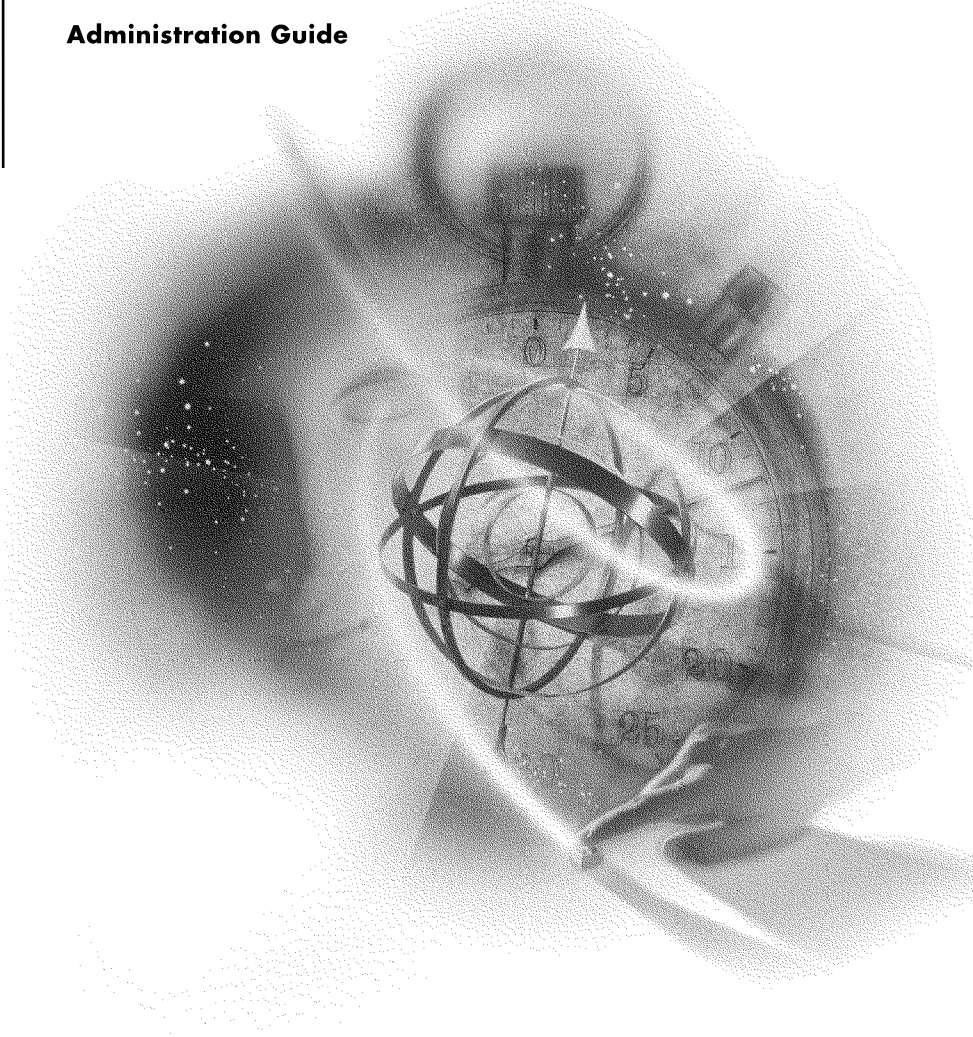


Queue-Based Printing

Administration Guide



NetWare[®] 5.1
NETWORKING SOFTWARE

Novell[®]

Legal Notices

Novell, Inc. makes no representations or warranties with respect to the contents or use of this documentation, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, Novell, Inc. reserves the right to revise this publication and to make changes to its content, at any time, without obligation to notify any person or entity of such revisions or changes.

Further, Novell, Inc. makes no representations or warranties with respect to any software, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, Novell, Inc. reserves the right to make changes to any and all parts of Novell software, at any time, without any obligation to notify any person or entity of such changes.

This product may require export authorization from the U.S. Department of Commerce prior to exporting from the U.S. or Canada.

Copyright © 1993-2000 Novell, Inc. All rights reserved. No part of this publication may be reproduced, photocopied, stored on a retrieval system, or transmitted without the express written consent of the publisher.

U.S. Patent Nos. 4,555,775; 5,157,663; 5,349,642; 5,455,932; 5,553,139; 5,553,143; 5,594,863; 5,608,903; 5,633,931; 5,652,854; 5,671,414; 5,677,851; 5,692,129; 5,758,069; 5,758,344; 5,761,499; 5,781,724; 5,781,733; 5,784,560; 5,787,439; 5,818,936; 5,828,882; 5,832,275; 5,832,483; 5,832,487; 5,859,978; 5,870,739; 5,873,079; 5,878,415; 5,884,304; 5,893,118; 5,903,650; 5,905,860; 5,913,025; 5,915,253; 5,925,108; 5,933,503; 5,933,826; 5,946,467; 5,956,718; 5,974,474. U.S. and Foreign Patents Pending.

Novell, Inc.
122 East 1700 South
Provo, UT 84606
U.S.A.

www.novell.com

Queue-Based Printing Administration Guide
January 2000
104-001229-001

Online Documentation: To access the online documentation for this and other Novell products, and to get updates, see www.novell.com/documentation.

Novell Trademarks

For a list of Novell trademarks, see the final appendix of this book.

Third-Party Trademarks

All third-party trademarks are the property of their respective owners.

Contents

	Overview of Queue-Based Print Services	11
1	Understanding	13
	Overview of Queue-Based Network Printing	13
	Step 1: Print Data Is Generated and Transmitted	14
	Step 2: Data Is Redirected to a Network Queue	15
	Step 3: Data Is Stored in a Print Queue	16
	Step 4: Print Data Is Transmitted to a Printer Station	16
	Step 5: Print Data Is Transmitted to the Printer	17
	Step 6: The Printer Formats the Data and Completes the Print Job	18
2	Planning	19
	Queue-Based Printing Enhancements Since NetWare 3	19
	Directory Services	19
	Quick Setup	20
	Individual Objects	20
	New Management Tools	20
	Cross-Platform Support	20
	Centralized Administration	20
	Polled Mode	20
	Other Changes You Must Plan For	21
	Different Configuration Locations	21
	New Database Formats	21
	Relocated Print Job Configuration Databases	22
	Relocated Print Device Databases	22
	Bindery Services	23
	Typical Network Printing Setups	23
	Simple Printing Setup	24
	Mid-Range Printing Setup	24
	Advanced Printing Setup	25
	Printing Task List	26
3	Setting Up	29
	Setting Up Queue-Based Print Services	29
	Using Quick Setup	30
	Adding Printing Objects	31
	Tailoring Your Printing Setup	32
	Creating Print Queues	33
	Setting Up Print Servers	37

Creating Printers	38
Assigning Print Queues to Printers	40
Assigning Printers to Print Servers	42
Setting Up Printers Attached to Workstations or Servers	43
System Requirements for Using NPRINT	44
Printer Cabling Options	44
New NPRINT Features Since NetWare 3	45
Setting Up Printers Attached to DOS and Windows 3.x Workstations	45
Printing Tasks Handled through NPRINT.EXE	46
Command Syntax	47
Running Port Drivers from Local Drives	48
Running Port Drivers on DOS or MS Windows Workstations	48
Setting Up Printers Attached to Windows 95 Workstations	51
Sharing a Printer Attached to a Windows 95 Workstation	51
Managing NPRINT Manager and the Shared Printer	54
Running NPRINT Manager from a Local Drive	55
Setting Up Network Printing on a Windows 95 Workstation	57
Setting Up Printers Attached to Servers	57
Printing Tasks Handled Through NPRINT.NLM	58
Loading NPRINT.NLM	58
Setting Up Network-Attached Printers	60
Remote Printer Mode	61
Queue Server Mode	61
Setting Up Print Services in Bindery Mode	63
Referencing Bindery Queues	63
Understanding Bindery Reference Queues and Reference Print Servers	66
Additional Setup Tasks	66
Task 1: At the Netware server console, load PSERVER.NLM.	66
Task 2: At a DOS or Windows 3.x workstation running Novell Client with a printer attached, load NPRINT.EXE.	67
Task 3: At a Windows 95 workstation running Novell Client with a printer attached, run NPTWIN95.EXE.	67
Setting Up CAPTURE for Applications Not Designed for Network Printing	67
Printing Tasks Handled through CAPTURE	68
Command Syntax for Using CAPTURE	68
Command Parameters for Using CAPTURE	69
Using CAPTURE When Printing to a Network Printer	74
Using CAPTURE When Printing to a Different NDS Context	76
Using CAPTURE When Using Print Job Configurations in a Different Context	77
Adding CAPTURE to Login Scripts	78
Tips on Using CAPTURE	79

4 Optimizing	81
Optimizing Network Printing Performance.	81

Parallel Versus Serial Ports	82
Selecting the Best Type of Printers for Your Setup.	82
Estimating Data Transmission Rates.	83
Software Version Incompatibilities	84
Document Type	84
Printer Configuration	84
Polled versus Interrupt Mode	84
Buffer Size	85
Timer Tick Values	85
Queue Sampling (Polling) Interval	86
Computer Type.	86
Printer Languages	87
Overburdened Servers or High Network Traffic	88
Application and Driver Software	88
Printer and Data Type	89
Suggestions	90
Improving Output by Adding Resources	90
Preventing Printer Problems	91
Preventing Problems with Laser Printers	91
Preventing Problems with Dot Matrix Printers	92
5 Managing	93
Overview of Queue-Based Printing Tasks	93
Managing Your Printing Objects	95
Moving Printing Objects	96
Viewing the Assignments for Printing Objects	96
Renaming Printing Objects	97
Deleting Printing Objects	97
Managing Printers	98
Configuring Printers	98
Viewing or Modifying a Printer's Status	101
Changing Printer Type	104
Specifying Printer Features	105
Managing Printer and Job Event Notification	107
Changing a Print Queue's Priority	109
Designating a New Default Print Queue	109
Managing Print Queues	110
Assigning Queue Operator Flags.	110
Viewing or Modifying Print Jobs	110
Viewing Details of Print Jobs	111
Viewing or Changing the List of Users for a Print Queue.	112
Viewing or Changing the List of Operators for a Print Queue	113
Managing Print Server Functions	113
Printing Tasks Handled through the Print Server.	114

New Print Server Features Since NetWare 3	114
System Requirements for Managing the Print Server	117
Managing Print Servers in NetWare Administrator	117
Viewing Your Printing Layout and Status	117
Print Layout Features	118
Enabling and Viewing the Print Server Auditing Log	119
Procedure	120
Adding, Changing, and Removing Print Server Passwords	122
Unloading Print Servers	123
Managing Print Servers at the Server Console	123
Command Syntax for Managing the Print Server at the Console	124
General Print Server Management Functions Available at the Console	124
Managing Printers from the Print Server Console	127
Servicing NetWare 5 Clients and Queues with a NetWare 3 Print Server	131
Managing Print Job Configurations	131
New Print Job Configuration Features Since NetWare 3	132
Location of Print Job Configuration Databases	132
Creating Print Job Configurations	133
Viewing or Modifying Print Job Configurations	136
Selecting a Default Print Job Configuration	137
Managing Printer Forms	137
Creating Printer Forms	138
Mounting Printer Forms	140
Procedure Using NetWare Administrator	140
Procedure Using PSERVER	141
Viewing or Modifying Printer Forms	141
Deleting Printer Forms	142
Managing Print Device Definitions	142
Location of Print Device Databases	143
More Information	144
Creating Print Device Definitions	144
Viewing or Modifying Print Device Definitions	145
Procedure	146
Creating or Modifying Print Device Functions	147
Procedure	147
Importing Print Device Definitions	148
Procedure	148
Exporting Print Device Definitions	150
Managing Print Device Modes	151
Creating Print Device Modes	151
Viewing or Modifying Print Device Modes	152
Procedure	152
Sending Jobs to Printers Using NPRINT	153
Command Syntax for Using NPRINT	153

Command Parameters for Using NPRINT	154
Tips on Using NPRINT	157
6 Troubleshooting	159
Troubleshooting Print Server Problems	159
Troubleshooting General Printing Problems	159
Troubleshooting Flow Charts	160
Troubleshooting Notes	160
No Printer Output: Troubleshooting Flowchart	162
Incorrect or Slow Printer Output: Troubleshooting Flowchart	164
1. Determining the Printer Language of Your Print Job	166
2. Determining the Printer Languages Your Printer Supports	167
3. Checking Your Non-Network (Local) Printer Setup	167
Insufficient Printer Memory	167
Incompatible Printer Language Versions	168
Interrupt Conflicts	168
Cabling Problems	168
Incorrect Printer Configuration	168
Faulty Hardware	169
4. Determining Whether Your Job is an ASCII Text File	169
5. Checking the Contents of Your Job for Incorrect Control Sequences	170
6. Determining Whether Your Job is Currently in the Print Queue	171
7. Determining Whether Your Job Ever Reached the Print Queue	171
8. Determining Where Your Job Was Sent	172
9. Activating Jobs on Hold Status	172
10. Troubleshooting Jobs Stuck in Active Status	173
11. Troubleshooting Jobs Stuck in Ready Status	174
12. Troubleshooting Jobs Stuck in Adding Status	174
13. Using CAPTURE to Redirect Parallel Ports to Network Queues	174
14. Troubleshooting Jobs Printed Slowly	175
15. Determining Whether a Printer is Connected as a Network Printer	175
16. Troubleshooting Jobs Printed in Pieces on Separate Pages	176
17. Determining the Status of Your Print Job	176
18. Solving NetWare Printing Problems When Running MS Windows	176
19. Isolating Bad Hardware or Corrupt Software	177
Troubleshooting Printers	178
General Printer Troubleshooting	178
Troubleshooting Laser Printers	179
Troubleshooting Dot Matrix Printers	180
Troubleshooting Network-Related Printer Problems	181
Troubleshooting Tips for Administering Printer Stations	181
Printing is Slow Using NPRINT.EXE as a Remote Network Station	182
The Message Printer is not connected Appears on the Console Screen	182
Remote Serial Printer Self-Tests Successfully But is Not Working as Network Device	182

NPRINTER.EXE Does Not Initialize or Hangs Periodically at Random	183
Workstation Hangs When NPRINTER Loads	184
Print Jobs are Ruined When Printing Locally	184
NPRINTER Cannot Reconnect to Print Server that was Downed and Loaded on Different NetWare Server 184	
Port Driver Status is Waiting for Job But Printer is Not Attached	185
NPRINTER.EXE Does Not Run from Local Drive	185

A Novell Trademarks 187

Overview of Queue-Based Print Services

Queue-based print services represent the traditional or legacy implementation of print services provided through NetWare.

