
```

Purpose

Use this command to display the NIC's TCP/IP characteristics. See "Source Routing" on page 320 to change a TCP/IP routing.

Chapter 33. Node Commands

This chapter describes NIC commands related to nodes. To use these commands, you must be logged onto the NIC. See “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.

Table 23. Node Commands Defined by Function

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.

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.

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.

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.

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:

- “Dump” on page 313
- “Load” on page 316
- “RARP” on page 318
- “Source Routing” on page 320

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.

Chapter 34. Port Commands

This chapter describes NIC commands that concern ports. To use these commands, you must be logged onto the NIC. See “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.

Table 24. 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 connected 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.

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.

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.

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.

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.

Chapter 35. Services Commands

This chapter describes NIC commands that affect services. To use these commands, you must be logged onto a NIC. See “Logging into a NIC using NetWare IPX” on page 287 or “Logging into a NIC using TCP/IP Telnet” on page 290.

Table 25. 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.

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:

- 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.

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.

Part 8. Appendixes

Appendix A. NIC Specifications

Physical Dimensions

Table 26. Physical Specifications of a Network Interface Card

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)• 10 BASE-T (Unshielded Twisted-pair, UTP, RJ45, Category 3 or 5 cable)• 10 BASE Tx (Unshielded Twisted-pair, UTP, RJ45, Category 5 cable)
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

Agency Approval

Table 27. Agency Approval for IBM Network Interface Cards

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.
-----------------	--

Ethernet 10Base2 (BNC) Connector Pinout

Table 28. Ethernet 10Base2 Connector Pinout

Pin	Signal
1	Signal
2	Ground (Shield)

Ethernet 10Base-T (RJ-45) Connector Pinout

Table 29. Ethernet 10Base-T Connector Pinout

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

Ethernet 100Base TX (RJ-45) Connector Pinout

Table 30. Ethernet 100Base-T Connector Pinout

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

Token Ring UTP (RJ-45) Connector Pinout

Table 31. Token Ring UTP Connector Pinout

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

Token Ring STP (DE-9) Connector Pinout

Table 32. Token Ring STP Connector Pinout

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/09

Appendix B. Resetting or Updating NICs

This chapter describes two procedures:

- “Resetting NIC Parameters to Factory Defaults”
- “Updating the NIC Microcode” on page 345

Resetting NIC Parameters to Factory Defaults

NPM

The NIC parameters can be reset to factory defaults using any of these methods:

- NPM
- Commands issued from the command line
- Modifying hardware pin jumper placement

Resetting NIC Parameters using NPM

1. From the NPM Main Window, select a printer from the container.
2. From the menu bar, select **Network**.
3. From the **Network** pull-down menu, select **Reset to Defaults**.
4. You see a message. Select either:

Yes: Resets the NIC

No: Does not reset the NIC

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. Use either:
 - “Logging into a NIC using NetWare IPX” on page 287
 - “Logging into a NIC using TCP/IP Telnet” on page 290
2. Enter the command:
`init delay 0 default`

This command causes the log in session to be broken.

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.

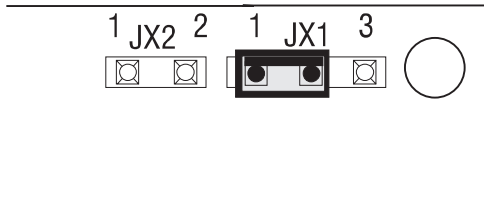
default

Causes the NIC to be reset to factory default settings.

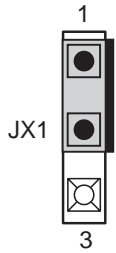
Resetting Ethernet NICs Using Hardware Pin Jumpers

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.
5. Locate and move the jumper at the JX1 pin:
 - For an Ethernet 10BaseT/10Base2 NIC, the jumper and JX1 pin are on the right, rear side of the NIC. Remove the jumper from its current setting and place over the pins labelled **1** and **JX1**.

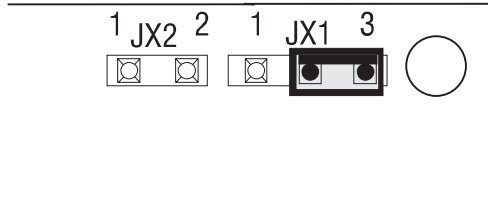


- For an Ethernet 100BaseTx NIC, the jumper and JX1 pin are in the center of the NIC. Remove the jumper from its current setting and place over the pins labelled **1** and **JX1**.

