IBM Network Printers

IBM

Ethernet and Token Ring Quick Configuration Guide

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First Edition (May 1997)

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

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Contents

Book at a Glance

Terminology:

NIC is used throughout the book to refer to the IBM **N**etwork **I**nterface **C**ard. (The NIC is referred to as the printer network card, or PNC, by some IBM network printing software.)

What this book Contains

This book is a condensed version of a larger book called **IBM Network Printers: Ethernet and Token Ring Configuration Guide,** Version G544-5240-04, henceforth called *ETR-04*, which is also contained on the medium (CD-ROM or Web) where you found this book.

This condensed version of *ETR-04* provides you with checklists of the major steps you need to take to configure your IBM network printers in a wide variety of environments. Whenever details are available in *ETR-04*, this book points you to a specific section or chapter in the larger book.

Note: This condensed book contains some corrections to and updates of material that is in *ETR-04*.

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

- SERVER-TO-PRINTER attachments (see Table 1). This book is primarily concerned with this form of attachment.

- PEER-TO-PEER attachments. Refer to "Chapter 17. Peer-to-Peer Attachments to IBM Network Printers" on page 69.

Table 1. Server-to-printer Attachments

Server Environment	Operating System	Server-to-Printer Protocol	Datastream
AIX	IBM AIX	TCP/IP	ASCII IPDS[1] PCL PostScript[5]

Apple	Apple System 7	AppleTalk:
		    EtherTalk
		    TokenTalk
			PostScript[5]

AS/400	OS/400	TCP/IP	ASCII IPDS[2] PCL PostScript[5]
MVS	MVS	TCP/IP	IPDS[3]
Novell NetWare	NetWare	IPX/SPX	ASCII PCL PostScript[5]

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

Server Environment	Operating System	Server-to-Printer Protocol	Datastream
OS/2	• IBM LAN Server • Microsoft LAN Manager	TCP/IP NetBIOS	ASCII IPDS[4] PCL PostScript[5]
SUN	SUN Solaris	TCP/IP	ASCII PCL PostScript[5]
Windows NT or 95	NT or 95	• Microsoft Service for NetWare • Novell Service for NT or 95 • TCP/IP (using LPR for NT or 95)	ASCII PCL PostScript[5]
Note: 1. IPDS requires the IPDS option on the printer and PSF for AIX. 2. IPDS requires the IPDS option on the printer and PSF/400. 3. IPDS requires the IPDS option on the printer and PSF for MVS. 4. IPDS requires the IPDS option on the printer and PSF/2. IPDS cannot be sent with the NetBIOS protocol. 5. PostScript requires the PostScript option on the printer.			

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

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

Required Steps

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

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

Beware of Static Electricity

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

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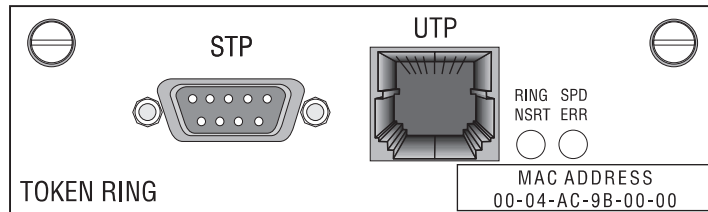
You **may** need this MAC address when configuring the NIC.

4. If you are using a Token Ring network and your network line speed is the default 16 Mbps, go to step 5 on page 2. If your network line speed is **not** the default 16 Mbps on the NIC, use the following procedure to reset the line speed:

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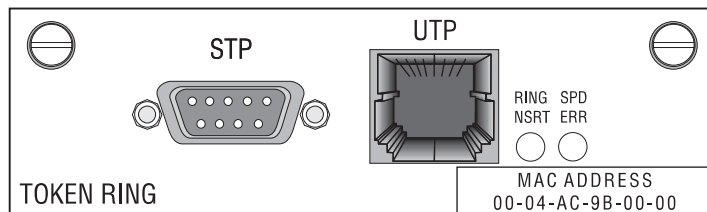
Figure 1. Token Ring Faceplate

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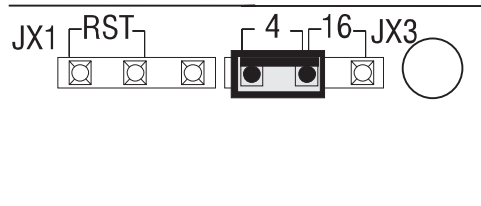
Figure 2. Jumper Placement for 4 Mbps

- If you are installing the card for a 16 Mbps network, a jumper must be placed over the pins labelled 16. (This is the default jumper position.)
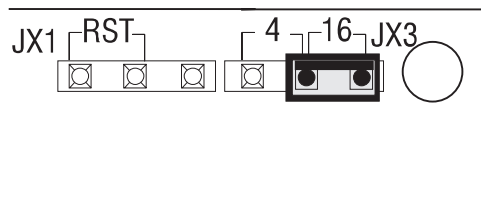
Figure 3. Jumper Placement for 16 Mbps

5. Install the NIC in the printer using the procedure in *ETR-04 section 1.8 "Physically Installing a NIC in the Printer"*. **Do not attach the NIC cable to the network at this point.**

   Note: If you power on the printer at this point, a NIC Configuration Page will print. Refer to *ETR-04 section 1.6 "The NIC Configuration Page"*.

6. Verify the physical installation of the card in the printer by doing the procedure in *ETR-04 section 1.5.1, "Obtaining a Printer Configuration Page"*. If the "Installed Options" section does not show Ethernet or Token Ring, repeat step 5.

7. Connect the NIC **physically** to the LAN cable by referring to *ETR-04 section 1.9 "Physically Connecting a NIC to a LAN."*

8. Verify the physical connection to the LAN cable by using the information in *ETR-04 section 1.10 "Verifying a Physical NIC-to-LAN Connection."*

Optional Steps

9. If you do not want to configure the LAA address for a NIC, go to step 12 on page 3 .

10. If you wish to change the MAC address on a Token Ring card to a Locally Administered Address (LAA), you can do so using one of these procedures:
    - You can use the printer operator panel as described in *ETR-04 section 17.3, "Setting the LAA from the Printer Operator Panel"*.
    - You can use the IBM NPM utility, which is also on the CD-ROM. For information on how to use NPM, access its help system.

> **Resetting the LAA to the MAC**
>
> If you want to reset an LAA address back to the MAC address, use the procedure in *ETR-04 section 17.3, "Setting the LAA from the Printer Operator Panel."*

11. You will find it useful to know how to obtain a NIC configuration page. Here is the procedure to use:

    a. Turn the printer **off**.

    b. Disconnect the power cord from the printer.

    c. Disconnect the LAN cable from the NIC.

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

    d. Plug in the AC power cord.

    e. Turn the printer **on**.

    f. The NIC configuration page prints automatically within two minutes. Refer to *ETR-04 section 1.6, "The NIC Configuration Page"* 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.

    g. Turn the printer **off**.

    h. Reconnect the printer to the LAN (it was disconnected in step c).

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

12. You can now configure the printer for your environment. Here are your server-to-printer choices:

- "Chapter 7. AIX to Format and Print PCL and PostScript Files" on page 27

- "Chapter 8. AIX to Print Formatted PCL and PostScript Files" on page 31

- "Chapter 9. AIX to Print IPDS Files" on page 35

- "Chapter 2. AppleTalk" on page 5

- "Chapter 10. AS/400 to Print PCL and PostScript Files" on page 39

- "Chapter 11. AS/400 to Print IPDS Files" on page 47

- "Chapter 12. MVS to Print IPDS Files" on page 53

- "Chapter 3. OS/2 NetBIOS" on page 7

- "Chapter 4. NetWare 3.X" on page 11

- "Chapter 5. NetWare 4.X" on page 15

- "Chapter 13. OS/2 TCP/IP to Print PCL and PostScript Files" on page 57

- "Chapter 14. OS/2 TCP/IP to Print IPDS Files" on page 61

- "Chapter 15. SUN Solaris to Format and Print PCL and PostScript Files" on page 65

- "Chapter 6. Windows NT using NetWare Services" on page 23

- "Chapter 16. Windows NT on TCP/IP Networks" on page 67

For PEER-TO-PEER configurations, refer to "Chapter 17. Peer-to-Peer Attachments to IBM Network Printers" on page 69.

Chapter 2. AppleTalk

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04). Note that wherever you see an "NPM" reference like NPM, this means that the IBM Network Printer Manager can be used to perform some or all of the configuration steps.

NPM–NT or NPM–95

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

Requirements

Verify that you have the following Apple software:

AppleTalk Phase 2 with EtherTalk or TokenTalk, depending on the cabling system used on all Macintosh workstations or servers that use the printer
Macintosh computers running System 7 or higher
Printer PostScript option

Configuration Checklist

Required Steps

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 1.

2. Use the README file to find out how to install the IBM Network Printer driver. You can instead use the procedure in *ETR-04 section 2.3, "Installing the IBM PostScript Printer Driver"*. The driver is included with the PostScript option for the printer.

3. Use the Chooser to configure your printer using the procedure in *ETR-04 section 2.4, "Configuring AppleTalk to Print to IBM Network Printers"*. Two steps are involved:

   • Associate the printer with its printer driver.

   • Select the printer's PPD.

   You will need the Printer Service Name (which defaults to IBM Network Printer *nn*). Step 5 describes how to change this name when the configuration is completed.

4. Verify the configuration by sending a print job to the printer, as described in *ETR-04 section 2.5, "Verifying the AppleTalk Configuration"*.

5. Use the IBM Printer Utility or the MAC LaserWriter Utility to change the default name of your printer as described in *ETR-04 section 2.6, "Changing the Name of the Printer on AppleTalk"*.

Optional Steps

6. If you are not using NetWare printing on your network and you have a Telnet capability on the Macintosh, NetWare can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It"*.

7. If you have a TCP/IP Telnet capability on the Macintosh and you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC"*.