To install a printer on the network using queue-based technology, the system administrator must create a Print Queue, Print Server, and Printer object, link them together, and then manage them for each printer on the network. To print, users must install the specific printer drivers, capture a port to that printer, and then wait for their print job to be sent and queued to the printer. While this complicated system works well, its management can be time-consuming and troubleshooting problems with the system can be tedious.

We recommend that you become familiar with Novell's new generation printing architecture, NDPS, which is included with NetWare 5, and begin the process of moving your existing printing resources to this new system. For more information about NDPS, you should view the multimedia Introduction to NDPS that can be accessed from the main browser view for the NetWare 5 documentation set.

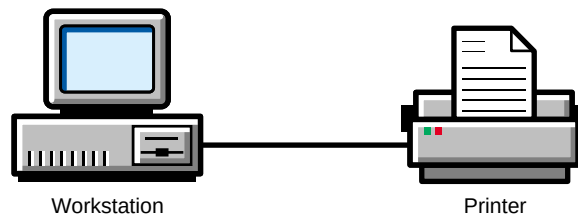
1

Understanding

The architecture of Novell legacy queue-based print services is based on the creation and linking of three components: printers, print queues, and print servers. Administrators create and link print queues, printers, and print servers; then users submit print jobs to the queues. In order to print, users first must capture the printer port and then the client redirects the data to a file in a print queue where it is stored while waiting to be sent to a printer by the print server.

Overview of Queue-Based Network Printing

To users not familiar with network printing, the printing process may seem fairly simple. In non-network printing, data is generated on a stand-alone computer and then sent to a printer cabled directly to the computer.



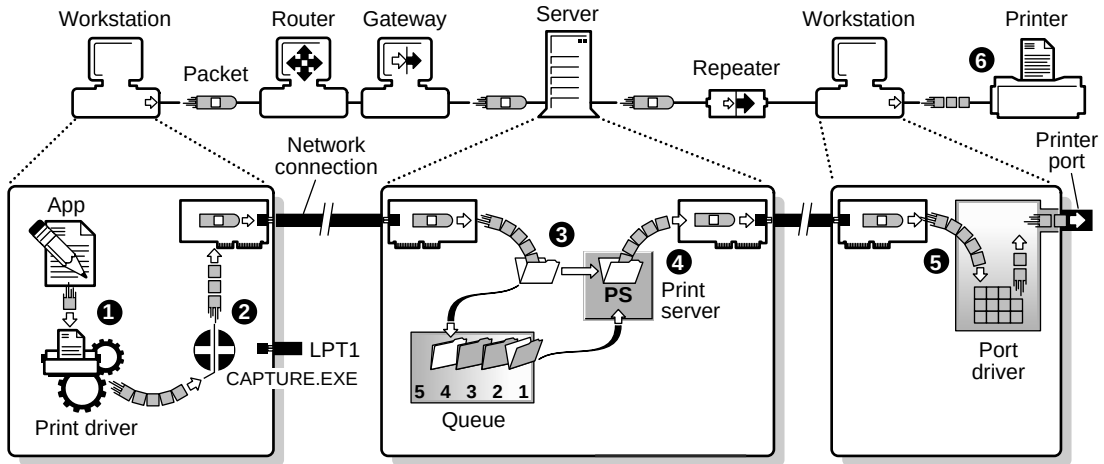
In network printing, printers are often shared and several intervening steps must take place (see “A Typical Network Printing Setup” on page 14):

- ♦ Storage
- ♦ Intermediate processing
- ♦ Transmission between various processing locations

These steps can greatly affect the complexity of the print job's journey and the time it takes for a print job to arrive at the printer.

Each step in the printing process affects the time necessary for a print job to be completed at the printer. The following scenario describes a typical path print data might follow during this process.

Figure 1 A Typical Network Printing Setup



Step 1: Print Data Is Generated and Transmitted

1. The application compiles the data entered by the user and passes it on to a print driver.

Initially, there is only an application data file or possibly a document file with imbedded image definition data. No print data yet exists.

2. A print driver generates the actual printer data and passes it toward LPT1.

The driver may be part of the application software, or may have been supplied with the operating system, or may have come from a third party. Print data now exists in one of the formats described in “Printer Languages” on page 87.

The speed at which print data can be generated varies greatly. As complexity increases with additional formatting and graphical requirements, the time required to generate print data increases. Streams

of simple text characters are created almost instantaneously on modern systems. Formatted text, which requires precise alignment of varying fonts and sizes, produces higher quality output but is more complex and takes longer to generate. Some types of graphics are so complex that they may require hours for a single image to be generated.

Step 2: Data Is Redirected to a Network Queue

In non-network printing, data generation and transmission can be nearly simultaneous on a single computer. However, during network printing, data is not sent directly to a printer as it is in non-network printing. Instead, the data is redirected to a file in a print queue where it is stored while waiting to be sent to a printer.

Redirection of print data and storage in a queue has several advantages for network users:

- ♦ The application and the user can resume work without waiting for the printer to complete a print job.
- ♦ Multiple users can share a single printer.
- ♦ Users can send jobs to printers at different locations.
- ♦ Print jobs can be sequenced so that high priority jobs are sent to the printer first.
- ♦ Large print jobs can be stored until they can be printed at a time (such as after normal work hours) that does not disrupt other printing.

With NetWare[®], sending a print job to a queue can be accomplished in two ways:

- ♦ Manually via the NPRINT utility
- ♦ Automatically via the CAPTURE utility, which intercepts the data headed toward LPT1 or other parallel ports.

In either case:

1. The data is assembled into small packets, which are labeled and passed to a network interface board and the associated driver software.
2. At the network interface, each packet is transmitted toward the destination file server that will store the data.
3. The individual packets travel over the network medium, possibly having to traverse repeaters, routers, gateways, and bridges along the way.

4. Upon the data's arrival at the destination NetWare server, another network interface (board and software) receives each packet of data, and may also check the packets for transmission errors and/or send acknowledgments back to the sending interface.

Step 3: Data Is Stored in a Print Queue

1. Each packet of data is then passed to the file storage area. At the NetWare server, the data packets are stripped of their labeling information and stored as a file on the server's hard drive.

It is important that any data storage area be large enough to hold both the largest print job likely to be stored and all the print jobs likely to be queued up at any one time on a busy day.

2. When the data for a complete job has all been received and stored, the file is closed and the filename is added to the queue associated with the printer.

At this point, the application and user are able to resume work.

3. The stored print job waits in the queue until the print server is able to transmit it to a printer.

If a print job is behind another job in the queue, the associated print server will request and receive the data file information immediately upon completion of the preceding job. The delay can be long if there are many other print jobs waiting in the print queue, or if the user stipulated that this job should print at some particular time in the future.

However, if the queue was empty when the completed data file name was passed to NetWare queue management system, the associated print server requests the data file information after the next predefined sampling interval. The default sampling interval is 15 seconds, but can be altered in NetWare Administrator.

Step 4: Print Data Is Transmitted to a Printer Station

1. After the print server receives the print job information, it begins reading the print data from the queue.
2. The print server assembles the data into small packets, labeling each and passing them to a network interface board and associated software.
3. The individual packets are transmitted over the network to the printer station, possibly traversing repeaters, routers, and bridges along the way.

As the packets are sent, the print server gets packets back from the printer station containing information about the status of the printer, the amount of data that has actually been sent to the printer, and how many packets the print station currently has room to receive.

Step 5: Print Data Is Transmitted to the Printer

The following discussion describes one of several printer configurations.

1. At the workstation the printer is attached to, a network interface board (and associated driver software) receives each packet of data, possibly checking the packets for transmission errors and sending acknowledgments back to the sending interface.
2. The packet labels are removed, the workstation's foreground task is interrupted, and the print data is passed to the port driver (NPRINTER).
3. When NPRINTER is loaded, the printer port is initialized and the interrupts are enabled. If the printer is not busy, one character is printed. Control is returned to the workstation's foreground task.
4. After each character is accepted by the printer, a hardware interrupt returns control to the port driver long enough to send one more byte.
 - ♦ If configured not to use interrupts (polled mode), NPRINTER instead gets control once each clock tick (18.2 ticks per second) and makes a fixed number of attempts to send bytes before relinquishing control to the foreground task for the remainder of the clock tick period.
 - ♦ If the byte is sent through a parallel port, it is put on the port and a strobe signal is sent. Later, a corresponding return signal notifies the hardware that the printer is ready for more, generating the hardware interrupt mentioned in the preceding paragraph.
 - ♦ Bytes transmitted through a serial port are passed at a fixed rate, one bit at a time, until all bits have been sent (assuming that all handshaking has occurred properly). The serial port generates the interrupt mentioned earlier when all bits have been sent. Additional hardware signals or characters sent back from the printer are monitored by NPRINTER to verify the printer's readiness for more data.

Ideally, the time that NPRINTER is taking control of the workstation to transfer data to the printer is spread out and small enough that the interference is rarely noticed by the user.

Step 6: The Printer Formats the Data and Completes the Print Job

1. Data travels by cable to the printer, where it is stored until enough data has been accumulated and converted to complete a single physical cycle.

The cycle for a laser printer is a full page; the physical cycle for most other printers is one pass of a print head. The formatting process can be brief or lengthy depending on the type of data being processed.

Data is usually transmitted to a printer via a Centronics-type parallel port or an RS-232 type serial port, depending on the printer type used.

2. During this process, the computer communicates with the printer, waiting for a ready signal between each byte that is sent.

Usually the computer spends much more time waiting than sending. However, it is possible to take advantage of these delays. Allowing the CPU to handle the user's foreground tasks during these large delays is what makes it possible for the printer's background task to operate with little apparent interference.

NOTE: If the printer has insufficient memory to store new data until the physical cycle has finished with the old data, the printer may signal NPRINTER to suspend transmission during each cycle.

3. When the last physical cycle of the printer is complete, the print job is done.

2

Planning

NetWare® 4™ and NetWare 5™ print services represent a significant advancement in both performance and versatility from NetWare 3™ print services. These advancements include the development of NDS (the directory service that has become the standard for the industry) and the central administration and control that it provides, a Quick Setup function, new management tools, cross-platform support, and bi-modal utilities.

Queue-Based Printing Enhancements Since NetWare 3

The following sections describe major enhancements incorporated into NetWare queue-based print services beginning with NetWare 4.

- ♦ “Directory Services” on page 19
- ♦ “Quick Setup” on page 20
- ♦ “Individual Objects” on page 20
- ♦ “New Management Tools” on page 20
- ♦ “Cross-Platform Support” on page 20
- ♦ “Centralized Administration” on page 20
- ♦ “Polled Mode” on page 20
- ♦ “Other Changes You Must Plan For” on page 21

Directory Services

NetWare 5 uses a framework for handling network resources that is much different from that used by NetWare 3. A replicated and distributed database replaces the NetWare 3 bindery as the storage medium for network information.

This database, part of the NDS™ technology, organizes network components, such as servers, printers, and network users, as objects within a hierarchical tree structure.

Quick Setup

The Print Services Quick Setup option in NetWare Administrator provides a simple way to get your initial printing setup running quickly.