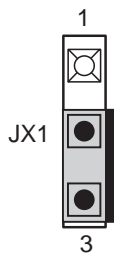


6. Place the NIC back in the printer (do not tighten the thumb screws to secure the NIC).
7. Turn the printer on and wait until it shows READY.
8. Turn the printer off.

9. Remove the NIC from the printer.
10. This time, remove the jumper and place it over the pins labelled **JX1** and **3**.
 - Ethernet 10BaseT/10Base2 NIC pin location:



- Ethernet 100BaseTx NIC pin location:



11. Put the NIC back in the printer and tighten the thumb screws to secure it.
12. Turn the printer on.

Notes:

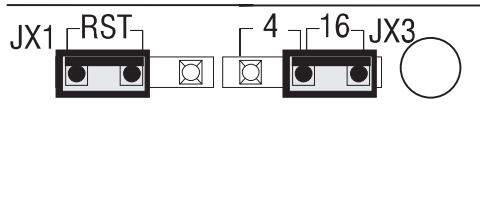
- a. The NIC's parameters have now been reset to factory defaults. The IP address is set to none; the subnet mask is set to none.
- b. If an IP address is set but a subnet mask is not, the default subnet mask is set to 255.0.0.0.

Resetting Token Ring NICs using Hardware Pin Jumpers

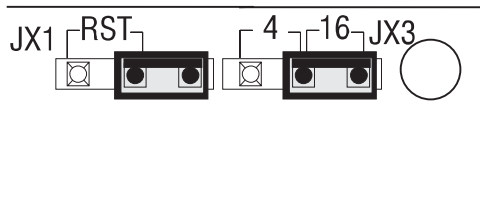
To reset the Token Ring NIC's parameters to factory defaults, perform the following procedure:

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.

Notes:

1. 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.
2. If an IP address is set but a subnet mask is not, the default subnet mask is set to 255.0.0.0.

Updating the NIC Microcode

NPM

To update the NIC microcode, you can use:

- IBM Network Printer Manager (NPM) Version 1.10 or later for Windows NT and 95
- TELNET and the command line interface
- Embedded web pages

Using NPM is generally easier than using TELNET. NPM is available on the World Wide Web and on the CD-ROM shipped with the NIC.

Obtaining the NIC Microcode

You can obtain the NIC microcode from either:

- The IBM Printing Systems Home Page on the World Wide Web, or
- the **Microcode CD-ROM for IBM Network Printers**, LCD4-0764-00 or later version.

Generally, the World Wide Web contains the most current version of NIC microcode.

Obtaining the NIC Microcode From the World Wide Web

1. Make a directory for the microcode, such as C:\IBMNIC.
2. Access the IBM Printing Systems Home Page on the World Wide Web.
3. Navigate to select Drivers, to select Utilities and microcode, and to select Network Interface Card microcode.
4. Download the self-extracting file NICnnn.EXE into the IBMNIC directory.
5. To unpack the files, enter the command:

```
filename d:path /d
```

For *filename*, use the name of the downloaded file.

For *d:path*, use the location where you want the files to be placed, as follows.

- If you use NPM, for *d:path* use *npm*\NIC, where *npm* is the name of the directory where you installed NPM, such as the default directory. For example,

For Windows 95, this is c:\ibmnp95\nic

For Windows NT, this is c:\ibmnpmt\nic

An example when using NPM for Windows NT and 95 is `nic620.exe c:\ibmnpm95\nic /d`.

- If you use TELNET, for "d:path" use the location on your system where you have configured the TFTP daemon to search for files.

For example, `nic620.exe c:\tftpdire /d`.