8. If you want to monitor your printer with tools other than those on the Macintosh, refer to *ETR-04 section 22.0 "IBM Network Printer Manager (NPM)"*.

Chapter 3. OS/2 NetBIOS

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04). Note that wherever you see an "NPM" reference like NPM, this means that the IBM Network Printer Manager can be used to perform some or all of the configuration steps.

NPM–OS/2

Use this checklist 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

Verify the existence of the following software requirements:

LAN Server Requirements:

OS/2:

On the LAN Server, you need **one** of the following versions of OS/2:
- OS/2 Version 2.11 or higher **and** LAN Server Version 3.0 or 4.0
- OS/2 Warp Version 3.0 or higher **and** LAN Server Version 3.0 or 4.0
- OS/2 Warp Connect Version 3.0 (including OS/2 TCP/IP Version 3.0), which includes LAN Server Version 4.0
- OS/2 Warp Server Version 4.0 (including OS/2 TCP/IP Version 3.0), which includes LAN Server 5.0

Submitter:

On each submitter (client) workstation, you need **one** of the following:
- PC DOS Version 6.0 or higher with IBM DOS LAN Requester
- OS/2 Version 2.1 or higher with OS/2 LAN Requester 3.0 or higher
- OS/2 Warp Connect Version 3.0 with LAN Requester installed

LAN Manager Requirements:

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

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

Configuration Checklist

Required Steps

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 1.

2. If you do **not** have a DHCP server anywhere on your network, go to step 3. If you **do** have a **DHCP server** anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   * *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   * *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   * *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

3. If you want to change the NIC's MAC address, but did not do so using the printer operator panel (see step 10 on page 2), you can change the MAC address on Token Ring cards only by using one of the following procedures:

   * **Command Line**:
     a. Login to the NIC using the appropriate procedure:
        – *ETR-04 section 25.1, "Logging into a NIC using NetWare IPX"*
        – *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet"*
     b. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line"*.
   * **NPM**:
     – Refer to the NPM OS/2 help system to determine how to do this.

4. You need the following data to configure the NIC:

Table 2. 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**. For information about the configuration page, refer to *ETR-04 section 1.6., "The NIC Configuration Page."*) The **default** NIC name is NCT or NCE plus the last six digits of the MAC address, for example NCT9a1234.	

Table 2. NetBIOS Configuration Data (continued)

Parameter	Description	Your Value
Printer service name	The Printer Service name should be something like NC*X*9a1234_1 if the NIC defaults have not been changed. If the NIC service names have been changed with NPM or the command line, print a NIC configuration page (see *ETR-04 section 1.6., "The 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.	

5. Use the README file to find out how to install the printer driver for OS/2 using the procedure in *ETR-04 section 3.3, "Installing the Printer Driver for OS/2."* This is the standard OS/2 printer driver installation procedure.

6. Use the README file to find out how to install the LAN Manager or LAN Server printer utility, or use the procedure in *ETR-04 section 3.4, "Installing OS/2 Utilities."*

7. Use the LAN Server or LAN Manager printer utility to install the printer, as described in *ETR-04 section 3.5, "Installing the Printer on OS/2 using NetBIOS."*

8. Create a printer alias using the procedure in *ETR-04 section 3.6, "Sharing the Printer by Creating the Printer Alias"* as a model.

9. Configure print requesters by doing the procedure in *ETR-04 section 3.7, "Configuring Print Requesters on OS/2."* Two steps are involved:

   • Set up a shared printer directory on the server.

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

10. Verify the configuration. Use the procedure in *ETR-04 section 3.8, "Verifying the NetBIOS Configuration"* to print from NetBIOS.

11. If you have problems, refer to "Handling NetBIOS Problems" on page 77.

Optional Steps

12. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

13. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

14. If you want to monitor your NetBIOS printers, you should consult *ETR-04 section 21.4, "Monitoring with NetView for OS/2"* and *ETR-04 section 22.1, "What is Network Printer Manager (NPM)?"*

Chapter 4. NetWare 3.X

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04). Note that wherever you see an "NPM" reference like NPM, this means that the IBM Network Printer Manager can be used to perform some or all of the configuration steps.

NPM—NT

Use this checklist to configure the IBM NIC under NetWare 3.X as a print server or remote printer using the NetWare command line. The IBM Network Printer Manager (NPM) can perform the command line procedures described here with a minimum of input from you. Refer to *ETR-04 section 22.8, "Monitoring with NPM in a NetWare IPX Environment."*

Requirements

Verify that you have the required software:

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

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

Configuration Checklist

Authority Level Required

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

Required Steps

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

2. If you have a network with multiple servers, perform the procedure in *ETR-04 section 4.3, "Configuring NetWare on a Large Network."* Otherwise, go to step 3 .

3. If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 10 on page 2), you can change the MAC address on Token Ring cards only by using one of the following procedures:

   - **Command Line**:
     - *ETR-04 section 25.1, "Logging into a NIC using NetWare IPX"*
     - Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

11

- **NPM**:
  - Refer to the NPM NT or 95 help system to determine how to do this.
4. Read *ETR-04 section 4.4, "Choosing Print Server or Remote Printer"* to determine which of the two ways of using the NIC, as a print server or a remote printer, you want to use when configuring the printer in step 5.
5. To configure your printer, select one of the following two tools:
   - **NPM**: If you are using NPM for Windows NT or 95, use the README file for NPM to determine how to install it.
   - **PConsole**: If you are using PConsole, go to either:
     - *ETR-04 section 4.5, "Configuring under NetWare 3 as a Print Server using PConsole"*
     - *ETR-04 section 4.6, "Configuring under NetWare 3 as a Remote Printer using PConsole"*

If you are configuring as a Print Server

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

You will need the following data:

Parameter	Description	Your Value
File server name	The name of the Novell file server, for example Novell31. Obtain this name from the network administrator.	
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
NIC name (print server)	The **default** or user-assigned name of the NIC. The **default** is NCT or NCE plus the last six digits of the card's MAC address (the MAC address is printed on the card's faceplate). On the NIC configuration page, the NIC name is called the **Node Name** in the "Network Information" section.	

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 *ETR-04 section 20.0, "Customizing the NIC."*	

If you are configuring as a Remote Printer:

The following steps are involved:
- Login to the NetWare file server.
- Create a print queue.
- Add the NIC as a remote printer.
- Map the print queue to the printer.
- Restart the print server.
- Test the configuration with a print job.

You will need the following data:

Parameter	Description	Your Value
File server name	The name of the Novell file server, for example Novell31. Obtain this name from the network administrator.	
Print queue name	The name you want to assign to the print queue, for example 4317Q.	
NIC name (print server)	The **default** of user-assigned name of the NIC. The **default** is NCT or NCE plus the last six digits of the card's MAC address (the MAC address is printed on the card's faceplate). On the NIC configuration page, the NIC name is called the **Node Name** on the "Network Information" section.	
NetWare Print Server (NLM or EXE) name	For example, Novell31PS. This is the name of the Print Server (NLM or EXE) that runs either on the NetWare file server or client. The name is used when running the NIC as a remote printer.	

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 *ETR-04 section 20.0, "Customizing the NIC."*	

6. Verify the configuration by doing the procedure in *ETR-04 section 4.7, "Verifying the NetWare Configuration."* The steps involved are:

   - Use the README file to learn how to install the printer drivers.
   - Capture a port with the command:

     `capture L=n q=queue_name`

   - Send a print job to the printer with the command:

     `copy file_name LPTn`

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

Optional Steps

8. If you have a large network, consult the suggestions provided in *ETR-04 section 5.8,"Improving Network Traffic on Large Networks."*

9. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

10. If you want to monitor your printer, refer to:

    - *ETR-04 section 21.3, "Monitoring Network Printers on NetWare"*
    - *ETR-04 section 22.8, "Monitoring with NPM in a NetWare IPX Environment"*

Chapter 5. NetWare 4.X

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04). Note that wherever you see an "NPM" reference like NPM, this means that the IBM Network Printer Manager can be used to perform some or all of the configuration steps.

NPM—NT

Use this checklist to configure NetWare 4.X using the NetWare command line. The IBM Network Printer Manager (NPM) can perform the command line procedures described here with a minimum of input from you. Refer to *ETR-04 section 22.8, "Monitoring with NPM in a NetWare IPX Environment."*

Requirements

Verify that you have the required software:

- The NetWare file server needs NetWare 4.0 or higher (for NDS mode)
- Requesters need NetWare Shell Version 3.26 or higher for bindery-mode logins, and the VLM requester for NDS-mode logins. The effects of NDS are that:
  - Printer objects must be in the same context as the PServer object that references the printer objects.
  - Only one PServer object can be defined for each IBM NIC.
  - The [Public] trustee—created by default during NetWare 4 installation—must exist on the root of the NDS tree.
  - Spaces and trailers in the NDS treename are converted to underscores to form a 32-byte field length.
- For the **network**, the requirements are:
  - The IPX/SPX protocol (NetWare File server version 4 or higher with NetWare requester VLM).
  - An IBM NIC.
  - The file server containing the NDS partition where the IBM NIC configuration resides needs either:
    - A NIC no more than two hops away from the file server
    - A NIC no more than two hops away from a replica
    - If a NIC is more than two hops away from the file server, you must specify a preferred file server for it. See *ETR-04 section 5.8.2.1, "Assigning a NetWare File Server Name"* 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.

Required Steps

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 1.

2. If you have a network with multiple servers, perform the procedure in *ETR-04 section 4.3, "Configuring NetWare on a Large Network."* Otherwise, go to step 3 .

3. If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 10 on page 2), you can change the MAC address on Token Ring cards only by using one of the following procedures:

   - **Command Line**:
     a. *ETR-04 section 25.1, "Logging into a NIC using NetWare IPX"*
     b. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*
   - **NPM**:
     – Refer to the NPM NT or 95 help system to determine how to do this.