Individual Objects

In NDS, the queue-based printing objects (print server, print queue, and printer) are individual objects. They can be created and modified in any order with NetWare Administrator.

One advantage this change provides is that your queue-based printing users never need to know about print queues or print servers in NetWare 5. Users can send their print jobs directly to a printer by specifying the printer name.

New Management Tools

NetWare 5 provides a wide variety of tools not available in NetWare 3 to manage these network objects, including NetWare Administrator, which lets you define objects and navigate through the tree structure using a graphical user interface.

Cross-Platform Support

In addition to DOS and MS Windows, NetWare 5 queue-based print services can support Macintosh and UNIX clients.

Centralized Administration

You can create a NetWare 5 queue-based print server that replaces NetWare 3 print servers. NetWare 5 queue-based print servers can service queues on NetWare servers that have not yet been upgraded to NetWare 5.

In addition, remote printers and direct-connect printers configured in NetWare 3 can communicate with NetWare 5 print servers.

Polled Mode

Polled mode is now supported and is the default for printer configurations. Users can now get their printer running without having to worry about which interrupt the port is set to or whether the port supports interrupts. This means

that you can now get your printers running much more quickly and easily. Then, if you want to find out whether interrupts will increase performance, you can reconfigure your system when time allows.

Other Changes You Must Plan For

The following sections explain other differences between NetWare 3 and NetWare 5 queue-based printing.

- ♦ “Different Configuration Locations” on page 21
- ♦ “New Database Formats” on page 21
- ♦ “Relocated Print Job Configuration Databases” on page 22
- ♦ “Relocated Print Device Databases” on page 22
- ♦ “Bindery Services” on page 23

Different Configuration Locations

The introduction of NDS affects the way configuration information is stored.

- ♦ In NetWare 3, the print server's configuration information was stored in SYS:SYSTEM. In NetWare 5, configuration data is stored as objects in NDS. For example, in NetWare 3, printers were print server attributes; in NetWare 5, printers are NDS objects.
- ♦ In NetWare 3, print job configurations were stored as database files in the users' subdirectories in SYS:MAIL. In NetWare 5, you can create both *public* (or *global*) and *private* databases. Private databases are still created by users and are stored as attributes of user objects. The public databases are created by the network supervisor to be used by all users, and are stored as attributes of container objects.
- ♦ In NetWare 3, database files (containing print device definitions and printer form definitions) were stored as a file in SYS:PUBLIC. In NetWare 5, the database is stored as an attribute of a container object.

New Database Formats

The format of the databases has changed. In bindery mode, the new databases have new names so there is no confusion between them and the old databases. In NDS, the new databases are now attributes of objects.

For information on the name and location of these databases, see the following sections, “Relocated Print Job Configuration Databases” on page 22 and “Relocated Print Device Databases” on page 22

If you are not using UNIX or any third-party utilities that require the NetWare 3 databases, we recommend that you delete the old databases. But if you do have these third-party utilities, you will need to keep the old databases because the new ones have a new format that the utilities may not be able to read.

The old and new databases can coexist. If you want to maintain the old ones and have been using NetWare utilities to do it, you should use the NetWare 3 utilities to maintain them. Use the NetWare 5 utilities to maintain the NetWare 5 databases. However, there is little reason to maintain NetWare 3 databases.

Switching to bindery mode in the new utilities will not maintain the old databases. Bindery mode allows you to maintain a bindery version of the new databases.

Relocated Print Job Configuration Databases

Both the format and location of the database for print job configurations have changed for NetWare 5:

- ♦ In NetWare 3, the job configuration database was
SYS:MAIL*username*\PRINTCON.DAT.
- ♦ In NetWare 5 in NDS, the database is an attribute of a Container object or User object. Configurations can be modified through the the Print Job Configurations dialog for the Container object in NetWare Administrator.
- ♦ In NetWare 5 bindery mode, the public database is
SYS:PUBLIC\PRINTJOB.DAT

The private database is

SYS:MAIL*username*\PRINTJOB.DAT

Relocated Print Device Databases

The print device definitions supplied in NetWare 5 are copied to the SYS:PUBLIC directory during installation. Additional device definitions imported or created are also stored in this directory unless you specify another location.

Both the format and location of the print device database have changed for NetWare 5.

- ♦ In NetWare 3, the database for print device definitions is
SYS:PUBLIC\NET\$PRN.DAT

- ♦ In NetWare 5 in NDS, this database is an attribute of a container object. Print device definitions can be accessed through the Print Devices dialog for the Container object in NetWare Administrator.
- ♦ In NetWare 5 bindery mode, the database is
SYS:PUBLIC\PRINTDEF.DAT

Bindery Services

NetWare 5 maintains compatibility with previous versions of NetWare clients. NetWare's bindery services provide access to NetWare 3 objects such as users and servers.

For example, all network objects in bindery mode must reside at levels defined by the bindery context that applies to the server. The bindery context of the server is set by an entry in its AUTOEXEC.NCF file (or manually by using the SET BINDERY CONTEXT command).

Typical Network Printing Setups

This section outlines general principles that can be of value for a variety of network printing configurations.

NetWare 5 queue-based print services requires that you create at least one of each of the three printing objects:

- ♦ Print queue
- ♦ Print server
- ♦ Printer

The following three examples show how the three printing objects can be arranged as you require.

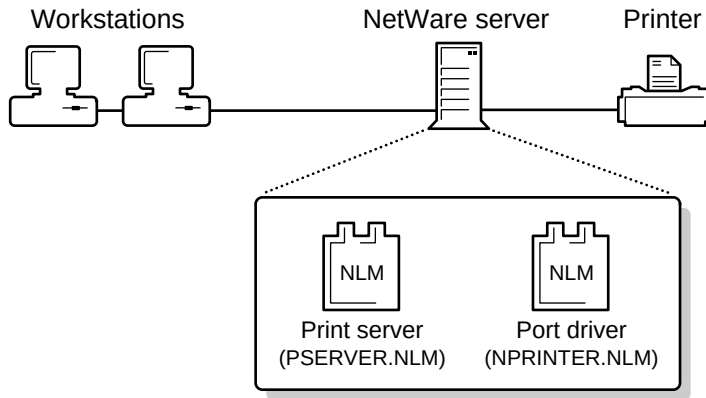
- ♦ “Simple Printing Setup” on page 24
- ♦ “Mid-Range Printing Setup” on page 24
- ♦ “Advanced Printing Setup” on page 25

You may use NetWare Administrator to set up any of the layouts described in the following pages. The easiest way to get a printing setup up and running is by using a quick setup feature in NetWare Administrator (see “Using Quick Setup” on page 30).

Simple Printing Setup

In this setup, a printer is cabled to the printer port of a NetWare server running PSERVER.NLM. When sending a print job, users can select a printer by name, or they can specify a print queue.

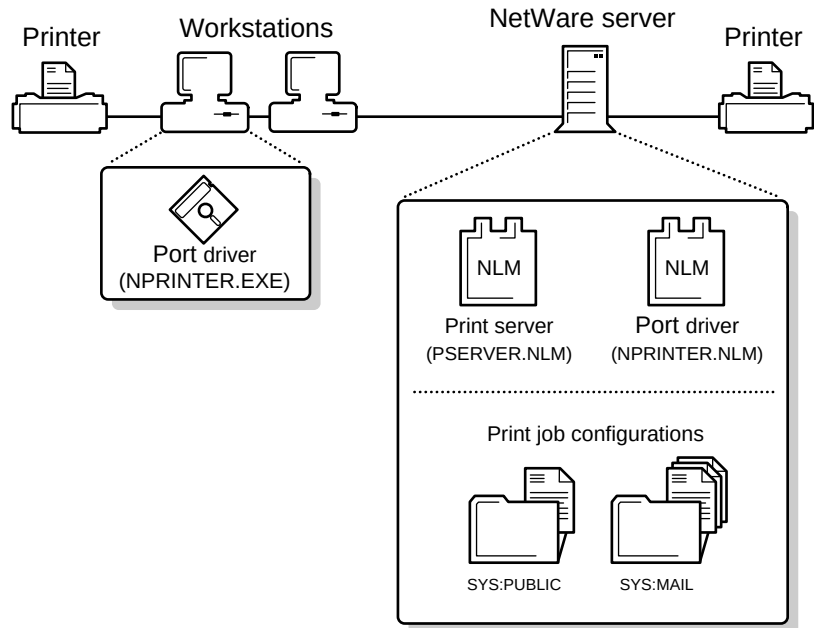
Figure 2 Simple Printing



Mid-Range Printing Setup

NetWare print services allow some printers to be cabled to workstations and some to a NetWare server. To automate printing, users can specify printer, banner page, tabs, and other options by using print job configurations. Print job configurations are groups of print job options that simplify using CAPTURE and NPRINT. Print job configuration information is stored for users (private) or container objects (public).

Figure 3 Mid-Range Printing

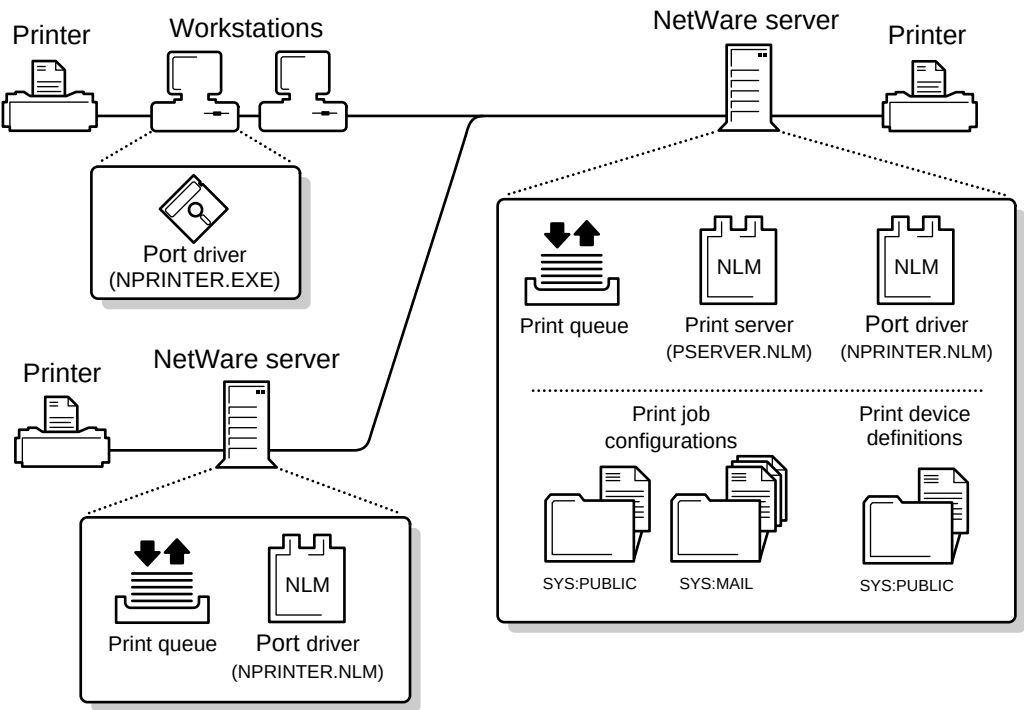


Advanced Printing Setup

A complex printing environment may use any combination of these features:

- ♦ One printer assigned to service multiple print queues. Both NetWare 3 and NetWare 4 print queues may be used.
- ♦ Multiple printers assigned to service one print queue
- ♦ Various print job configurations
- ♦ Printer reset at the end of print jobs
- ♦ Printer definitions (if your application does not format print jobs for a specific printer, NetWare provides print device definitions for many common printers)
- ♦ Multiple printing environments (such as AppleTalk* printers, UNIX printers, or printers attached directly to the network cabling)
- ♦ Multiple print servers

Figure 4 Complex Printing



Printing Task List

The following table lists many of the major printing tasks you will need to perform on your network and indicates the NetWare utilities you can use to perform them.

Table 1 Printing Tasks

Task	Utility
Assign Print Queue objects to printers.	NetWare Administrator (Printer object)
Assign Printer objects to print servers.	NetWare Administrator (Print Server object)
Control printer and print server.	NetWare Administrator, PSERVER

Task	Utility
Create, assign, modify, or delete Print Queue, Print Server, and Printer objects.	NetWare Administrator
Create print jobs.	CAPTURE, NPRINT
Customize print job characteristics with print job configurations.	NetWare Administrator (User, Organization, and Organizational Unit objects)
Customize printer characteristics with printer forms and print devices (printer definition files).	NetWare Administrator (Organization and Organizational Unit objects)
Delete, modify, or reorder print jobs.	NetWare Administrator
Get configuration layout and status of printing.	NetWare Administrator
Monitor printer and print server.	NetWare Administrator, PSERVER
Monitor print jobs.	NetWare Administrator, PSERVER
Print files.	CAPTURE, NPRINT
Run print server on NetWare server.	PSERVER
Run network printer on NetWare server.	NPRINTER.NLM
Run network printer on a DOS workstation.	NPRINTER.EXE
Run network printer on a Windows 95 workstation.	NPRINTER Manager for Windows 95 (NPTWIN95)

3

Setting Up

NetWare queue-based print services requires that you create a Print Server object, a Printer object, and a Print Queue object in order for network users to share printers. You can perform these tasks in the graphical NetWare Administrator utility.