6. The following files are unpacked into the target location:
 - NICREAD.TXT—The README file
 - NCEnnn.SYS—10BaseT/10Base2 NIC microcode
 - NCXnnn.SYS—100BaseTx NIC microcode
 - NCTnnn.SYS—Latest token-ring microcode
 - TFTP.D.EXE—For OS/2 only: the TFTP daemon for OS/2 containing APAR 12482 for TCP/IP Versions 2.0 and 3.0

Obtaining the NIC Microcode From the Microcode CD-ROM

1. From your CD-ROM drive, run the Setup Utility (`setup.exe`).
2. Select the Network Interface Card tab.
3. Select the appropriate microcode, and then select Copy.
4. Specify the destination for the copy as follows:

- If you use NPM, the destination is

`npm\nic`

where *npm* is the name of the directory where you installed NPM, such as the default directory. On Windows 95, this would be

`c:\ibmnpm95\nic`

On Windows NT, this would be

`c:\ibmnpmnt\nic`

- If you use TELNET, for the destination use the location on your system where you have configured the TFTP daemon to search for files. For example,

`c:\tftpdire`

5. The following files are unpacked into the target location:
 - NICREAD.TXT—The README file
 - NCEnnn.SYS—10BaseT/10Base2 NIC microcode
 - NCXnnn.SYS—100BaseTx NIC microcode
 - NCTnnn.SYS—Latest token-ring microcode
 - TFTP.D.EXE—For OS/2 only: the TFTP daemon for OS/2 containing APAR 12482 for TCP/IP Versions 2.0 and 3.0

Updating the NIC Microcode

Follow the instructions in the README, NICREAD.TXT.

Appendix C. Related Publications

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

IBM Network Printer 12

- *IBM Network Printer 12: Quick Setup*, G544-5371
- *IBM Network Printer 12: User's Guide*, S544-5370

IBM Network Printer 17

- *IBM Network Printer 17: Quick Setup*, G544-5346
- *IBM Network Printer 17: User's Guide*, S544-5343

IBM InfoPrint 20

- *IBM InfoPrint 20: Quick Reference Card*, G544-5512
- *IBM InfoPrint 20: Setup Poster*, S544-5515
- *IBM InfoPrint 20: User's Guide*, S544-5516

IBM Network Printer 24

- *IBM Network Printer 24: Quick Setup*, G544-5375
- *IBM Network Printer 24: User's Guide*, S544-5378

IBM Network Printer 32

- *IBM InfoPrint 32: Quick Reference Card*, G544-5480
- *IBM InfoPrint 32: Setup Poster*, S544-5481
- *IBM InfoPrint 32: User's Guide*, S544-5484

Related Documents

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

MVS

- *TCP/IP for MVS: Customization and Administration Guide*, SC31-7134
- *TCP/IP for MVS: Planning and Migration Guide*, SC31-7189

PSF

- *PSF/MVS MVS Download Guide*, G544-5294
- *PSF/MVS System Programming Guide*, S544-3672

Publications from Other Vendors

Publications available from Novell:

- *Novell's Guide to NetWare Printing*
- *Novell NetWare for Macintosh File and Print Services*
- *Novell Print Services*

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Network Printer 24
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OS/2
OS/2 LAN Server
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Responsible Party:

International Business Machines, Corp.
Old Orchard Road
Armonk, NY 10504
Tele: 1-919-543-2193

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Zulassungsbescheinigung Gesetz über die elektromagnetische
Verträglichkeit von Geräten (EMVG) vom 30. August 1995

Dieses Gerät ist berechtigt in Übereinstimmung mit dem deutschen das EG-Konformitätszeichen - CE - zu führen.

Der Aufsteller der Konformitätserklärung ist die IBM(1)

Informationen in Hinsicht EMVG Paragraph 3 Abs. (2) 2:

Das Gerät erfüllt die Schutzanforderungen nach EN 50082-1 und EN 55022 Klasse A.
--

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Anmerkung: Um die Einhaltung des EMVG sicherzustellen sind die Geräte, wie in den Handbüchern angegeben, zu installieren und zu betreiben.

The United Kingdom Telecommunications Act 1984

This apparatus is approved under approval No. NS/G/1234/J/100003 for the indirect connections to the public telecommunications systems in the United Kingdom.

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This Class A digital apparatus meets the requirements of the Canadian Interference-causing equipment regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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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 asNIC.

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 for 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. 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 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.)

port monitor. Software on the workstation or server that controls job submission to a printer. Someport monitors (such as IBM TCP/IP Network Port Monitor) also allow the user to monitor bidirectional status and configuration from the printer.

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. 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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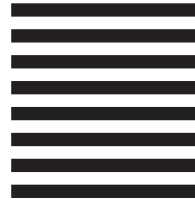
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