4. Read *ETR-04 section 4.4, "Choosing Print Server or Remote Printer"* to determine which of the two ways of using the NIC, as a print server or a remote printer, you prefer.

5. Select one of the following two tools to do the configuration:
   - If you are using NPM for NT or 95, refer to the NPM NT or 95 help system to determine how to do this.
   - If you are using standard NetWare tools (PConsole or NWAdmin), go to one of the following:
     Using PConsole

     – **Either** *ETR-04 section 5.3, "Configuring as a Print Server in NDS Mode using PConsole"* **or** "Configuring as a Print Server in NDS Mode using PConsole" on page 17 in this book.

     – **Either** *ETR-04 section 5.4, "Configuring as a Print Server in Bindery Mode using PConsole"* **or** "Configuring as a Print Server in Bindery Mode using PConsole" on page 18 in this book.

     – **Either** *ETR-04 section 5.5, "Configuring as a Remote Printer in NDS Mode using PConsole"* **or** "Configuring as a Remote Printer in NDS Mode using PConsole" on page 19 in this book.
     Using NWAdmin

     – **Either** *ETR-04 section 5.6, "Configuring as a Print Server using NWAdmin 4.X in NDS Mode"* **or** "Configuring as a Print Server in NDS Mode using NWAdmin 4.X" on page 20 in this book.

     – **Either** *ETR-04 section 5.7, "Configuring as a Remote Printer using NWAdmin 4.X in NDS Mode"* **or** "Configuring as a Remote Printer in NDS Mode using NWAdmin 4.X" on page 21 in this book.

6. Verify the configuration by doing the procedure in *ETR-04 section 4.7, "Verifying the NetWare Configuration."* The steps involved are:
   - Use the README file to install the printer driver(s).
   - Capture a port with the command:

     `capture L=n q=queue_name`
   - Send a print job to the printer with the command:

     `copy file_name LPTn`
7. If you encounter problems, refer to "Handling NetWare/IPX Problems" on page 78 .

Optional Steps

8. If you have a large network, consult the suggestions provided in *ETR-04 section 5.8, "Improving Network Traffic on Large Networks."*
9. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*
10. If you want to monitor your printer, refer to:
    - *ETR-04 section 21.3, "Monitoring Network Printers on NetWare"*
    - *ETR-04 section 22.8, "Monitoring with NPM in a NetWare IPX Environment"*

Configuring as a Print Server in NDS Mode using PConsole

The steps involved are:
- Login to the desired context on the NDS tree.
- Establish the context.
- Create a print queue.
- Add the NIC as a print server.
- Add the printer.
- Map the print queue to the printer.
- Link the NIC to the printer.
- Restart the NIC.

You will need the following data:

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.	

Parameter	Description	Your Value
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 *ETR-04 section 20.0, "Customizing the NIC."*	

Configuring as a Print Server in Bindery Mode using PConsole

The steps involved are:

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

You will need the following data:

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 *ETR-04 section 20.0, "Customizing the NIC."*	

Configuring as a Remote Printer in NDS Mode using PConsole

The steps involved are:

- Login to thedesired context on the NetWare NDS tree as Admin.
- Create a print queue.
- Add the printer.
- Select the Print Server.
- Associate the printer with the print server.
- Map the print queue to the printer.
- Restart the print server.

You will need the following data:

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.	

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 *ETR-04 section 20.0, "Customizing the NIC."*	
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.	

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

The steps involved are:
- Login to the desired context on the NDS tree.
- Establish the context.
- Create a print queue.
- Add the NIC as a print server.
- Add the printer.
- Map the print queue to the printer.
- Link the NIC to the printer.
- Restart the NIC.

You will need the following data:

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 *ETR-04 section 20.0, "Customizing the NIC."*	

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

The steps involved are:

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

You will need the following data:

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.	

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 *ETR-04 section 20.0, "Customizing the NIC."*	
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.	

Chapter 6. Windows NT using NetWare Services

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04). Note that wherever you see an "NPM" reference like NPM, this means that the IBM Network Printer Manager can be used to perform some or all of the configuration steps.

NPM—NT or NPM—95

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

Table 3 describes the different NetWare services supported by the following procedures.

Table 3. 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.

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

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

```
┌─ Windows 95 ─────────────────────────────────────────────────────┐
│                                                                   │
│ The following procedures can be adapted for Windows 95.           │
│                                                                   │
└───────────────────────────────────────────────────────────────────┘
```

Configuration Checklist

```
┌─ Authority Level Required ───────────────────────────────────────┐
│                                                                   │
│ Some of the following configuration steps carried out on Windows NT may │
│ require **administrative** authority to be able to use NetWare services. │
│                                                                   │
└───────────────────────────────────────────────────────────────────┘
```

Required Steps

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

2. If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 10 on page 2), you can change the MAC address on Token Ring cards only by using one of the following procedures:

   - **Command Line**:
     a. Login to the NIC using the procedure in *ETR-04 section 25.1, "Logging into a NIC using NetWare IPX"*
     b. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*
   - **NPM**:
     – Refer to the NPM NT or 95 help system to determine how to do this.

3. Configure the printer on your NetWare system. Refer to the appropriate one of the following two procedures:
   - "Chapter 4. NetWare 3.X" on page 11 in this book
   - "Chapter 5. NetWare 4.X" on page 15 in this book

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

5. Perform one of the following two procedures:
   - *ETR-04 section 6.3, "Configuring Windows NT 3.51 using a NetWare Service."*
   - *ETR-04 section 6.4, "Configuring Windows NT 4.0 using a NetWare Service."*

If you are configuring NT 3.51:

The steps involved are:
- Connect to printer.
- Associate printer to queue.
- Specify printer driver.

You will need the following data:

Parameter	Description	Your Value
NetWare queue name	User-assigned name for the queue servicing the printer. This name was assigned when you configured the printer under NetWare 3 or 4 in step 3 on page 24.	
Printer driver name	Name of the IBM printer driver for NT. The default name is IBM Network Printer *nn*.	

If you are configuring NT 4.0:

The steps involved are:

- Associate printer to queue.
- Select appropriate driver.

You will need the following data:

Parameter	Description	Your Value
NetWare queue name	User-assigned name for the queue servicing the printer. This name was assigned when you configured the printer under NetWare 3 or 4 in step 3 on page 24.	
Printer driver name	Name of the IBM printer driver for NT. The default name is IBM Network Printer *nn*.	

6. Verify the configuration by doing the procedure in *ETR-04 section 6.5, "Verifying the NetWare Service Configuration."*

Optional Steps

7. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*
8. If you want to monitor your printer, refer to:
   - *ETR-04 section 21.3, "Monitoring Network Printers on NetWare"*
   - *ETR-04 section 22.8, "Monitoring with NPM in a NetWare IPX Environment"*

Chapter 7. AIX to Format and Print PCL and PostScript Files

<div style="border:1px solid">

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04).

</div>

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

- If you want to configure AIX to print already-formatted files, use the procedure in "Chapter 8. AIX to Print Formatted PCL and PostScript Files" on page 31.

- If you want to print IPDS files on your printer, use the procedure in "Chapter 9. AIX to Print IPDS Files" on page 35.

Requirements

You need:

AIX 3.2.5	AIX 4.1.X	AIX 4.2.X
APAR IX56644 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server	None

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

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

<div style="border:1px solid">

Authority Level Required

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

</div>

Required Steps

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 1.

2. If you do **not** have a DHCP server anywhere on your network, go to step 3 on page 28 . If you **do** have a **DHCP server** anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   - *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   - *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   - *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

3. If you want to change the MAC address to the LAA address and you did not do so in step 10 on page 2, then use the following procedure:

   a. Make sure an IP address has been assigned to the NIC. Refer to step 4.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

4. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC. You can **either** assign the address(es) while you are doing the print queue configuration **or** make the assignments now before doing the configuration.

   - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*

   - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:

     – *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN); then you need to use *ETR-04 section 22.6, "Setting Subnet Mask and Gateway Addresses with NPM"* or *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.

     – *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.

   - Optionally, use *ETR-04 section 17.10, "Setting a Symbolic Name for an IP Address."*

5. Use the README file to find out how to install the printer drivers and utilities for network printers, or use the procedure in *ETR-04 section 7.3, "Installing AIX Printer Driver and Utilities."*

6. Configure your printer by doing one of the two procedures:

   - *ETR-04 section 7.4, "Configuring AIX 3.2.5 to Format and Print Files."*

   - *ETR-04 section 7.5, "Configuring AIX 4.1.X or 4.2.X to Format and Print Files."*

If you are configuring AIX 3.2.5

The steps involved are:
- Identify the printer.
- Specify address(es).
- Set up print queue.

You will need the following data:

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.	

If you are configuring AIX 4.x.x

The steps involved are:

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

You will need the following data:

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

7. Verify the configuration by doing the procedure in *ETR-04 section 7.6, "Verifying an AIX Configuration."*

8. If you have problems, refer to "Handling TCP/IP Problems" on page 82.
Optional Steps

9. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

10. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

11. If you want to monitor your printer, refer to the following:
    - *ETR-04 section 21.2, "Monitoring with AIX NetView/6000"*
    - *ETR-04 section 21.5, "Monitoring Network Printers on TCP/IP Networks"*
    - *ETR-04 section 21.6, "Configuring AIX/UNIX for Syslog Support"*

Chapter 8. AIX to Print Formatted PCL and PostScript Files

> **What this Chapter Contains**
>
> This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04).

Use this checklist to configure AIX 3.2.5 and AIX 4.1.*x* or 4.2.*x* to print already formatted PostScript or PCL print files.

- If you want to configure AIX to format and then print your files, use the procedure in "Chapter 7. AIX to Format and Print PCL and PostScript Files" on page 27.

- If you want to print IPDS files on your printer, use the procedure in "Chapter 9. AIX to Print IPDS Files" on page 35.