Setting Up Queue-Based Print Services

The Print Services Quick Setup feature in NetWare Administrator can automatically create the following printing objects with default settings and assignments. (See “Using Quick Setup” on page 30.)



Print Server



Printer



Print Queue

If you prefer to create your printing objects and configure them manually to your specific needs, see the following discussions:

- ♦ “Creating Print Queues” on page 33
- ♦ “Setting Up Print Servers” on page 37
- ♦ “Creating Printers” on page 38
- ♦ “Assigning Print Queues to Printers” on page 40
- ♦ “Assigning Printers to Print Servers” on page 42
- ♦ “Setting Up Network-Attached Printers” on page 60
- ♦ “Setting Up Printers Attached to Workstations or Servers” on page 43

- ♦ “Setting Up Printers Attached to DOS and Windows 3.x Workstations” on page 45

NOTE: If you upgraded from a previous version of NetWare that used print services, your printing environment should already be installed. In this case, the procedures described here are unnecessary.

After you finish the quick or manual setup, complete the tasks outlined in the “Additional Setup Tasks” on page 66 section.

After experimenting with the resulting setup, you will probably want to tailor the configuration to match your specific needs. See “Tailoring Your Printing Setup” on page 32.

Using Quick Setup

Use the Quick Setup option to define your initial Print Server, Printer, and Print Queue objects and assign a print queue to a printer.

- 1 Install your printer.
- 2 Log in to the NetWare server as user ADMIN or equivalent.
- 3 Run Windows, and then run NetWare Administrator.
- 4 From the Tools menu, choose Print Services Quick Setup.
- 5 In Print Server Name, type a name for this Print Server object (or browse to an existing print server).
- 6 In Printer Name, type a name for this Printer object.
- 7 Choose Create.
- 8
Make sure you follow standard object naming conventions.
- 9 In Type, choose the type of communication used by the printer.
If the printer is attached directly to the network, choose Other/Unknown.
- 10 (Conditional) If a dialog box appears, check the communication settings and make any needed changes.
For help with the settings, choose Help.
- 11 Under Print queue in Name, type a name for the new Print Queue object.
Again, make sure you follow standard object naming conventions.

12 In Volume, type the complete name of the volume to create the physical queue on, or choose the browse button to choose from the available volumes.

13 Choose Create.

14 At the console of the NetWare server that you want to become the print server, load PSERVER.NLM.

When prompted for the Print Server name, type in the complete name of the object you created in Step 1, or press Insert to browse the tree for it.

15 Load the printer driver.

- ♦ If the printer is attached to a DOS workstation, run NPRINTER.EXE on the workstation.
- ♦ If the printer is attached to a Windows* 95* workstation, run NPTWIN95.EXE on the workstation. This completes the first part of setting up NetWare Print Services. But the Printer object you created is not yet associated with any physical printer.
- ♦ If the printer is attached to the server, the driver (NPRINTER.NLM) is automatically loaded by the print server.

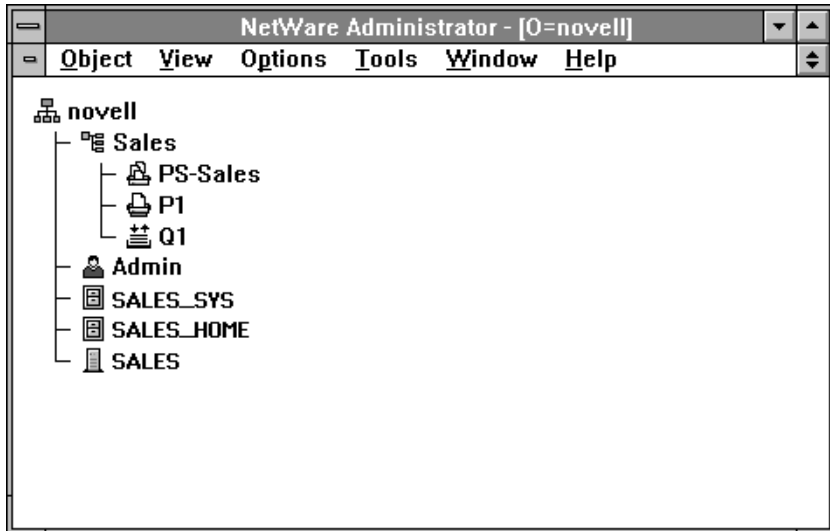
Adding Printing Objects

If you followed the instructions, you have now created and properly assigned the three necessary printing objects (at least one print server, printer, and print queue).

Each print server can service up to 255 printers (0-254).

When you are finished, your NetWare Administrator browser could resemble the following figure.

Figure 5 Browser Showing Print Server



Repeat this process for each additional printer you want to add to your setup.

You do not need to create a print server for each printer, but you must assign each printer to an existing print server.

When you have created and assigned all of your queues and printers, load the print server software (PSERVER.NLM) on a NetWare 5 server. See “Additional Setup Tasks” on page 66.

Tailoring Your Printing Setup

After you have completed the Quick Setup process and gained some experience with that setup, you may want to modify it to better serve the needs of your network's users. The following sections explain some of the configuration options available to you.

Assigning Unique Object Names

Names for each object must be unique (per context in NetWare 5 and per server in NetWare 3). Names should be meaningful and unambiguous.

You may want to put a sign on each printer listing the NetWare context and printer name. If you are using a NetWare 3 setup, you may prefer to list names of the NetWare server and print queue(s) used instead.

Managing Security

Attaching all printers directly to NetWare servers may yield security and administrative advantages. Attaching printers to workstations may yield increased flexibility and accessibility. The ideal mix for each installation is different and will change as needs change.

The number of printers that can be attached to each server or workstation is limited first by the port hardware. Most DOS-based PCs have a maximum of three parallel and four serial ports.

IMPORTANT: The type of port used *must* match the type of port on the printer. The printer must be set up and cabled properly as described in the printer's documentation.

Managing Interrupts

NetWare supports both interrupt and polled mode operation in your printer configuration. Polled mode, the default, generally provides satisfactory performance. If optimal performance is important for your setup, interrupt mode with parallel port operation is often fastest; polled mode serial port operation is generally slower.

Polled mode avoids problems that may occur if interrupts conflict with one another. The interrupt to be used by each port must be configured properly in the hardware, must be unique, and must match the NetWare configuration set in NetWare Administrator in order to use that port properly in interrupt mode.

Polled mode also can be used for printers assigned to a specific port if all of the interrupts are already assigned.

Keep in mind, however, that multiple printers using polled mode on one workstation may adversely affect foreground operation on that workstation.

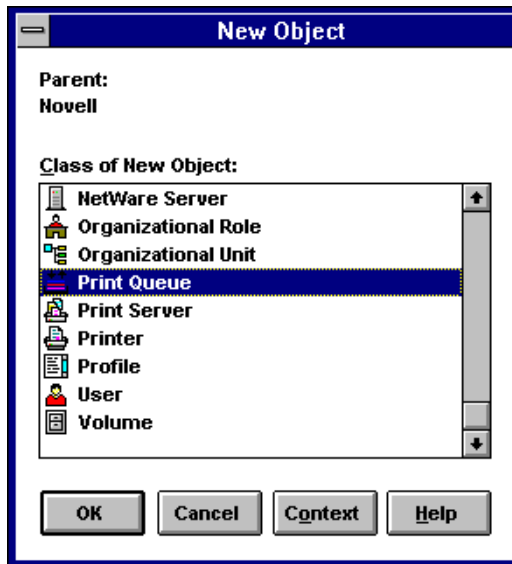
Creating Print Queues

You must have a print queue, along with a print server and a printer, in order for network users to share printers.

The following procedure lets you create a Print Queue object to represent a physical print queue on the NetWare server.

- 1 From the browser's Object menu for the Organization or Organizational unit, choose Create.

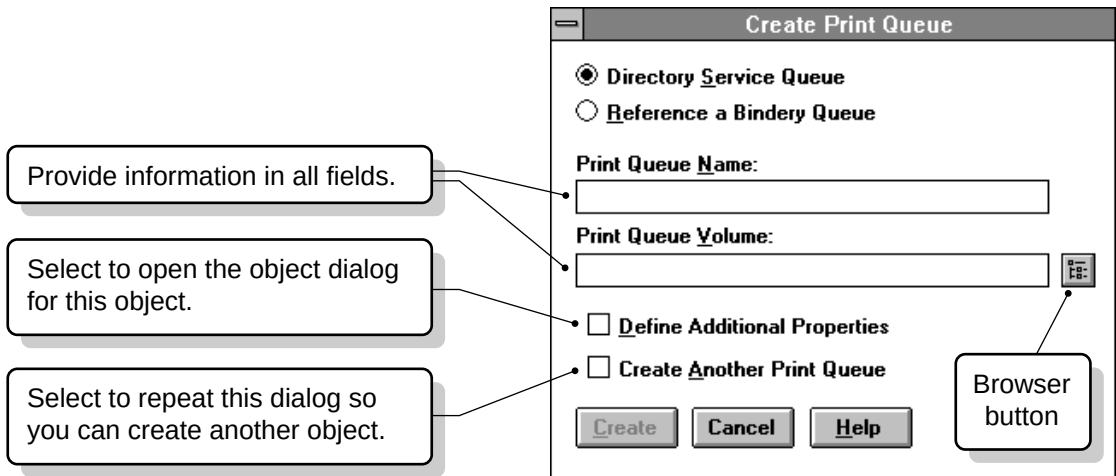
The New Object dialog appears similar to that shown in the following figure.



2 Choose Print Queue.

The Create Print Queue dialog appears similar to the following figure.

Figure 6 Create Print Queue Dialog



- ◆ **Directory Service Queue** allows you to create both a print queue object in your NDS tree and a physical directory for that print queue on a server.
- ◆ **Reference a Bindery Queue** allows you to create a print queue object for a print queue that already exists outside your NDS tree. This queue is a previously defined directory on a NetWare 3™ server or a NetWare 5 server in another NDS tree. Creating a print queue object for this queue allows you to manage printing outside of your current NDS tree.
- ◆ **Print Queue Name** shows the name of the print queue.
- ◆ **Print Queue Volume** shows the name of the object representing the volume on which the print jobs sent to this print queue are stored.
- ◆ **Define Additional Properties** lets you define more information about this print queue immediately after creating it.
- ◆ **Create another Print Queue** repeats this dialog rather than returning to the browser.
- ◆ **Create** creates the new Print Queue.
- ◆ **Cancel** returns to the browser without creating a Print Queue.

3 Select Directory Service Queue.

This is the default.

4 Type a name in Print Queue Name.

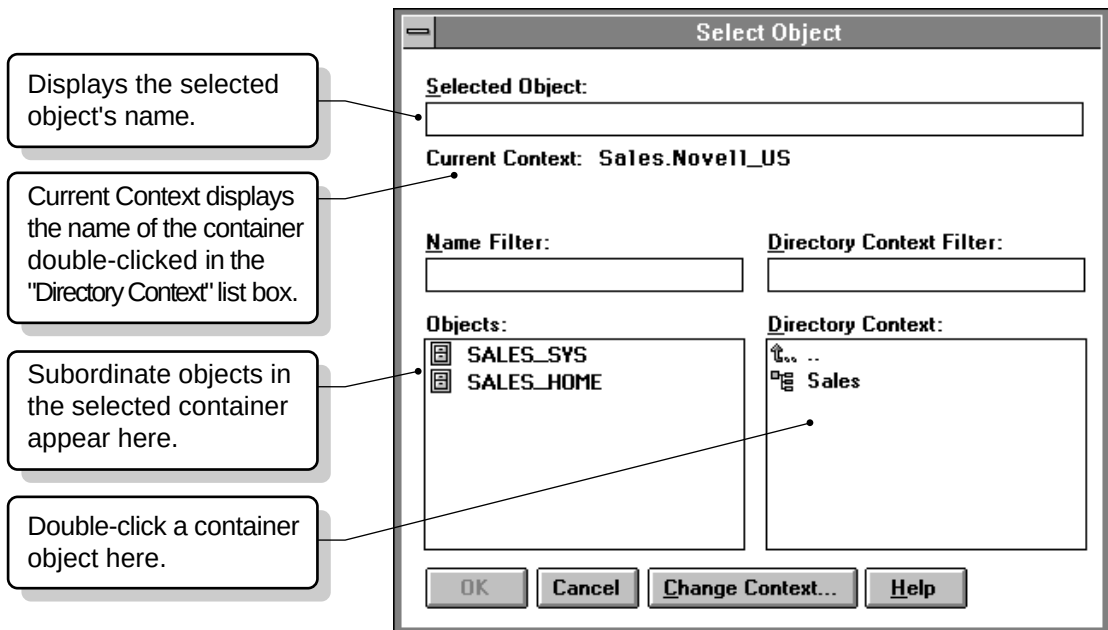
For example, type Q1.

5 Choose the browser button to select a print queue volume.

You cannot create a queue until you have selected a volume.

The Select Object dialog appears, similar to that shown in the following figure.

Figure 7 Select Object Dialog



6 In the Directory Context field, browse until the volume you want is listed in the Objects field.

When you are creating a print queue, only volumes appear in the Objects field.

To limit the range of volumes listed, you can use the optional Name Filter and Directory Context Filter fields. These fields allow you to use the wildcard delimiter (*) in the same way it is used in DOS. For example, to

list only containers beginning with BR in the Directory Context Filter field, you would type BR*.

Because the number of simultaneous print jobs in the print queue is limited only by disk space, be sure to choose a volume with sufficient disk space.

- 7** Select the volume in the Objects field. Then choose OK.

You are returned to the Create Print Queue field.

- 8** At the Create Print Queue dialog, select Create.

Novell recommends one print queue for each printer.

Setting Up Print Servers

The following procedure lets you create a print server.

You must have a print server, along with a printer and a print queue, in order for network users to share printers.

- 1** From the browser's Object menu for the Organization or Organizational unit, select Create.

The New Object dialog appears.

- 2** Select Print Server.

The Create Print Server dialog appears.

- 3** Type a name of your choice in the Print Server Name field.

Not all print server names will be valid Service Advertising Protocol (SAP) names. For example, SAP names may not exceed 47 characters, they cannot contain spaces, and they must be in all-caps. In addition, many double-byte characters used on certain code pages are not valid SAP characters.

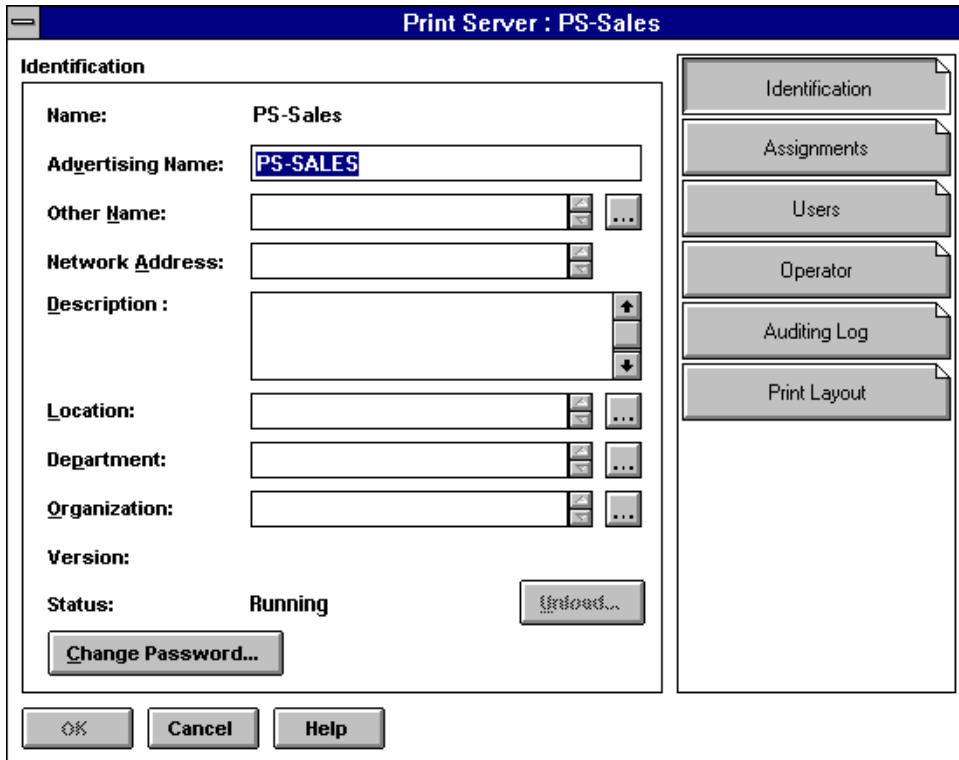
- 4** Mark the Define Additional Properties box.

- 5** Select Create.

- 6** Enter information in the Print Server dialog.

The Print Server dialog for the print server you created appears, similar to the one shown here. The information you enter can later help you search for and manage network resources.

Figure 8 Print Server Identification Page



The image shows a Windows-style dialog box titled "Print Server : PS-Sales". The main area is labeled "Identification" and contains several fields: "Name:" with the value "PS-Sales", "Advertising Name:" with the value "PS-SALES" (highlighted in blue), "Other Name:" (empty), "Network Address:" (empty), "Description:" (empty with up/down arrows), "Location:" (empty), "Department:" (empty), "Organization:" (empty), "Version:" (empty), "Status:" with the value "Running", and a "Change Password..." button. To the right of the main area is a vertical list of buttons: "Identification", "Assignments", "Users", "Operator", "Auditing Log", and "Print Layout". At the bottom of the dialog are three buttons: "OK", "Cancel", and "Help".

For context-sensitive help in adding information to this dialog, select Help.

Creating Printers

The following procedure lets you create a Printer object to represent a physical printer on the network.

You must have a printer, along with a print server and a print queue, in order for network users to share printers.

- 1 From the browser's Object menu for the Organization or Organizational unit, choose Create.

The New Object dialog appears.

- 2 Select Printer.

The Create Printer dialog appears.

- 3** Type a name of your choice in the Printer Name field.

For example, type P1.

This is both the name of the Printer object as it appears in the NDS tree and as it is loaded at the NetWare server console or workstation. Object naming conventions must be followed.

- 4** (Optional) Mark the Define Additional Properties box.

This allows you to define additional information about this printer immediately after you create it.

- 5** Select Create.

The object dialog for Printer P1 appears, similar to that shown in the following figure.

Figure 9 Printer Identification Page

The screenshot shows a window titled "Printer : p1". Inside, there's a tabbed interface. The "Identification" tab is selected, displaying several input fields: "Name:" with the value "p1.Novell", "Other Name:" (empty), "Description:" (empty), "Network Address:" (empty), "Location:" (empty), "Department:" (empty), and "Organization:" (empty). Each field has a small icon to its right. To the right of these fields is a vertical stack of tabs: "Identification", "Assignments", "Configuration", "Notification", "Features", "See Also", and "Printer Status". At the bottom of the window are three buttons: "OK", "Cancel", and "Help".

For context-sensitive help in adding information to this dialog, select Help.

For every printer, you need to set up a Printer object.

Then complete the instructions for setting up one of the following kinds of printers:

- ♦ “Setting Up Network-Attached Printers” on page 60
- ♦ “Setting Up Printers Attached to Workstations or Servers” on page 43
- ♦ “Setting Up Printers Attached to DOS and Windows 3.x Workstations” on page 45

Assigning Print Queues to Printers

A print queue must be assigned to a printer before the printer can take print jobs from the network.

- 1** From the browser, select the object Details dialog by double-clicking on the printer object.
- 2** From the Printer dialog, select the Assignments page.

The Assignments page appears, similar to the following figure.

Figure 10 Printer Assignments Page

Printer : p1

Assignments

Print Server:
ps-1.Novell

Print Queues:

Queue	Priority
q1.Novell	1

Add... **Delete** **Priority:** 1

Default Print Queue:
q1.Novell

Identification
Assignments
Configuration
Notification
Features
See Also
Printer Status

OK **Cancel** **Help**

3 Select Add.

The Select Object dialog appears, similar to that shown in Figure 7 on page 36. Only print queue objects appear in the list of objects.

4 In the Directory Context field, browse until the queue you want is listed in the Objects field.

When you are assigning a print queue to a printer, only print queues appear in the Objects field.

To limit the range of print queues listed, you can use the optional Name Filter and Directory Context Filter fields. These fields allow you to use the wildcard delimiter (*) in the same way it is used in DOS. For example, to list only containers beginning with BR in the Directory Context Filter field, you would type BR*.

5 Select the print queue in the Objects field. Then choose OK.

You are returned to the Printer dialog.

- 6 Select the Configuration page and make any necessary changes, including parameters available after selecting Communication.

See “Configuring Printers” on page 98.

Assigning Printers to Print Servers

A network printer must be assigned to a print server before you can perform network printing.

- 1 From the Print Server dialog, select the Assignments page.

The Assignments page appears, similar to that shown in the following figure.

Figure 11 Print Server Assignments Page

Print Server : ps-1

Assignments

Printers:

Printer	Number
p1.Novell	0
P2.Novell	1

Add... **Delete** **Printer Number**

Identification
Assignments
Users
Operator
Auditing Log
Print Layout

OK **Cancel** **Help**

Remember that print queues are assigned to printers, not to print servers. See “Assigning Print Queues to Printers” on page 40.

- 2** Select Add, and select the Printer object you want to assign.

The Select Object dialog appears.

- 3** In the Directory Context field, browse until the printer you want is listed in the Objects field.

When you are assigning a printer to a print server, only printers appear in the Objects field.

To limit the range of printers listed, you can use the optional Name Filter and Directory Context Filter fields. These fields allow you to use the wildcard delimiter (*) in the same way it is used in DOS. For example, to list only containers beginning with BR in the Directory Context Filter field, you would type BR*.

- 4** Select the printer in the Objects field. Then select OK.

You are returned to the Print Server dialog.

- 5** Select OK.

Setting Up Printers Attached to Workstations or Servers

You must use NPRINT.EXE or NPTWIN95.EXE if your printer will be attached to a workstation. Use NPRINT.NLM if your printer will be attached to a NetWare server.

Printers attached directly to servers running PSERVER.NLM may be configured to be loaded either automatically (using the Auto Load (Local) option) or manually (using the Manual Load option). Printers attached to workstations can only be configured for manual loading.

The terms *local*, *remote*, *auto load*, and *manual load* may be confusing at first. Keep in mind that *local* and *auto load* are the same thing while *remote* and *manual load* are the same thing.

Configuring your printer to Auto Load (Local) means that when you load your print server, it is also going to load NPRINT with the printers that you have configured as Auto Load (Local) printers.

Configuring your printer to Manual Load means that you can load a printer remotely; that is, NPRINT may be run on a different machine from the print server.

System Requirements for Using NPRINTER

Before using NPRINTER, you need the following:

- ☐ NetWare 5 server.
- ☐ Print server, print queue, and printer that have been created and assigned. (See “Using Quick Setup” on page 30.)
- ☐ Print server (PSERVER.NLM) loaded on a NetWare server. (See “Setting Up Print Servers” on page 37.)
- ☐ Printer cabled to a network workstation running DOS or MS Windows, directly to the network, or to a NetWare server.

HINT: Make sure each printer functions properly in its current environment. If a printer functions properly in its current environment (non-network or otherwise), it will work with NetWare print services.

Printer Cabling Options

A network printer can print jobs sent from any network workstation. Network printers include printers that are cabled in any of the following ways:

- ♦ **To a DOS or Windows 3.x workstation (NPRINTER.EXE).** For standard systems, you can attach up to 3 parallel and 4 serial printers to a workstation. See “Setting Up Printers Attached to DOS and Windows 3.x Workstations” on page 45.
- ♦ **To a Windows 95 workstation (NPTWIN95.EXE).** For standard systems, you can attach up to 3 parallel and 4 serial printers to a workstation. “Setting Up Printers Attached to Windows 95 Workstations” on page 51
- ♦ **To a NetWare server (NPRINTER.NLM).** For standard systems, you can attach up to 3 parallel and 4 serial printers to a single machine. See “Setting Up Printers Attached to Servers” on page 57.
- ♦ **Directly to the network cabling.** See “Setting Up Network-Attached Printers” on page 60.

NOTE: Only printers cabled to a NetWare server running the print server may have NPRINTER.NLM loaded automatically when PSERVER.NLM loads.

Manually loaded NPRINTER NLM™ modules display a separate status screen on the NetWare server console. Any NPRINTER NLM configured for Auto Load (Local) is tracked in the print server console screen.

New NPRINTER Features Since NetWare 3

MS Windows Support

While RPRINTER for NetWare 3™ software supports MS Windows, the support provided for MS Windows by NPRINTER in NetWare 5™ software has been improved.

NLM Version

The port driver has been taken out of PSERVER.NLM and has become NPRINTER.NLM. This allows greater flexibility in setting up your network and in deploying your network resources.

For example, you may now choose to include only one Print Server object in your NDS context. You can use this print server to service printers attached to NetWare servers that do not have a print server running. This was not possible in NetWare 3.

The use of NPRINTER.NLM also allows you to unload the port driver without bringing down the print server.