Requirements

You need:

AIX 3.2.5	AIX 4.1.*x*	AIX 4.2.*x*
APAR IX56644 applied on the RS/6000 server	APAR IX56699 applied on the RS/6000 server	None

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

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.

Required Steps

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 1.

2. If you do **not** have a DHCP server anywhere on your network, go to step 3 on page 32 . If you **do** have a **DHCP server** anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   - *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   - *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   - *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

3. If you want to change the MAC address to the LAA address and you did not do so in step 10 on page 2, then use the following procedure:

   a. Make sure an IP address has been assigned to the NIC. Refer to step 4.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

4. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC. You can **either** assign the address(es) while you are doing the print queue configuration **or** make the assignments now before doing the configuration.

   - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*

   - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:

     – *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN); then you need to use *ETR-04 section 22.6, "Setting Subnet Mask and Gateway Addresses with NPM"* or *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.

     – *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.

5. Configure your printer with one of the two procedures:

   - *ETR-04 section 8.3, "Configure AIX 3.2.5 to Print Formatted Files."*
   - *ETR-04 section 8.4, "Configure AIX 4.1.X or 4.2.X to Print Formatted Files."*

If you are configuring AIX 3.2.5

The steps involved are:
- Add a remote queue.
- Associate printer with queue.

You will need the following data:

Parameter	Description	Your Value
Your name for the printer queue	The name of the queue you want the printer to have.	
Queue name on the remote printer	Name of the remote queue on the NIC. Set to the capitalized word PASS. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word TEXT.)	
Destination host	IP address or hostname of the NIC.	

If you are configuring AIX 4.x.x

The step involved is:

- Add a remote print queue.

You will need the following data:

Parameter	Description	Your Value
Name of the printer queue	Your name for the queue assigned to the printer.	
Hostname	Hostname or IP address of the NIC.	
Queue name of the remote printer	Set to the capitalized word PASS. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word TEXT.)	

6. Verify the configuration by doing *ETR-04 section 8.5, "Verifying an AIX Configuration."*

7. If you have problems, refer to "Handling TCP/IP Problems" on page 82.

Optional Steps

8. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by doing the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

9. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

10. If you want to monitor your printer, refer to the following:

    - *ETR-04 section 21.2, "Monitoring with AIX NetView/6000"*
    - *ETR-04 section 21.5, "Monitoring Network Printers on TCP/IP Networks"*
    - *ETR-04 section 21.6, "Configuring AIX/UNIX for Syslog Support"*

Chapter 9. AIX to Print IPDS Files

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name
in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**,
544-5240-04 (ETR-04).

Use this checklist 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").

Configuration Checklist

Authority Level Required

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

Required Steps

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

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	• AUTO, if you want to use the printer for other than IPDS printing • IPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
IPDS	IPDS PORT	TRING, ETHER

---

3. If you do NOT have a DHCP server anywhere on your network, go to the next step in the overall sequence. If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   * *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   * *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   * *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

4. If you want to change the MAC address to the LAA address and you did not do so in step 10 on page 2, then use the following procedure:

   a. Make sure an IP address has been assigned to the NIC. Refer to step 5.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

5. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC. You can **either** assign the address(es) while you are doing the print queue configuration **or** make the assignments now before doing the configuration.

   * To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*
   * If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
     – *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN); then you need to use *ETR-04 section 22.6, "Setting Subnet Mask and Gateway Addresses with NPM"* or *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.
     – *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.
   * Optionally use *ETR-04 section 17.10, "Setting a Symbolic Name for an IP Address"*

6. Use the PSF for AIX "Add a Printer" SMIT panels to do the procedure in *ETR-04 section 9.3, "Configuring AIX to Print IPDS Files."* You will need the following data:

Parameter	Description	Your Value
IP address	IP address of the NIC.	
Printer queue name	Name of the queue for the printer. User-assigned.	
NIC queue name	Set to the capitalized word PASS. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word TEXT.)	

7. Configure the printer for sharing by doing the procedure in *ETR-04 section 9.4, "Configuring PSF for AIX for Printer Sharing."*

8. Verify the configuration by sending a print job to the printer using any of the commands in *ETR-04 section 9.5, "Verifying an AIX Configuration for IPDS."*

9. If you have problems, refer to "Handling TCP/IP Problems" on page 82.

Optional Steps

10. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by doing the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

11. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

12. If you want to monitor your printer, refer to the following:
    * *ETR-04 section 21.2, "Monitoring with AIX NetView/6000"*
    * *ETR-04 section 21.5, "Monitoring Network Printers on TCP/IP Networks"*
    * *ETR-04 section 21.6, "Configuring AIX/UNIX for Syslog Support"*

Chapter 10. AS/400 to Print PCL and PostScript Files

> **What this Chapter Contains**
>
> This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04).

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

If you want to configure AS/400 to print IPDS files, use the procedure in "Chapter 11. AS/400 to Print IPDS Files" on page 47.

> **SCS Printing**
>
> AS/400 cannot print SCS files over the network to IBM network printers. However, if you use LPD and Host Print Transform (TRANSFORM) is set to *YES, OS/400 transforms SCS to PCL and prints the result. If you want SCS transformed into IPDS before printing, refer to *IBM Network Printers: IPDS and SCS Technical Reference* , S544-5312.

Requirements

> **AS/400 and Related Software Levels**
>
> IBM recommends that you (1) apply the latest cumulative fix package for an AS/400 or related software feature, **and** (2) contact AS/400 Support and request verification of required software.

Host Print Transforms

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

V3R1	V3R2	V3R6	V3R7
• *HP4 or • *WSCST	• *IBM43*nn* or • *WSCST	• *HP4 or • *WSCST	• *IBM43*nn* or • *WSCST

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

System Requirements

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

- V3R1 and above
- V3R6 and above

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

`http://as400service.ibm.com`

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

Configuration Checklist

Authority Level Required

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

Required Steps

1. If you have not already done so, set up the printer and install the NIC as described in "Chapter 1. Start Here—Install the Network Interface Card (NIC)" on page 1. Optionally, disconnect the printer from the LAN cable for the time being. We will tell you when to reconnect the printer to the LAN cable.

2. If you do NOT have a DHCP server anywhere on your network, go to step 3. If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   - *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   - *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   - *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

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

   a. Make sure an IP address has been assigned to the NIC. Refer to step 4.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

4. You need to assign an IP address to the NIC. Obtain an IP address, subnet mask, and hostname (what the printer will be called on the AS/400) from the network administrator. Use the printer operator panel to set the IP address and subnet mask. Refer to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."* If you do not use the printer operator panel to set the addresses, you need a DOS/Windows or OS/2 workstation, with Telnet capability and attached to the LAN, from which you can do a remote login to the printer and set the addresses from the command line. If you are assigning addresses from the command line, refer to the following:

- *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"*
- *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line."*

5. If the printer and AS/400 are not on the same LAN segment, verify that there is a route defined in the TCP/IP route list. (Refer to *ETR-04 section 10.4.2, "Configuring a Router Definition with ADDTCPRTE."*)

6. If you have not yet done so, create a line description for your Ethernet or Token Ring IBM NIC by doing the procedure in *ETR-04 section 10.3, "Developing Line Descriptions with CRTLINETH or CRTLINTRN."*

7. Set up AS/400 for TCP/IP using the procedure in *ETR-04 section 10.4, "Configuring AS/400 for TCP/IP."*

8. Attach the printer to the LAN cable.

9. If you are using V3R1 or V3R6, upload and create a workstation customization object (WSCO) using the CRTWSCST command. You may use either a generic WSCO like *HP4 or the specific WSCO created for network printers. You need the name of this WSCO when you do the next step to configure the printer on AS/400. Refer to *ETR-04 section 10.1.1, "Host Print Transforms"* for information about the WSCO to use.

10. Configure your printer on the AS/400 by doing the following procedure:

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

Parameter	Description	Your Value
Remote Printer Queue name	Set to the capitalized word PASS. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word TEXT.)	
IP address	IP address of the NIC.	

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

a. **Set up PostScript and PCL Printing**:
   - Specify LPR for **manual** submissions.
   - Configure a remote output queue for **automatic** submissions.

b. Submit a PostScript or PCL file, as shown in step 11 on page 44

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

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

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

To use LPR manually:

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

b. At the AS/400 command line, enter:
   ```
   LPR
   ```

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

```
                        Send TCP/IP Spooled File (LPR)

Type choices, press Enter.
Remote system  . . . . . . . . . RMTSYS        > *INTNETADR
Printer queue  . . . . . . . . . PRTQ          > 'PASS'
Job name . . . . . . . . . . . . JOB             *
  User . . . . . . . . . . . .
  Number . . . . . . . . . . .
Spooled file number  . . . . . . SPLNBR          *ONLY
Destination type . . . . . . . . DESTTYP         *OTHER
Transform SCS to ASCII . . . . . TRANSFORM       *YES
Manufacturer type and model  . . MFRTYPMDL     > *IBM4317
Internet address . . . . . . . . INTNETADR     > '9.99.2.3'
```

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

Remote system
> Enter the hostname of your printer or *INTNETADR, which then prompts you to specify the IP address of your printer.

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

Destination type (DESTTYP)
> Specify *OTHER for the DESTTYPE parameter.

Transform (TRANFORM)
> Specify *YES.

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

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

Internet Address (INTNETADR)
> IP address of the NIC.

> **Note:** You may specify **either** *INTNETADR (and the NIC IP address) **or** you may specify the hostname for the NIC if you did add the printer to the host table entry.