Improved Performance

Tests indicate that NPRINTER executes faster than RPRINTER. The effect this added speed will have on printing performance on your own network will be determined by such items as port speed (the speed at which data can pass through your port), printer speed, type of data being printed (for example, graphics vs. text), and the speed of the machine NPRINTER is running on.

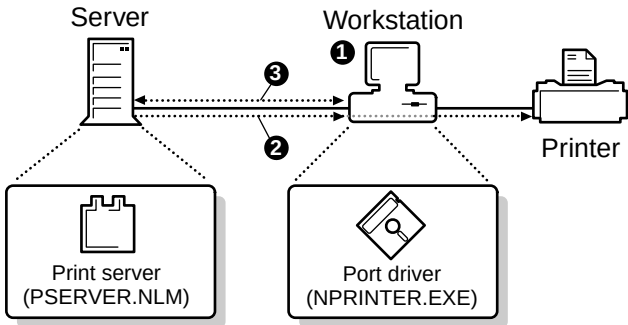
For example, if you are printing graphics data from a fast machine that has a fast parallel port, and you also have a fast printer, the performance improvement should be quite noticeable. On the other hand, if you are printing to a serial port, you will not see any performance difference.

Setting Up Printers Attached to DOS and Windows 3.x Workstations

The NetWare port driver portion of NPRINTER.EXE for a DOS or Windows workstation is a terminate-and-stay-resident program that can be loaded either from the NPRINTER menu or from the command line.

“Data Path for Print Jobs from PSERVER to a Printer” on page 46 illustrates the path taken by print data from a print queue on a NetWare server to a printer attached to a network workstation.

Figure 12 Data Path for Print Jobs from PSERVER to a Printer



- ❶ NPRINTER waits for a print job.
- ❷ PSERVER sends print job data to the printer via NPRINTER. After checking for printer readiness, NPRINTER sends print job data until the printer's buffer is full or until its own buffer is empty.
- ❸ NPRINTER requests more data from PSERVER and also sends its status.

Printing Tasks Handled through NPRINTER.EXE

Table 2 NPRINTER.EXE Tasks

To get to the screen where you can	Do the following
Load a printer configured as manual load or type Other/Unknown.	1. Type NPRINTER . 2. Select a print server then a printer, or press F4 and Enter to browse and select a printer. 3. Press F1 for help from here.

To get to the screen where you can	Do the following
Load port driver for printer P_1 for organizational unit Sales in organization Novell.	NPRINT .P_1.SALES.NOVELL
Load port driver for printer P_1 (logical number 0) for print server PS-SALES (NetWare 3 syntax).	NPRINT PS-SALES 0
View the status of all loaded port drivers.	NPRINT /S
Unload the port driver loaded last.	NPRINT /U
View Help for the command-line NPRINT.	NPRINT /?

Command Syntax

NPRINT [*printer*|*printserver printernumber*] *option*

NPRINT.EXE can be loaded up to seven times on the same workstation. This is because you can load NetWare port drivers for up to 3 LPT and 4 COM workstation ports with NPRINT.EXE (menu or command-line)

The following figure shows you options available with NPRINT.EXE at a DOS workstation.

Table 3 NPRINT.EXE Options

Parameter	Syntax or variable	Description
Buffer	B = <i>number</i>	Overrides defined buffer size (3-60 KB). The default is 3.
Printer	<i>printername</i>	Indicates a Printer object for which to load the NetWare port driver. Syntax requires either the printer name or the print server name plus the printer number.
Print server	<i>printserver name</i>	Indicates the print server assigned to the printer you want to load. Syntax requires either the printer name or the print server name plus the printer number.
Printer number	<i>printer number</i>	Indicates the logical printer number of the printer you want to load. Syntax requires either the printer name or the print server name plus the printer number.
Show	/s	Shows the current status of all loaded NetWare port drivers.

Parameter	Syntax or variable	Description
Timing	T=1-9	Controls the duration of the strobe signal. The default is 1 (allowed range is 1-9). Assigning a higher number gives more priority to the machine's foreground tasks, which will in turn slow down printing but improve overall workstation performance.
Unload	/U	Unloads the most recently loaded NetWare port driver.
Version	/VER	Displays version information for this utility. Also lists the names and version number of all files required to run this utility.
Help	/? or /H	Displays online help.

Running Port Drivers from Local Drives

If you want to avoid logging in to the network before running NPRINTER.EXE, it is possible to run the program from a local drive. However, to ensure the proper execution of the program, you must copy all associated files to the same directory as the one containing the executable file on your local drive.

To get a list of all of the associated files and correct version numbers of each, type `NPRINTER /VER` at the network command line.

Running Port Drivers on DOS or MS Windows Workstations

The NetWare port driver portion of NPRINTER.EXE for a DOS or Windows workstation is a TSR (terminate-and-stay-resident) program that can be loaded either from the NPRINTER menu or from the command line.

NPRINTER.EXE can run any printer configured in NetWare Administrator as Manual Load.

NOTE: Each loaded NPRINTER.EXE occupies 2 KB more of workstation RAM than the buffer size defined for that printer. Buffer sizes can be set in either NetWare Administrator, or the command line. You can load NPRINTER.EXE up to 7 times per workstation.

Buffer size can be changed in NetWare Administrator. NPRINTER options loaded from the command line override these configuration settings.

Loading Port Drivers on MS Windows Workstations

If your workstation uses MS Windows 3.x, you must load NPRINTER.EXE before you load MS Windows *and* you must perform one of the following options:

- ♦ In NetWare Administrator, configure the printers to use polled mode instead of a specific interrupt number. (After selecting a printer, select the printer type at the Printer Configuration screen and then select Interrupt: None at the Configuration field.)
- ♦ If you want to use a specific interrupt, place the following lines in the MS Windows SYSTEM.INI file under the heading [386Enh]:

```
LPT1AutoAssign=0  
LPT1irq=-1
```

Replace LPT1 with the port that the printer is cabled to (for example: LPT2, COM1, COM2).

Loading Port Drivers from the NPRINTER Menu

The NPRINTER menu allows you to load printers configured as Manual Load and printers of type Other/Unknown. This menu also allows you to view available print servers or printers before selecting which printer to load. Printers configured as type Other/Unknown can be configured at load time as parallel or serial with the interrupt you select.

1 (Optional) Log in.

2 Type the following:

```
NPRINTER
```

A list of available print servers appears.

NOTE: Press F4 to switch to Directory Services mode and then press Insert to browse for a printer and skip the remaining steps. Press F1 for help. Switching to Directory Services mode only determines how you find a printer. You will still have the advantages of NDS without using Directory Services mode to find a printer.

3 Choose a print server.

A list of printers assigned to the print server appears.

For example, to load a printer that is assigned to PS-SALES, choose PS-SALES. A list of printers not in use that are assigned to PS-SALES appears.

4 Choose a printer.

For example, to load network printer P_1, choose P_1 from the list of available printers on PS-SALES.

NOTE: If you choose a printer of type Other/Unknown, you will be asked to specify the printer type (parallel or serial), the port, the interrupt, and so forth.

Loading Port Drivers from the Command Line

The command line option of NPRINTER allows you to quickly load a port driver without entering a menu. We recommend that you use the command-line option in the workstation's AUTOEXEC.BAT file to load the network port driver each time the workstation boots.

1 Log in.

2 Type the following at the command line:

```
NPRINTER printername
```

Depending on the default context for the workstation, you may need to specify the full name that includes the NDS context. For example, to load the port driver for printer P_1, type one of the following:

```
NPRINTER .P_1.SALES.NOVELL
```

or

```
NPRINTER printservername printername
```

For example, to load printer P1, which has printer number 0 and is assigned to PS-Sales, type

```
NPRINTER PS-SALES 0
```

(The printer number can be determined in NetWare Administrator.)

Place this line in AUTOEXEC.BAT following your network login command for automatic execution.

NOTE: NPRINTER.EXE can be executed without logging in if you copy all necessary NPRINTER files to a local workstation drive. To get a list of the necessary files and correct version numbers, type NPRINTER /VER.

Unloading Port Drivers from the Command Line

You must unload port drivers one at a time, beginning with the one most recently loaded. To unload a port driver, type

```
NPRINTER /U
```

Setting Up Printers Attached to Windows 95 Workstations

Use NPRINT Manager (NPTWIN95.EXE) to allow network users to share a printer attached to a Windows 95 workstation.

When you run NPRINT Manager after the initial setup, the program checks which printers need to be loaded. If the print server is running and the printer specified is free, that printer is loaded, and its information window is displayed in the NetWare Nprinter Manager window.

For specific information, see the following discussions:

- ♦ “Sharing a Printer Attached to a Windows 95 Workstation” on page 51
- ♦ “Managing NPRINT Manager and the Shared Printer” on page 54
- ♦ “Running NPRINT Manager from a Local Drive” on page 55
- ♦ “Setting Up Network Printing on a Windows 95 Workstation” on page 57

Sharing a Printer Attached to a Windows 95 Workstation

NPTWIN95.EXE, the NPRINT Manager executable, allows network users to share a printer physically attached to a Windows 95 workstation that is running the Novell Client™. “Typical NPRINT Setups” on page 58 illustrates this principle using NPRINT.EXE on a DOS workstation as an example.

Running NPRINT Manager and adding a local printer makes the local printer available to network users. Any printer you add will remain available to the network during that session of Windows 95. You can also specify that the printer will be activated whenever NPRINT Manager starts.

NPTWIN95.EXE can run any printer configured in NetWare Administrator as Manual Load.

Prerequisites

- ☐ Printer cabled to the workstation as if ready for local printing
- ☐ Initial print setup completed, which includes creating and associating a Print Server object, Printer object and Print Queue object (see “Setting Up Queue-Based Print Services” on page 29)
- ☐ PSERVER.NLM loaded at the server console

- ☐ Windows 95 operating system running on the workstation
- ☐ Novell Client running on the workstation

NOTE: NPTWIN95.EXE is not compatible with the Microsoft* NetWare Client.

Procedure

Upon completion of this procedure, network users should be able to capture a port for the shared printer, and then begin printing to the shared printer.

1 Make sure the Windows 95 workstation with the attached printer is running the Novell Client.

2 At the workstation, log in to the network as any user.

3 Double-click Network Neighborhood.

4 Navigate to the SYS\PUBLIC folder on your server.

5 Double-click NPTWIN95 (the NPRINTER Manager program).

6 (Conditional) If the Add Network Printer dialog box does not display, choose Printers and then choose Add.

The dialog box does not display after you have added your first printer to the program.

7 Choose an NDS printer or bindery-based print server and printer.

7a Choose either NDS Printer or a Bindery-Based Printer.

7b Choose the browse button to browse.

7c (Conditional) If adding a bindery-based printer, choose a print server to view printers that you have rights to.

The print servers displayed in the Print Servers and Printers window are all those which are advertising to your server. But when you choose a print server, only printers you have rights to will display.

7d Choose a printer.

An NDS Printer object displayed might not be available if it is incompatible with your setup or if its print server is not running.

7e Choose OK.

8 (Conditional) If the Set Properties dialog box displays, set printing properties in the displayed box, and choose OK.

The dialog box will only display if the selected printer was previously defined as Other/Unknown.

8a Choose an LPT or COM port.

8b Choose an interrupt setting or Polled.

Polled mode is usually the default setting for interrupts. However, dedicated interrupts usually provide better printing performance.

If you do not know what interrupt to set or if you are having interrupt conflicts, try using the polled mode. A polled mode printer may not be as fast as an interrupt-driven printer, but it avoids the difficulty of identifying an available interrupt and the conflicts that can arise from choosing an incorrect interrupt.

8c Choose a buffer setting from 3 KB to 60 KB of memory.

8d (Conditional) If a COM port was selected, set the following to correspond with your serial printer settings.

- ♦ Baud Rate
- ♦ Data Bits
- ♦ Stop Bits
- ♦ Parity
- ♦ XON/XOFF

8e Choose OK.

9 (Optional) If you want NPRINTER to load this printer and the required NLM programs the next time the program is run, check Activate Printer When Nprinter Manager Loads.

If the box is unchecked, the printer being added will only remain active for this Windows 95 session, and the printer must be added again to the program before it will be available as a shared printer to network users.

10 Choose OK.

11 Verify that the printer was successfully set up by ensuring the printer's status window displays and the settings are correct.

- ♦ If this is the only printer added to NPRINTER Manager, from the Printers menu, choose Clear, and then choose Add and add the printer again.