To create **a remote output queue**:

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

```
CRTOUTQ
```

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

```
                    Create Output Queue (CRTOUTQ)

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



Remote printer queue . . . . . . RMTPRTQ        > PASS
Writers to autostart . . . . . . AUTOSTRWTR     1
Queue for writer messages  . . . MSGQ           QSYSOPR
  Library  . . . . . . . . . . .                   *LIBL
Connection type  . . . . . . . . CNNTYPE        > *IP
Destination type . . . . . . . . DESTTYPE       > *OTHER
Host print transform . . . . . . TRANSFORM      *YES
Manufacturer type and model  . . MFRTYPMDL      > *IBM4312
Workstation customizing object   WSCST          *NONE
  Library  . . . . . . . . . . .
Internet address . . . . . . . . INTNETADR      > '9.99.57.173'
Destination options  . . . . . . DESTOPT        *NONE


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

c. Enter values for the following parameters:

Output queue (OUTQ)
> The name of the AS/400 output queue. The name can be anything you want. This name is **not** the same as the printer's internal queue name, PASS.

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

Remote printer queue (RMTPRTQ)
> Default name of the IBM network printer. Set to the capitalized word PASS. (If you are printing plain text files without an IBM printer driver and experience formatting problems, try using the capitalized word TEXT.)

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

Connection type (CNNTYPE)
> Specify this value as *IP.

Destination type (DESTTYPE)
> Specify *OTHER.

Transform (TRANSFORM)
> Specify this value as *YES.

Manufacturer type (MFRTYPMDL)
> Specify a manufacturer type and model to be used when printing on a network printer. Select *IBM4312, *IBM4317, or *IBM4324 if

you have V3R2. Otherwise, select *HP4 or some other generic printer type. You may also use a Workstation Customizing Object (*WSCST) and specify the object.

Warning! Envelope Printing

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

Internet address (INTNETADR)

Specify the IP address of the printer.

11. Verify the configuration by doing the following procedure:

To test **PCL printing**, do the following:

a. If it is not already started, start TCP/IP by entering the command:

`STRTCP`

b. Verify that the AS/400 TCP/IP interface is active.

c. Ping the printer from an AS/400 workstation with the command:

`PING ip_address`

where *ip_address* is the Internet address of the remote system printer (the NIC) or the hostname of the printer.

d. If you are able to ping the printer, go to step e.

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

- Enter the **LPR** command on the AS/400 command line, then enter the parameters.
- Enter the following command on the AS/400 command line:

  `STRRMTWTR name`

  where *name* is the name of the AS/400 remote output queue (not the printer's internal queue).

Note: To print PCL files, you must have specified PASS in the Remote Printer queue name for CRTOUTQ.

To test **PostScript printing,** do the following:

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

`STRTCP`

b. To verify that the printer is connected to AS/400, ping the printer from an AS/400 workstation with the command:

`PING ip_address`

where *ip_address* is the Internet address of the remote system printer (the NIC) or the hostname of the printer.

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

- Enter the **LPR** command on the AS/400 command line, then enter the parameters.
- Enter the following command on the AS/400 command line:

  `STRRMTWTR name`

where *name* is the name of the AS/400 output queue (not the printer's internal queue).

> **Note:** To print PostScript files, you must have specified PASS on the Remote Printer queue name for CRTOUTQ.

12. If you have problems, refer to "Resolving AS/400 Problems" on page 77.

Optional Steps

13. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

14. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

15. If you want to monitor your printer, you can use IBM's Network Printer Manager (NPM) on an OS/2 or Windows NT or 95 system.

Chapter 11. AS/400 to Print IPDS Files

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04).

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

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

If you want to configure AS/400 to format and print ASCII, PCL, or PostScript files, use the procedure in "Chapter 10. AS/400 to Print PCL and PostScript Files" on page 39 .

Printing SCS Files

PSF/400 accepts SCS files, but transforms them into IPDS files before printing. To minimize performance problems caused by the SCS to IPDS conversion, you can set the IPDSPASTHR parameter to YES. If you want SCS data transformed into PCL, refer to *IBM Network Printers: IPDS and SCS Technical Reference* , S544-5312 for details.

Requirements

AS/400 and Related Software Levels

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

Verify that you have the following software:

Table 4. AS/400 V3R1

Area	Software	Documentation
General	Cumulative tape C6198310 or later	Order only the cover letters for the following PTFs: • SF35164 (TCP/IP for PSF/400) • SF29961 (WRKAFP2 for PSF/400 configuration) • SF24140 IPDS pass through
Sockets related	PTF SF30018	
Network Printer Support	PTF SF32911	

Table 5. AS/400 V3R2

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

Table 6. AS/400 V3R6

General	Cumulative tape 37TH360 or later	Order only the cover letters for the following PTFs: • SF35164 (TCP/IP for PSF/400) • SF29961 (WRKAFP2 for PSF/400 configuration) • SF24140 IPDS pass through
Sockets related	PTF SF30508	
Network Printer support	PTF SF33118	

Table 7. AS/400 V3R7

General	No PTFs are required	Standard V3R7 documentation
Network Printer support	PTF SF33025	

Table 8. 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.

Required Steps

1. If you are installing the printer on AS/400 V3R1 or V3R6, you need to install WRKAFP2 for PSF/400 (this is one of the items on the list of software provided at the beginning of this chapter). Make sure WRKAFP2 has been installed before proceeding. Refer to *ETR-04 section 11.3, "Installing WRKAFP2 for V3R1 or V3R6."*

2. 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 1.

3. Using the printer operator panel, set up the printer for IPDS by setting the following parameters and values:

Menu	Item	Setting
ETHERNET or TOKEN RING	PERSONALTY	• AUTO, if you want to use the printer for other than IPDS printing • IPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
Note: FONTSUB must be set to ON, else you may receive an error message when printing IPDS.		
IPDS	IPDS PORT	TRING, ETHER

4. If you do NOT have a DHCP server anywhere on your network, go to step 5. If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   • *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*

   • *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*

   • *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

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

   a. Make sure an IP address has been assigned to the NIC. Refer to step 6.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

6. You need to assign an IP address to the NIC. Obtain an IP address, subnet mask, and hostname (what the printer will be called on the AS/400) from the network administrator. Use the printer operator panel to set the IP address and subnet mask. Refer to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."* If you do not use the printer operator panel to set the addresses, you need a DOS/Windows or OS/2 workstation, with Telnet capability and attached to the LAN, from which you can do a remote login to the printer and set the addresses from the command line. If you are assigning addresses from the command line, refer to the following:

   • *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"*

   • *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line."*

7. If the printer and AS/400 are not on the same LAN segment, verify that there is a route defined in the TCP/IP route list. (Refer to *ETR-04 section 11.5.2, "Configuring a Router Definition with ADDTCPRTE."*)

8. You need the following data to configure the NIC:

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

9. Create or verify the existence of a line description for either Token Ring or Ethernet. Refer to *ETR-04 section 11.4, "Developing Line Descriptions with CRTLINETH or CRTLINTRN."*

10. Create or verify the existence of an AS/400 TCP/IP interface for Token Ring or Ethernet. Refer to *ETR-04 section 11.5, "Configuring an AS/400 TCP/IP Interface."*

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

- *ETR-04 section 11.6, "Configuring PSF/400 for IPDS on V3R1"* or by using the following CRTDEVPRT command:

```
CRTDEVPRT DEVD(P4324) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
        AFPATTACH(*APPC) FONT(11) RMTLOCNAME(TCPIP)
        TEXT('IBM Network Printer Model 24')
```

then the WRKAFP2 command:

```
WRKAFP2 DEVD(P4324) IPDSPASTHR(*NO) TCPIP(*YES) RMTSYS('128.9.12.134')
        PORT(5001) INACTTMR(*SEC15)
```

- *ETR-04 section 11.7, "Configuring PSF/400 for IPDS on V3R2"* or by using the following CRTDEVPRT command:

```
CRTDEVPRT DEVD(P4317) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
        AFPATTACH(*APPC) FONT(11) RMTLOCNAME(TCPIP)
        TEXT('IBM Network Printer Model 17')
```

then the CRTPSFCFG command:

```
CRTPSFCFG PSFCFG(P4317) IPDSPASTHR(*NO) RLSTMR(*SEC15)
        TEXT('IBM Network Printer Model 17')
        RMTLOCNAME('128.99.12.134') PORT(5001)
```

- *ETR-04 section 11.8, "Configuring PSF/400 for IPDS on V3R6"* or by using the following CRTDEVPRT command:

```
CRTDEVPRT DEVD(P4312) DEVCLS(*RMT) TYPE(*IPDS) MODEL(0) AFP(*YES)
        AFPATTACH(*APPC) FONT(11) RMTLOCNAME(TCPIP)
        TEXT('IBM Network Printer Model 12')
```

then the WRKAFP2 command:

```
WRKAFP2 DEVD(P4324) IPDSPASTHR(*NO) TCPIP(*YES) RMTSYS('128.99.12.134')
        PORT(5001) RLSTMR(*SEC15)
```

- *ETR-04 section 11.9, "Configuring PSF/400 for IPDS on V3R7"* or by using the following CRTDEVPRT command:

```
CRTDEVPRT DEVD(P4324) DEVCLS(*LAN) TYPE(*IPDS) MODEL(0) LANATTACH(*IP)
        AFP(*YES) PORT(5001) FONT(11) RMTLOCNAME('128.9.12.134')
        USRDFNOBJ(AFP/NETWRKPRT *PSFCFG)
        TEXT('IBM Network Printer Model 24')
```

then the CRTPSFCFG command:

```
CRTPSFCFG PSFCFG(AFP/NETWRKPRT) IPDSPASTHR(*NO) RLSTMR(*SEC15)
          TEXT('IBM Network Printers')
```

12. Vary the printer ON using the VFYCFG command.

13. Verify that TCP/IP has been started using the STRTCP command.

14. Test your configuration by using the following procedure:

   a. Vary on the line description—VRYCFG CFGTYPE(*LIN)— if it is not already on.

   b. Start TCP/IP by entering the command:

      ```
      STRTCP
      ```

   c. Verify that the AS/400 TCP/IP interface is active.

   d. Turn the printer on and wait until the printer operator panel displays READY.

   e. Ping the printer from an AS/400 workstation with the command:

      ```
      PING RMTSYS ('ip_address')
      ```

      where *ip_address* is the Internet address of the remote system printer (the NIC).

   f. Also, ping the hostname of the printer.

   g. If the pings are not successful, refer to "Printer Cannot be PINGed" on page 77 .

   h. If pings are successful, vary on the printer device description with the command:

      ```
      VRYCFG (printer-device) CFGTYPE(*DEV) STATUS(*ON)
      ```

   i. Use PSF/400 to send an IPDS file to the printer by entering the following command on the AS/400 command line:

      ```
      STRPRTWTR DEV (printer device)
      ```

      where *printer device* is the name of the printer.

      If you have problems printing, do the following:

      - Print a NIC configuration page. Refer to step 11 on page 3.

      - 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.

15. To share the printer on the network, verify that the necessary parameters have been set correctly by referring to *ETR-04 section 11.11, "Sharing the AS/400 Printer on the Network."*

16. If you have problems, refer to "Resolving AS/400 Problems" on page 77.

Optional Steps

17. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

18. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

19. If you want to monitor your printer, you can do so using IBM's Network Printer Manager (NPM) on OS/2 or Windows NT or 95.

Chapter 12. MVS to Print IPDS Files

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04).

Use this checklist 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").

Configuration Checklist

The following checklist is divided into required and optional steps.

Authority Level Required

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

Required Steps

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

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	• AUTO, if you want to use the printer for other than IPDS printing • IPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
IPDS	IPDS PORT	TRING, ETHER

3. If you do NOT have a DHCP server anywhere on your network, go to step 5. If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   a. *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   b. *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   c. *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

4. If you want to change the MAC address to the LAA address and you did not do so in step 10 on page 2, then use the following procedure:

   a. Make sure an IP address has been assigned to the NIC. Refer to step 5.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

5. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC. You have two main options:

   • Use the printer operator panel to assign TCP/IP addresses to a LOCAL printer. Refer to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*

   • If you have REMOTE printers to which you want to assign TCP/IP addresses, you need to use either ARP (if the printer is on a local segment) or BOOTP (if the printer is on a WAN):

     – Use *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN). To set other TCP/IP addresses, you need to use *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.

     – Use *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.

6. Configure the printer by doing the procedure in *ETR-04 section 12.3, "Configuring PSF for MVS to Print IPDS Files."* The following steps are needed:

   • Define the MVS communications control unit to MVS.

   • Modify the TCP/IP profile on your MVS system, if necessary. Set the following parameters:

     DATABUFFERPOOLSIZE Statement
     The DATABUFFERPOOLSIZE 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

     SMALLDATABUFFERPOOLSIZE Statement
     The SMALLDATABUFFERPOOLSIZE 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.

     TINYDATABUFFERPOOLSIZE Statement
     The TINYDATABUFFERPOOLSIZE 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.

- Ping the printer.
- Define the printer as a writer-controlled printer to JES.
- Define the printer to PSF/MVS with a PRINTDEV statement, including the IP address. Here is an example:

```
//PSFPROC PROC
//*************** IBM NETWORK PRINTERS WRITER PROCEDURE ***************
//*
//*01* MODULE-NAME = PSFPROC
//*
//*01* DESCRIPTIVE-NAME = START PROCEDURE FOR PSF:
//*             TCP/IP ATTACHED IBM NETWORK PRINTERS
//*
//FONT300  DD   DSN=SYS1.FONT300,  /* SYSTEM FONTS - 300 PEL      */
//         DISP=SHR
///* ********************************************************     */
//*             PRINTDEV                                          */
//* ********************************************************      */
//PRT1     CNTL
//PRT1      PRINTDEV FONTDD=*.FONT300,/* 300 PEL FONT LIBRARY DD   */
//          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
```

7. Verify the configuration by doing the procedure in *ETR-04 section 12.4, "Verifying a TCP/IP-Attached Printer on MVS."*

8. If you want to share the printer, do the procedure in *ETR-04 section 12.5, "Sharing IBM Network Printers on MVS."*

9. If you have problems, refer to *ETR-04 section 12.6, "Handling MVS Connectivity Problems."*

Optional Steps

10. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

11. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

Chapter 13. OS/2 TCP/IP to Print PCL and PostScript Files

> **What this Chapter Contains**
>
> This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04). Note that wherever you see an "NPM" reference like NPM, this means that the IBM Network Printer Manager can be used to perform some or all of the configuration steps.

NPM—OS/2

Use this checklist 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 14. OS/2 TCP/IP to Print IPDS Files" on page 61.

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.

Required Steps

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 1.

2. If you do NOT have a DHCP server anywhere on your network, go to step 3. If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0,"Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   - *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   - *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   - *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

3. If you want to change the MAC address to the LAA address and you did not do so in step 10 on page 2, then use the following procedure:

   a. Make sure an IP address has been assigned to the NIC. Refer to step 4.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

4. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.
   - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*
   - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
     - *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN); then you need to use *ETR-04 section 22.6, "Setting Subnet Mask and Gateway Addresses with NPM"* or *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.
     - *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.
   - Optionally use *ETR-04 section 17.10, "Setting a Symbolic Name for an IP Address."*

5. You can use one of two different procedures to configure your printer in a server-to-printer environment:
   - USING THE IBM LAN SERVER/MANAGER PRINTER UTILITY:

a. Use the README file to install the printer driver for OS/2 (the standard OS/2 installation procedure); or use the procedure in *ETR-04 section 3.3, "Installing the Printer Driver for OS/2."*

b. Use the README file to install the printer utility (LSPU or LMPU) from IBM or use the procedure in *ETR-04 section 3.4, "Installing OS/2 Utilities."*

c. Add the printer using *ETR-04 section 13.3, "Installing the Printer for OS/2 using IBM Utilities."*

d. You can create aliases for the printers. To do this optional step, refer to *ETR-04 section 3.6, "Sharing the Printer by Creating the Printer Alias."*

- USING STANDARD OS/2 TCP/IP:

   a. Define a printer object using the procedure in *ETR-04 section 13.4, "Installing the Printer using Standard OS/2 TCP/IP"*

   b. You can create aliases for the printers. To do this optional step, refer to *ETR-04 section 3.6, "Sharing the Printer by Creating the Printer Alias."*

6. Configure print requesters by doing the procedure in *ETR-04 section 3.7, "Configuring Print Requesters on OS/2."*

7. Verify the configuration by doing the procedure in *ETR-04 section 13.5, "Verifying the LAN Server Configuration."*

8. If you have problems, refer to "Handling TCP/IP Problems" on page 82.

Optional Steps

9. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

10. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

11. If you want to monitor your printers, refer to:

   - *ETR-04 section 22.1, "What is Network Printer Manager (NPM)?"*
   - *ETR-04 section 21.5, "Monitoring Network Printers on TCP/IP Networks"*
   - *ETR-04 section 21.4, "Monitoring with NetView for OS/2"*

Chapter 14. OS/2 TCP/IP to Print IPDS Files

> **What this Chapter Contains**
>
> This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04). Note that wherever you see an "NPM" reference like `NPM`, this means that the IBM Network Printer Manager can be used to perform some or all of the configuration steps.

`NPM—OS/2`

Use this checklist to configure OS/2 to print IPDS files on your IBM network printer.

If you want to configure OS/2 to format and print ASCII, PCL, or PostScript files, use the procedure in "Chapter 13. OS/2 TCP/IP to Print PCL and PostScript Files" on page 57.

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 as described in "Chapter 1. Start Here—Install the Network Interface Card (NIC)" on page 1.

2. If you do NOT have a DHCP server anywhere on your network, go to step 4 on page 62 . If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   - *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*

- *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
- *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

3. Using the printer operator panel, set up the printer for IPDS by setting the following parameters and values:

Menu	Item	Setting
ETHERNET or TOKEN RING	PERSONALTY	• AUTO, if you want to use the printer for other than IPDS printing • IPDS, for IPDS only
IPDS	EMULATION	4028
IPDS	FONTSUB	ON
Note: FONTSUB must be set to ON, else you may receive an error message when printing IPDS.		
IPDS	IPDS PORT	TRING, ETHER

4. If you want to change the MAC address to the LAA address and you did not do so in step 10 on page 2, then use the following procedure:

   a. Make sure an IP address has been assigned to the NIC. Refer to step 5.

   b. Login to the NIC using the procedure in *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*

   c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*

5. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.

   - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*

   - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:

     – *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN); then you need to use *ETR-04 section 22.6, "Setting Subnet Mask and Gateway Addresses with NPM"* or *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.

     – *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.

   - Optionally use *ETR-04 section 17.10, "Setting a Symbolic Name for an IP Address."*

6. Configure the printer for IPDS by doing the procedure in *ETR-04 section 14.3, "Configuring PSF/2 to Print IPDS Files."* You will need the following data:

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

7. If you want to, set up printer sharing by doing the procedure in *ETR-04 section 14.4, "Configuring PSF/2 for Printer Sharing ."*

8. Verify the PSF/2 configuration by sending a print job to the printer. Use the instructions in *ETR-04 section 14.5, "Verifying the PSF/2 Configuration."*

9. If you have problems, refer to "Handling TCP/IP Problems" on page 82.

Optional Steps

10. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

11. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

12. If you want to monitor your printers, refer to:
    - *ETR-04 section 22.1, "What is Network Printer Manager (NPM)?"*
    - *ETR-04 section 21.5, "Monitoring Network Printers on TCP/IP Networks"*
    - *ETR-04 section 21.4, "Monitoring with NetView for OS/2"*

Chapter 15. SUN Solaris to Format and Print PCL and PostScript Files

> **What this Chapter Contains**
>
> This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04).

Use this checklist to configure an IBM network printer to work in the SUN Solaris environment.

Requirements

You need SUN Solaris 2.3, 2.4, or 2.5.

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.

Required Steps

1. If you have not already done so, setup the printer and install the NIC as described in "Chapter 1. Start Here—Install the Network Interface Card (NIC)" on page 1.

2. If you do NOT have a DHCP server anywhere on your network, go to step 3. If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   - *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   - *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   - *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

3. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.
   - To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*
   - If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
     - *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN); then you need to use *ETR-04 section 22.6, "Setting Subnet Mask and Gateway Addresses with NPM"* or *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.

– *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.

- Optionally use *ETR-04 section 17.10, "Setting a Symbolic Name for an IP Address."*

4. Use the README file to install the printer driver and utilities for network printers or do the procedure in *ETR-04 section 15.3, "Installing the SUN Solaris Printer Driver."*

5. Configure your printer by doing the procedure in *ETR-04 section 15.4, "Configuring SUN Solaris."* The steps involved are:

   a. Change directories to:

      `/opt/ibmnp/admin`

      Note: You could also add this directory to your PATH environment variable.

   b. Enter the following command:

      `./IBMnpmenu`

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

   You will need the following data:

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.	

6. Verify the configuration by doing the procedure in *ETR-04 section 15.5, "Verifying a SUN Solaris Configuration."*

7. If you have problems, refer to "Handling TCP/IP Problems" on page 82.

Optional Steps

8. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*

9. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*

10. If you want to monitor your printer, refer to:

    - *ETR-04 section 21.5, "Monitoring Network Printers on TCP/IP Networks"*
    - *ETR-04 section 21.6, "Configuring AIX/UNIX for Syslog Support"*

Chapter 16. Windows NT on TCP/IP Networks

What this Chapter Contains

This chapter is an **extract** of the material in the chapter with the same name in **IBM Network Printers: Ethernet and Token Ring Configuration Guide**, 544-5240-04 (ETR-04).

Use this checklist to configure Windows NT 3.51 or 4.0 to print over a TCP/IP network to your IBM network printers.

Note: There are different ways of configuring Windows NT on TCP/IP networks. This checklist provides one example.

Requirements

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

- IBM printer driver for NT
- TCP/IP protocol
- Microsoft TCP/IP Printing

Configuration Checklist

Required Steps

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 1.

2. If you do NOT have a DHCP server anywhere on your network, go to step 3. If you DO have a DHCP SERVER anywhere on the network, go to *ETR-04 section 18.0, "Dynamic Host Configuration Protocol (DHCP) and BOOTP"* and determine what you should do by reading:

   - *ETR-04 section 18.1, "Industry Standards for Setting TCP/IP Addresses"*
   - *ETR-04 section 18.2, "Options for Configuring NICs for DHCP and BOOTP"*
   - *ETR-04 section 18.3, "Setting Dynamic IP Addresses with DHCP"*

3. If you want to change the NIC's MAC address, but did not do so using the printer operator panel (as described in step 10 on page 2), you can change the MAC address on Token Ring cards only by using one of the following procedures:

   - **Command Line**:
     a. Make sure an IP address has been assigned to the NIC. Refer to step 4.
     b. Login to the NIC using *ETR-04 section 25.2, "Logging into a NIC using TCP/IP Telnet."*
     c. Set the MAC to the LAA using the procedure in *ETR-04 section 17.4, "Setting the LAA from the Command Line."*
   - **NPM**:
     – Refer to the NPM NT help system to determine how to do this.

4. You need to assign an IP and maybe other TCP/IP addresses like subnet mask and gateway to the NIC.

67

- To assign TCP/IP addresses to a local printer now, you can use the printer operator panel by referring to *ETR-04 section 17.6, "Setting TCP/IP Addresses from the Printer Operator Panel."*
- If you have remote printers to which you want to assign TCP/IP addresses now, you need to use:
  - *ETR-04 section 17.7, "Setting an IP Address on a Local Segment with ARP"* to set the IP address, if the printers are all on the same local segment (LAN); then you need to use *ETR-04 section 22.6, "Setting Subnet Mask and Gateway Addresses with NPM"* or *ETR-04 section 17.8, "Setting Subnet Mask and Gateway Addresses from the Command Line"* to set subnet mask and gateway addresses.
  - *ETR-04 section 17.9, "Setting TCP/IP Addresses with BOOTP"* to set IP and other addresses if the printers are on a WAN.
- Optionally use *ETR-04 section 17.10, "Setting a Symbolic Name for an IP Address."*

5. Select one of the two procedures:
   - *ETR-04 section 16.3, "Configuring Windows NT 3.51 on TCP/IP Networks."*
   - *ETR-04 section 16.4, "Configuring Windows NT 4.0 on TCP/IP Networks"*

   The steps involved are:
   - Set up the NIC as an LPR port
   - Share the printer on the network

   You will need the following data:

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 *nn*".	
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.)	

6. If you have problems, refer to "Handling TCP/IP Problems" on page 82.

Optional Steps

7. If you are not using NetWare printing on your network, it can be disabled if you want to reduce traffic on your network by using the procedure in *ETR-04 section 20.1, "Disable NetWare if You're Not Using It."*
8. If you want to customize your NIC, refer to *ETR-04 section 20.0, "Customizing the NIC."*
9. If you want to monitor your printer, you can use IBM's Network Printer Manager (NPM) on an OS/2 or Windows NT machine. Refer to *ETR-04 section 22.7, "Monitoring with NPM in TCP/IP Environments."*

Chapter 17. Peer-to-Peer Attachments to IBM Network Printers

The other chapters of this configuration guide are primarily concerned with server-to-printer attachments. Use this chapter if you want to set up peer-to-peer attachments instead. By peer-to-peer attachments, we mean attachments where no file or print server is used to control printing; each workstation may serve as a mini-server (to share resources) and workstation (to use resources) at the same time.

The following topics are described here:
- First, we tell you about the limitations of peer-to-peer attachments.
- Second, we tell you about some of the ways of making peer-to-peer attachments.
- Third, we describe how peer-to-peer attachments are done for several of the standard peer-to-peer environments. We provide examples for native OS/2, WIN-OS2, and Windows 95.

Limitations of Peer-to-Peer Configurations

From the perspective of IBM network printer NICs, there are three principal limitations of peer-to-peer attachments:
- Small network requirements
- Lack of security
- Limited TCP/IP capabilities

Peer-to-Peer is for Small Networks

IBM network printers and the IBM NIC are intended for use mainly, though not exclusively, in large networking environments where security and traffic control are of primary concern.

Peer-to-peer printing is best used in a small, low-traffic LAN, where all users know each other. Because the NIC does not have the disk resources of a network server, large jobs or many jobs sent concurrently to the printer will probably cause the NIC to issue error messages such as "LPD Server is busy" or "Not responding".

Security Limitations

Similarly, in a peer-to-peer environment all security controls are bypassed. The printer may be used by anyone who configures their workstations for peer-to-peer.

TCP/IP Limitations

The IBM NIC provides support mainly for TCP/IP peer-to-peer connections. This means that the NIC supports peer-to-peer where workstation operating systems have at least the LPR function and a redirector, like LPRMON, as well. However, some workstation operating systems (such as Windows 95) come with only a limited TCP/IP capability, which requires the use of third-party LPR/redirector capabilities.

Forms of Peer-to-Peer Attachment

There are several ways of attaching IBM network printers to workstations in a peer-to-peer environment:

- Attaching a workstation to the printer's parallel port, then sharing the printer with other workstations.

> **Parallel Cable Recommendations**
> Please refer to "Parallel Cable Recommendations" on page 74 before making a parallel attachment.

- Attaching the printer through the NIC to the network, then using TCP/IP to send print jobs over the network to the printer.
- Some combination of these.

In this chapter, we describe the first two methods of attachment.

Table 9 summarizes the peer-to-peer attachment capabilities of the operating systems described in this book.

Table 9. Peer-to-peer Attachment Capabilities

Peer System	Default Peer-to-Peer Protocol	LPR/Redirector on OS
Apple	AppleTalk	No
Personal NetWare	IPX/SPX	No
OS/2 (Standard)	NetBIOS	Yes
OS/2 Warp Peer Service	NetBIOS	Yes
Windows for Workgroups	NetBEUI	No
Windows 95	NetBEUI	No
Windows NT	NetBEUI	Yes

Note: All peer-to-peer networking systems can attach their workstations to the network printer's parallel port, but this makes no use of the NIC.

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

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.
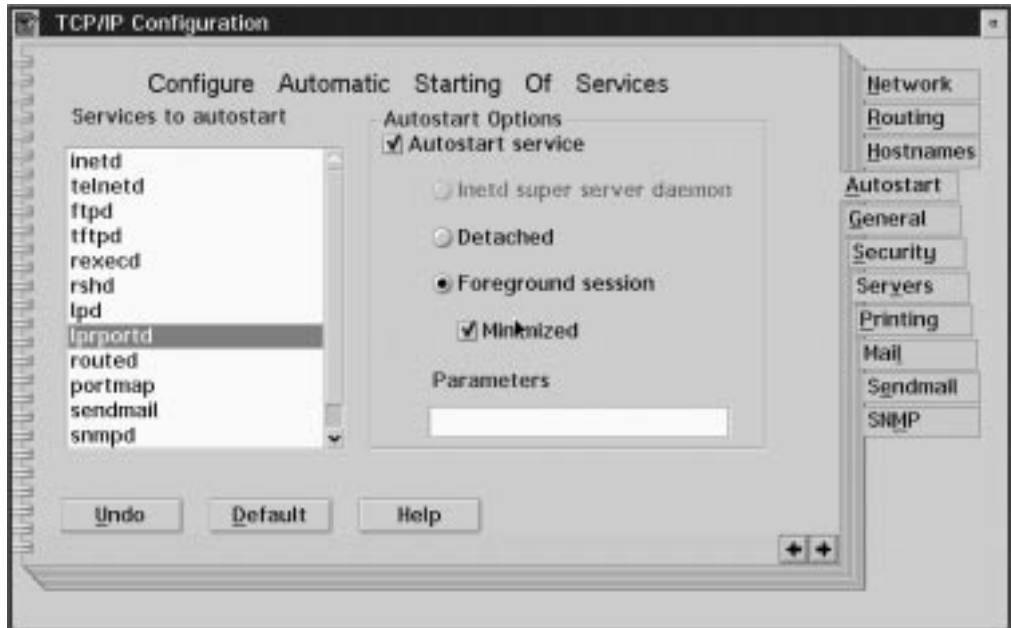
Configuring Peer-to-Peer for Native OS/2 Applications

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 1.

2. Assign an IP address (and maybe other TCP/IP addresses, like subnet mask and gateway) to the NIC using the instructions in *ETR-04 section 17.0, "TCP/IP Addresses."*

3. Use the README instructions to install the printer driver for OS/2 or use the instructions in *ETR-04 section 3.3, "Installing the Printer Driver for OS/2."*

4. Create a printer object on the OS/2 desktop. Define the Output port for that printer as port LPD*x*. (Refer to *ETR-04 section 13.4, "Installing the Printer using Standard OS/2 TCP/IP."*)

   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 1.

2. Assign an IP address (and maybe other TCP/IP addresses, like subnet mask and gateway) to the NIC using the instructions in *ETR-04 section 17.0, "TCP/IP Addresses."*

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 LPTn
    ```

    ip_address
    > IP address of the NIC.

    LPT*n*   Port number to be redirected. The port was defined at step 3. Even though you defined the port number at step 3 as LPT*n*.OS2, specify it here without the "OS2" suffix (that is, as LPT*n*). Caution should be used for LPT1 since the port may already be used for a locally attached printer.

    After the monitor is started, you can access the LPRMON window to view current print jobs.

5. From an OS/2 session, check the connection to the printer with a command like:

   ```
   copy filename lpt2
   ```

   Note: When you enter the command, the print job will display (perhaps only momentarily) in the LPRMON window.

Configuring Windows 95 Systems for Peer-to-Peer

This section describes how to configure the IBM network printers for a peer-to-peer network on Windows 95 workstations.

Note: The following material is also generally, though not necessarily specifically, applicable to Windows for Workgroups and Windows NT.

Microsoft Peer-to-Peer Documents

For detailed information on connecting Windows 95 machines in peer-to-peer relationships, access the following Web location to obtain the Microsoft Windows Peer-to-Peer publication:

```
http://www.windows95.com/connect/peercon.html
```

Note: IBM neither supports nor supplies this document, and makes no claims about its suitability for fulfilling your purposes.

To print to the network printers from Windows 95, you need one of the following:
- "Using the Printer's Parallel Port"
- "Using an LPR Port Driver" on page 74

Using the Printer's Parallel Port

To set up this option, you need to configure:
- The printer to which the printer is parallel attached
- Other machines that will use the printer

Configuring the Workstation with attached Printer
1. Connect the printer to the parallel port of the Windows 95 system.
2. Navigate your way through the **Settings**, **Control Panel**, then **Network** windows and verify that the following are installed:
   - Client for Microsoft Networks
   - An appropriate driver for your printer
   - An appropriate protocol for the other devices in your workgroup (for example, NetBEUI is the default for Windows networking)
   - File or printer sharing for Microsoft Networks
3. Share the printer by right-clicking the printer icon and then selecting **Sharing** from the drop-down menu.
4. Select **Shared as...** and enter the name by which this printer is to be known to other network users.
5. Verify that the "hand", which indicates that the printer is now shared, appears below the printer icon.

Configuring Workstations without an attached Printer

1. Select **My Computer, Printers**, then start the **Add a Printer** wizard.
2. Select **Network Printer**, then **Next**.
3. Enter the network path as follows:

   *machinename**printername*

   or browse the network to locate the printer you want to share.
4. Indicate whether or not you want this printer to be your default printer, then print a test page.

Using an LPR Port Driver

Another way of printing to IBM network printers from Windows 95 is to use an LPR port driver for Windows 95.

To use an LPR port driver, Windows 95 users must obtain a third-party LPR port driver since Windows 95 does not ship with an LPR spooler. You can obtain one vendor's Windows LPR Spooler from the Web at the following locations:

ftp://ftp.winsite.com/pub/pc/win3/winsock/wlprs41.zip

or

ftp://ich210.ich.kfa-juelich.de/pub/win31/wlprs41.zip

Note: The Windows LPR Spooler is neither supplied nor supported by IBM.

Once you have the Windows LPR Spooler (or equivalent), you can configure Windows 95 to use an IBM network printer in the following way:

1. You must set up the printer and install the NIC, as described in "Chapter 1. Start Here—Install the Network Interface Card (NIC)" on page 1.
2. Install the network printer on the LAN.
3. Assign an IP (and maybe other TCP/IP addresses such as subnet mask and gateway) to the printer using the instructions in *ETR-04 section 17.0, "TCP/IP Addresses."*
4. Install the Windows LPR Spooler on every Windows 95 workstation in the group and allow each workstation to send print jobs to the printer using LPR.

Parallel Cable Recommendations

This section describes IBM's recommendations concerning the parallel cable you use for attaching a printer directly to a PC.

The IEEE Standard 1284-1994 Parallel Cable

IBM recommends that the IEEE standard 1284-1994 compliant parallel cable be used to attach to the parallel port on all IBM network printers.

The IEEE standard 1284-1994 cables have the following characteristics:

- Bidirectional communication between host and printer using all available signals
- Improved signal integrity (more robust performance) protecting data from external electrical noise sources such as electrostatic discharge, EMI susceptibility, and so on.

- Longer cable lengths, up to three meters with a 1284-B printer connector
- Reduced EMI emissions ensuring that the IBM network printers comply with Title 47 of the Code of Federal Regulations (CFR)

Obtaining an IEEE 1284-1994 Cable

IBM believes that the use of the above cable type will result in improved printer quality and performance. These cables can be obtained from IBM. Following are the part numbers for the parallel cables for the network printers:

Table 10. IEEE 1284-1994 Compliant Parallel Cables

Printer	Part Number
4312	63H3329
4317	63H2804
4324	63H1994
4303	64H5827

Chapter 18. Troubleshooting NetBIOS, NetWare, and TCP/IP

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 the error codes for the following possible problems:
- 10 means an incorrect RMTSYS (V3R1 or V3R6) or RMTLOCNAME (V3R2 or V3R7) has been specified for the printer.
- 15 means that PSF/400 timed out waiting for the printer's response. You should check the value you entered for Activation Timer when using WRKAFP2 (V3R1 or V3R6), CRTPSFCFG (V3R2), or CRTDEVPRT (V3R7).
- 20-39 indicate general communications failure.
- 40-59 indicate a logic error between PSF and the printer control unit. Contact IBM support.

Spooled Print File Remains in PND Status

Check the output queue with the command:

```
WRKOUTQ OUTQ (queuename)
```

This typically indicates that PSF/400 is waiting for a response from the printer. This can be verified by displaying the QSPL subsystem, WRKACTJOB SBS(QSPL). If the status of the PDJ job for the printer is SELW, then PSF/400 is waiting for a response from the printer.

Data is Being Clipped

To resolve this problem, you may want to set the PSC (Page Size Control) parameter in WRKAFP2 (V3R1 and V3R6) or CRTPSFCFG (V3R2 or V3R7) to be set to *YES and the IPDSPASTHR parameter to be set to *NO.

Handling NetBIOS Problems

Use this section to resolve NetBIOS problems.

77

Network Setup

Before doing anything else to try to resolve problems, you should verify that NetBIOS is enabled on the NIC. To do that, obtain a NIC configuration page (refer to 11 on page 3).

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

NetBIOS Connectivity Problems

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

Refer to the "README file for LAN Server Printer Utility Version 3.0n1" that is on the CD-ROM (you can also obtain it from the Web) for additional information.

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's name.

Moving the Printer from one Network to Another

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

To resolve such a problem, perform the following procedure:
1. Logon to the NIC using the procedure in *ETR-04 section 25.1, "Logging into a NIC using NetWare IPX."*
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.

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

To determine whether a problem is a hardware problem or not, check the following:
1. Verify that power is going to the printer by checking the printer's operator panel.
2. Verify that the printer is Ready.
3. Verify that the NIC is installed in the printer by performing the procedure described in 11 on page 3.
4. Verify that the NIC is connected to the network. Refer to *ETR-04 section 1.9, "Physically Connecting a NIC to a LAN."*

   Note: If the printer's 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 required protocol is enabled on the NIC by printing a NIC configuration page (see step 11 on page 3).

- Verify that the required protocol is enabled on the system from which a print job is being sent.

From the NetWare client workstation, enter the following command:

```
nprint filename q=print_queue
```

filename
> Name of the file to print.

print_queue
> Name of the printer's queue.

Formatting Problems

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

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

Printing Problems

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

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

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

1. Capture a port with the command:

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

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

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

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

2. Print an ASCII file with the command:

   `copy file_name LPTn`

   n was assigned in step 1.

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=queuename l=n
```

to redirect the LPT*n* port to the specified queuename.

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

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

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. Verify that the NIC is connected to the network. Refer to *ETR-04 section 1.9, "Physically Connecting a NIC to a LAN."*

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 11 on page 3).

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:

Note: Before using the following command, a queue with *queuename* must be created.

```
lp -d queuename filename
```

queuename
      Name of the destination queue.

filename
      Name of the file to be printed.

From OS/2:

```
lpr -s ip_address -p PASS filename
```

ip_address
      IP address of the destination server.

PASS Destination printer name. Could also be TEXT.

filename
      Name of the file to print.

From Windows NT:

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

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

ip_address
      IP address of the destination server.

filename
> name of the file to print.

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. No other name can be used, that is, you cannot modify these names.
2. **TEXT** is used for print files that contain plain (raw), unformatted text with only carriage returns (CR) or carriage returns and line feeds (CRLF).
3. **PASS** is used for **binary** print files or files that are processed through any IBM printer driver to produce PCL or PostScript files.

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