- ♦ If there are other printers added to NPRINT Manager, (1) from the Printers menu, choose Properties and uncheck Activate Printer When Nprinter Manager Loads, (2) choose Remove, and (3) add the printer again.
- 12** (Optional) Close the NetWare NPRINT Manager window by choosing Printers and then choosing Exit.
- By closing the window, you exit the program but leave the NLM programs required for printing loaded. Network users will still be able to print to the printers that have been added to the window.
- 13** (Optional) To automatically run NPTWIN95 when you start the workstation, add NPTWIN95 to the workstation STARTUP folder.
- 13a** From the Windows 95 desktop, choose Start, and then point to Settings.
- 13b** Choose Taskbar, and then choose the Start Menu Programs tab.
- 13c** Choose Add, and then choose Browse.
- 13d** Navigate to the NPTWIN95 file, and then double-click it.
- 13e** Choose Next, and then double-click Startup.
- 13f** Type the name that you want to see on the StartUp menu (like NPRINT), and then choose Finish.
- 13g** (Conditional) If Windows 95 prompts you to choose an icon, choose one, and then choose Finish.
- 14** (Optional) To avoid logging in to the network before running NPRINT Manager, copy the required files to your hard drive.

This process is described in “Running NPRINT Manager from a Local Drive” on page 55.

The attached printer should now be available as a shared network printer. Network users can now capture a port for the printer and begin printing to it. For information on capturing a port at a Windows 95 workstation running the Novell Client, see “Setting Up Network Printing on a Windows 95 Workstation” on page 57.

Managing NPRINT Manager and the Shared Printer

After you complete the required steps to activate the shared printer (see “Sharing a Printer Attached to a Windows 95 Workstation” on page 51), the NPRINT Manager can be used to perform the following printing tasks.

Table 4 NPRINTER Manager Tasks

Task	Procedure
Add a printer to the NetWare Nprinter Manager window.	1. From the Printers menu, choose Add. 2. Choose to add an NDS printer or bindery-based printer. 3. Browse to the printer, highlight it, and click OK. 4. If you want to load this printer the next time the NPRINTER Manager runs, check Activate Printer When Nprinter Manager Loads. If not, uncheck the box.
Change all printers attached to the workstation from network printers to local printers.	1. Notify users of the printers' changing status. 2. From the Printers menu, choose Clear.
Temporarily down a network printer attached to the workstation.	1. Notify users of the temporary situation. 2. In the NetWare Nprinter Manager window, make the printer's information window active. 3. From the Printers menu, choose Remove.
Temporarily down all network printers attached to the workstation.	1. Notify users of the temporary situation. 2. From the Printers menu, choose Remove All.
View current printer configuration or status.	In the NetWare Nprinter Manager window, make the printer's information window active, and then from the Printers menu, choose Properties.

Running NPRINTER Manager from a Local Drive

If you want to avoid logging in to the network before running NPRINTER Manager, it is possible to run the program from a local drive. However, to ensure the proper execution of the program, you must copy all associated files to the same directory as the one containing the executable file NPTWIN95.EXE on your local drive.

If you have added NPRINTER Manager to the StartUp folder or if you have created any shortcut buttons for the program, the paths to NPTWIN95.EXE will need to be updated.

Complete the following to load NPRINT Manager on a hard drive.

- 1** From the Windows 95 desktop, open My Computer, choose a local drive, and create a folder called Nprinter.
- 2** Choose Network Neighborhood and then navigate to the SYS\PUBLIC folder on the server.
- 3** Copy the following files from the SYS\PUBLIC folder to the Nprinter folder in My Computer.
 - ♦ NPTWIN95.EXE (usually displays without the .EXE extension)
 - ♦ NPTR95.NLM
 - ♦ NPTDRV95.NLM
 - ♦ DPCMN32.DLL
 - ♦ BIDS45F.DLL
 - ♦ CW3215.DLL
 - ♦ OWL252F.DLL
- 4** Copy the following files from the SYS\PUBLIC\NLS\language folder to the Nprinter folder in My Computer.
 - ♦ NPTWIN95.DLL
 - ♦ NPTWIN95.HLP
 - ♦ NPTDRV95.MSG
 - ♦ DPCMNR32.DLL
- 5** (Conditional) If you have previously added NPTWIN95.EXE to your Startup folder or created a shortcut to the program, update the shortcut target string or the command line in the Startup folder now. To update the shortcut:
 - 5a** Highlight the shortcut and right-click.
 - 5b** Choose Properties.
 - 5c** Choose Shortcut.
 - 5d** Edit Target String to point to the local drive, and then add the /EXIT option on the end.

This will close the NetWare Nprinter Manager window, but will leave the NLM programs running in the background. Using the /

EXIT option in this instance allows users the benefits of the loaded NPRINTERR without being aware of its existence.

5e Choose OK.

Setting Up Network Printing on a Windows 95 Workstation

In order to make use of network printers, all network users are required to capture a printer at their workstations. This procedure allows you to capture a shared printer from a Windows 95 workstation running the Novell Client.

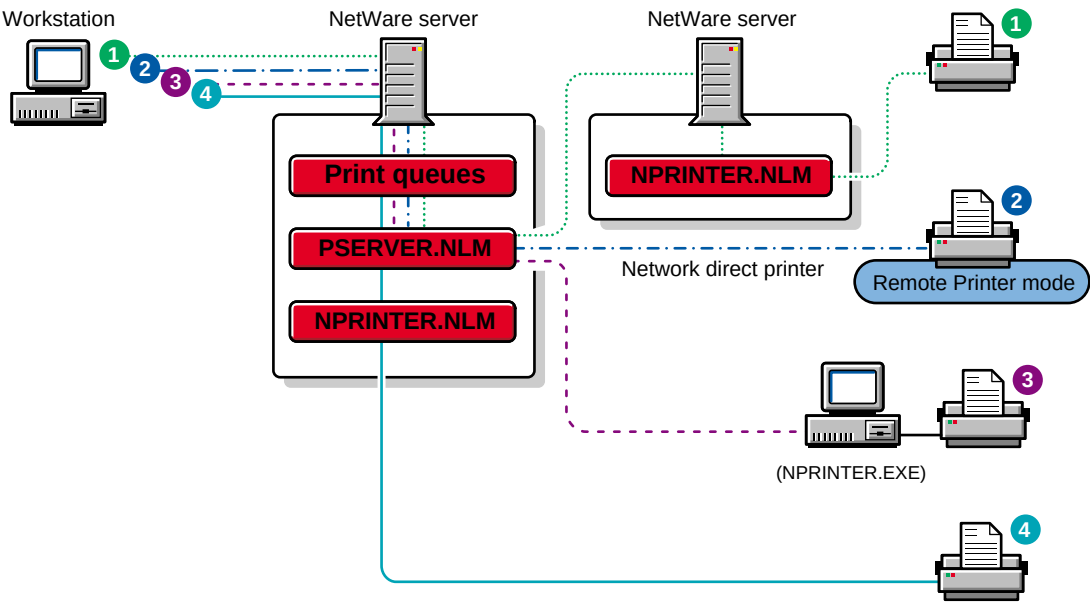
- 1** Double-click Network Neighborhood.
- 2** Navigate to the network location where the printer or print queue resides.
- 3** Right click the printer and choose Install.
- 4** Follow the screen prompts using the following guidelines.
 - ♦ Capture a printing port for the attached printer.
 - ♦ Change the printer name only to change the way the printer displays in My Computer. The default name will still display in Network Neighborhood.
 - ♦ Verify that this printer has been chosen as the default (see statement below Printer name box). You might have to choose Yes.

Setting Up Printers Attached to Servers

NPRINTERR.NLM allows you to attach network printers directly to a NetWare server, even a server other than the one on which your print server (PSEVER.NLM) is running.

“Typical NPRINTERR Setups” on page 58 shows typical printing setups using NPRINTERR.NLM, NPRINTERR.EXE, and a network-direct printer in remote mode, which contains its own port driver.

Figure 13 Typical NPRINTERTypewriter Setups



Printing Tasks Handled Through NPrinter.NLM

Table 5 NPrinter.NLM Tasks

Task	Procedure
Load printer P_1 (logical number 0) for print server PS-SALES.	Type <code>LOAD NPrinter PS-SALES 0</code>
Unload a manually loaded NPrinter.NLM.	Go to the Status screen and press Escape.
Unload all loaded NPrinter.NLMs.	Type <code>UNLOAD NPrinter .</code>

Loading NPrinter.NLM

NPrinter.NLM can be loaded on a NetWare server multiple times.

When a printer is configured to be loaded on the same server where the PSERVER is running, it can be configured to load automatically or manually. Specify which loading option you want to use as part of your printer configuration in the NetWare Administrator utility.

If Auto Load (Local) is selected, NPRINT.NLM loads whenever the print server is loaded. (The default is Auto Load (Local).)

Configuring printers attached to the server that loads PSERVER as Manual Load allows you to determine when you want the port driver to be loaded. This can be useful if you must limit the number of resources running on your network at a given time.

NPRINT.NLM cannot load until the print server is running.

To load NPRINT.NLM, at the NetWare server console, type one of the following:

```
LOAD NPRINT printername
```

Depending on the default context for the NetWare server, you may need to specify the full name that includes the NDS context. For example, to load the port driver for printer P_1, type one of the following:

```
LOAD NPRINT .P_1.SALES.NOVELL
```

or

```
LOAD NPRINT printservername printername
```

For example, to load printer P1, which is printer number 0 (as seen in NetWare Administrator) and is assigned to print server PS-Sales, type

```
LOAD NPRINT PS-SALES 0
```

NOTE: If NPRINT is to be loaded on the same NetWare server as the print server, the printer can be configured as Auto Load (Local). If NPRINT is to be loaded on a NetWare server other than where print server is running, the LOAD command can be placed in the AUTOEXEC.NCF file for automatic loading and the printer should be configured as Manual Load.

The following figure illustrates the status screen that appears if you manually load NPRINT.NLM.

```
Print server:  PS-SALES  
Printer:      0  
Printer name: P1.Sales.Novell  
Printer type: LPT1  
Interrupt:    Polled  
  
Status:  
  NPRINT status:  Waiting for Print Job  
  Printer status: Running
```

The status screen for a serial printer displays four characteristics used in RS-232-C serial communication: DCD (Data Carrier Detect), DSR (Data Set Ready), CTS (Clear To Send), and RI (Ring Indicator). You can typically interpret the high and low signal levels as follows:

- ♦ DCD remains low unless the printer is off or disconnected
- ♦ DSR remains high while in use by NPRINT
- ♦ CTS fluctuates high when the printer is ready to receive data and low when the printer is unavailable
- ♦ RI (currently not used) remains constant depending on the port

Setting Up Network-Attached Printers

NetWare 5 supports existing network-direct printers and hardware queue servers produced by various manufacturers. These devices either connect to a printer and then to the network or are installed in a port at the printer.

In many cases, these devices offer a fast, effective, low-cost printing solution in NetWare 5 as well as NetWare 3 environments.

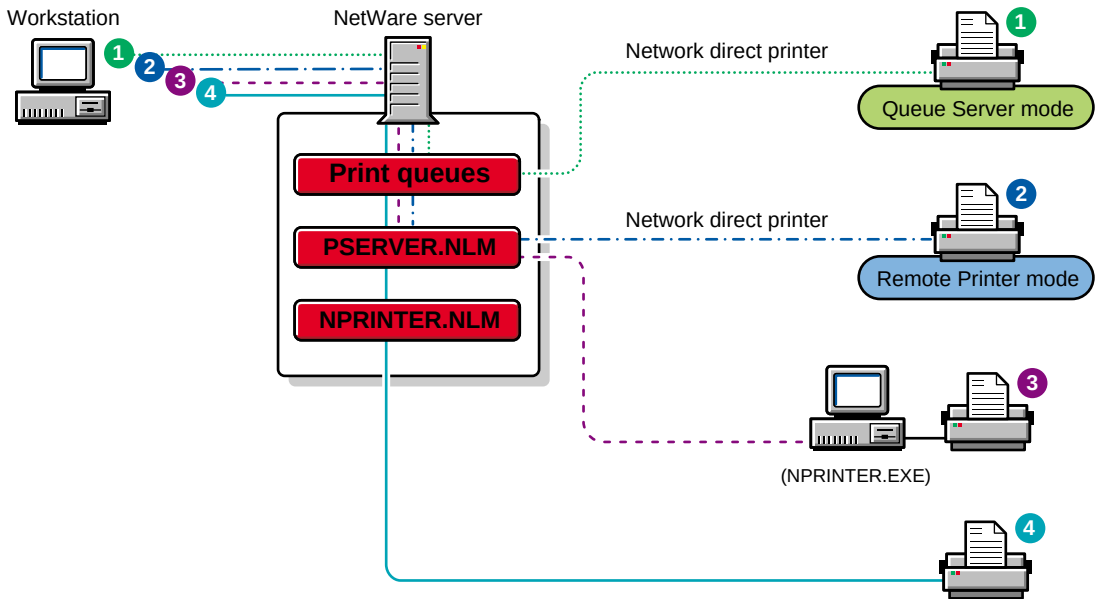
Typically, these print devices are shipped with their own installation utilities. The manufacturer's utilities configure the device to recognize network print components and to communicate with the network. To effectively use network-direct print devices in a NetWare 5 environment, you will need to know the manufacturer's procedures for installing the specific device that you are using.

Many of these devices can be configured to run in either remote printer mode or queue server mode, as described in the following sections.

- ♦ "Remote Printer Mode" on page 61
- ♦ "Queue Server Mode" on page 61

The following illustration, "Network-Direct Print Devices Running on Same Network with Printers Attached to a Workstation and a NetWare Server" on page 61, shows representative network printing setups incorporating network-direct print devices used in both queue server and remote printer modes.

Figure 14 Network-Direct Print Devices Running on Same Network with Printers Attached to a Workstation and a NetWare Server



Remote Printer Mode

In this mode, the device functions in a way similar to a workstation running the NetWare 5 NPRINT or the NetWare 3 RPRINT. Devices configured for remote printer mode are controlled by a NetWare print server.

By using this mode, you are NDS-aware and will also get notification and other functionality available through NetWare Administrator. These advantages are generally not available in queue server mode described in the next section.

Devices running in this mode under NetWare 5 run considerably faster than they did under NetWare 3. The increased speed and flexibility offered with NetWare 5 makes remote printer mode a very effective way of providing network printing with these devices.

Queue Server Mode

In this mode, the hardware print server directly accesses the print queue using NetWare Core Protocol™ calls. In NetWare 3, this mode was faster than

remote printer mode, but the improved performance of the NetWare 5 PSERVER has minimized this distinction.

Queues created in the bindery context can be seen by both NDS™ and bindery users, so both types of users can access these hardware print servers.

Network-direct print devices developed before NDS are designed to work well with the NetWare bindery. When used in queue service mode, some of these products present the following set of common issues of concern to the network administrator within a NetWare 5 environment.

- ♦ Some network-direct print devices and their installation programs are designed to look in the bindery for network printing information. In order for these devices to see binderies and queues, they must be in the same bindery context as these printers and queues.
- ♦ The queue's volume must be located on the same server as the queue.
- ♦ Queues serviced by network-direct printers must be created in the bindery context where the queue server is defined. The bindery context tells the NetWare server which NDS objects should be visible as bindery information.
- ♦ Queue users should be in the same bindery context as the queue.
- ♦ In NetWare 3, print server configuration files for bindery printers are located in the SYS:SYSTEM directory. In NetWare 5, these files have been replaced by attributes of the print server. Because most network-direct print devices are designed to access information from the bindery and are not NDS aware, you must create print device configurations in the bindery emulation mode of NetWare Administrator in order for the configuration files these devices require to be created.
- ♦ Some of these direct-connect devices need to be configured within the 16 printer limitation for NetWare 3 print servers.

When using these devices in remote printer mode, you should reserve printer slots 0-15 for them.

- ♦ NetWare 3 created the group EVERYONE by default. Some of the network-direct print devices assume that this group exists in NetWare 5. For these devices, make sure that group EVERYONE is a user of the affected queue. You may need to create this group in the context where the printer is defined before the device will be able to communicate with the network.

- ♦ Some network-direct devices require a running print server before you can configure for remote-printer mode.

Because the communication protocol between print servers and network-direct devices running in remote printer mode have not changed since NetWare 3, the running print server can be a NetWare 5 print server.

- ♦ Some of the utilities provided with these print devices can only be operated with the SUPERVISOR right and do not recognize Supervisor equivalents. You will need to log in as SUPERVISOR in bindery mode rather than logging in as ADMIN in Directory Services mode.
- ♦ Some devices include a remote printer configuration utility that requires you to complete duplicate configuration steps. In such cases, you should first define the remote printer in the NetWare Administrator utility, and then define the printer again using the third party utility.

As a result of these duplicate steps, you may end up with unused NetWare 3 printer configuration files on the NetWare 5 server.

Setting Up Print Services in Bindery Mode

You can add a NetWare 5 server and NetWare 5 clients to your network and still retain your existing PSERVER.EXE and NetWare 3 and NetWare 4 environment.

- ♦ If you use bindery mode, you define objects that a bindery-based print server knows how to access for configuration information upon loading.
- ♦ If you use the Directory Services mode to configure the information, you define objects that a Directory Services-based print server knows how to access for configuration information when loading.

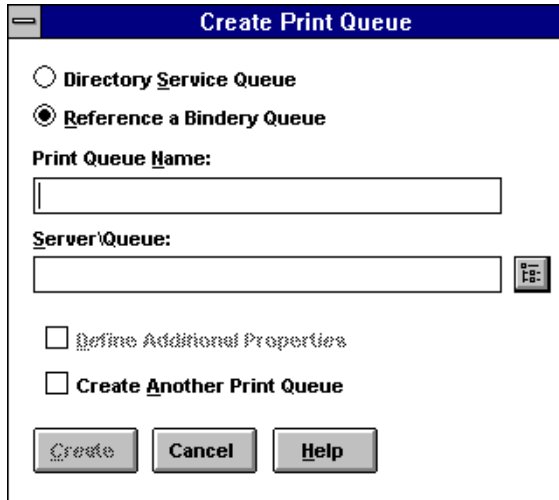
To change between Directory Services and bindery modes, press F4 at the Available Options menu. The last menu option in bindery mode changes to Change Current NetWare Server from Change Context.

Referencing Bindery Queues

The following procedure lets you reference a bindery queue and add it to your list of print queues available for printing.

- 1 At the Create Print Queue screen, shown in the following figure, select Reference a Bindery Queue.

Notice that the screen changes when this option is selected.

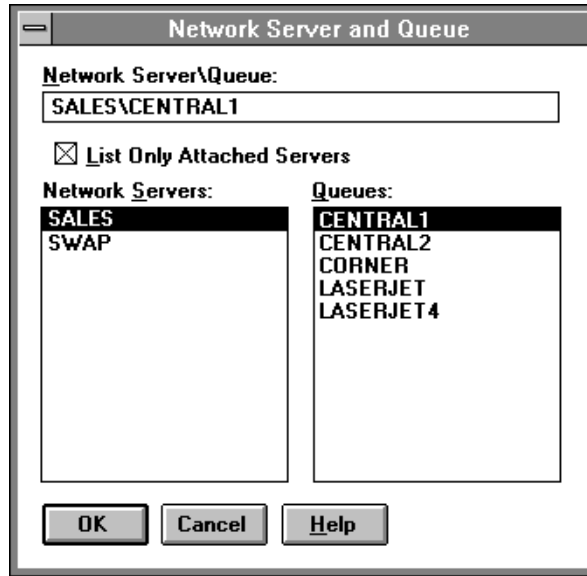
The image shows a 'Create Print Queue' dialog box with a blue title bar. It contains two radio buttons: 'Directory Service Queue' (unselected) and 'Reference a Bindery Queue' (selected). Below these are two text input fields: 'Print Queue Name:' and 'Server\Queue:'. To the right of the 'Server\Queue:' field is a small square button with a folder icon. At the bottom, there are two checkboxes: 'Define Additional Properties' and 'Create Another Print Queue', both of which are unchecked. At the very bottom are three buttons: 'Create', 'Cancel', and 'Help'.

- 2** (Optional) If you want to assign a bindery reference queue name different from the queue's name on the NetWare 3 server, enter the reference name into the Print Queue Name field.

If you do not want to assign a reference name, leave the field blank.

- 3** Click on the browser button to select a bindery server and queue.

The Network Server and Queue window appears, similar to the following figure.



- ♦ **Network Server\Queue** displays the queue that will appear in the NDS tree and the queue's bindery server.
 - ♦ **List Only Attached Servers** allows you to limit the list of bindery servers to only those you are currently attached to or expand the list to all bindery servers in the network. If your network is large, building a list of all servers can take some time.
 - ♦ **Network Servers** lists servers outside of your NDS tree from which you may want to access queues.
 - ♦ **Queues** lists queues available on the server highlighted in the Network Servers list.
- 4** Select List Only Attached Servers to select whether you want this option turned on or off.
- To see a list of all available servers, turn off this option. Select the name of the server you want to attach to. Log in to this server at the prompt.
- 5** At the list of print queues that appears, select the queue you want to reference.
- If no queue names appear, no queues have been defined on that server. Select OK.
- 6** At the Create Print Queue dialog, select Create.

Understanding Bindery Reference Queues and Reference Print Servers

When you reference a bindery queue on a NetWare 3 server, a *bindery reference queue* is created on the NetWare 5 server to represent the NetWare 3 queue. This reference queue is actually a pointer to the real NetWare 3 queue.

A print server is also created on the NetWare 3 server with the same name as the print server on the NetWare 5 server that is referencing that queue.

This new NetWare 3 print server will not know the password for the NetWare 5 print server, and will not have a password when it is created. This means that the new print server can log into the NDS database without a password even though the NetWare 5 print server of that name requires a password.

As a network supervisor, you may wish to address this issue in one of the following ways:

- ♦ Leave the new print server as is (no password).
- ♦ Assign the same password to the new print server as is used by the NetWare 5 print server.
- ♦ Assign a different password to the new print server, which will limit access to the bindery queue being referenced.

Additional Setup Tasks

Before you can make printers available for network users to capture and print to, you need to complete Task 1 described below. Complete the additional tasks that are applicable to your hardware configuration.

Task 1: At the Netware server console, load PSERVER.NLM.

Type **LOAD PSERVER**, then follow the prompts to browse for the name of the print server you want.

You can also include the print server name in your load command. For example:

```
LOAD PSERVER .PS_1.NOVELL
```

This command can be placed in your AUTOEXEC.NCF file.

Specify the context if it is different from your server's bindery context.

Where a printer is physically attached, an NPRINT_{ER} must be loaded. If the printer is physically attached to the server, the printer is defined as auto load and PSERVER.NLM will automatically load NPRINT_{ER}.NLM.

NOTE: You must load a network port driver for any printer configured as Manual Load. Printers cabled directly to the network use print driver software stored in the printer.

Task 2: At a DOS or Windows 3.x workstation running Novell Client with a printer attached, load NPRINT_{ER}.EXE.

The port driver syntax is as follows:

```
NPRINTER printservername printernumber
```

For example, the following command connects printer PR_NEAR to the print server:

```
NPRINTER PS_NEAR 1
```

Task 3: At a Windows 95 workstation running Novell Client with a printer attached, run NPTWIN95.EXE.

NOTE: Each printer requires a network port driver (like NPRINT_{ER}.EXE or NPRINT_{ER}.NLM). For Windows 95* workstations, NPTWIN95.EXE serves this purpose. It automatically loads the port driver software (NPTR95.NLM and NPTDRV95.NLM) and NPRINT_{ER} Manager (a printer setup and management utility in Windows 95).

After starting the Novell Client™ software, double-click NPTWIN95.EXE (the port driver executable, usually located in the SYS\PUBLIC\WIN95 folder on your server), and then complete the Add Network Printer dialog box.

After the NetWare port driver is loaded, network workstations can send print jobs to the printer. For more information, see “Setting Up Printers Attached to Windows 95 Workstations” on page 51.

Upon completion of these tasks, the printer should be available to network users, who can then capture the printer.

Setting Up CAPTURE for Applications Not Designed for Network Printing

Many applications are designed for network printing. For example, WordPerfect* submits print jobs directly to the print queue. Because you can specify the number of copies, a banner page, and so forth from inside such

applications, you do not need specialized NetWare® utilities to send network print jobs. Such applications usually supply the necessary print driver (control sequences, functions, etc.) and include it with each network print job.

However, there are many applications that are not designed for network printing. CAPTURE is a command line utility that allows you to print from applications not designed for NetWare print services. It sets up redirection parameters for printing output from your workstation; the NetWare DOS Requester™ software then redirects the workstation output from an LPT port to the specified network printer or file.

For specific information see the following discussions:

- ♦ “Printing Tasks Handled through CAPTURE” on page 68
- ♦ “Command Syntax for Using CAPTURE” on page 68
- ♦ “Command Parameters for Using CAPTURE” on page 69
- ♦ “Using CAPTURE When Printing to a Network Printer” on page 74
- ♦ “Using CAPTURE When Printing to a Different NDS Context” on page 76
- ♦ “Using CAPTURE When Using Print Job Configurations in a Different Context” on page 77
- ♦ “Adding CAPTURE to Login Scripts” on page 78
- ♦ “Tips on Using CAPTURE” on page 79

Printing Tasks Handled through CAPTURE

You can use CAPTURE to perform the following tasks:

- ♦ Set flags to redirect DOS print jobs to a network printer (or file) from an application designed to print to workstation parallel (LPT) ports.

NOTE: CAPTURE cannot be used to redirect jobs to a serial port.

- ♦ Redirect print screen text to a network printer or file.

Command Syntax for Using CAPTURE

The following example represents a typical CAPTURE command:

```
CAPTURE [P=printername | Q=queuename] [L=1 or LPT1]  
[options]
```

For example, to redirect the LPT1 port to printer P_1 with no banner or form feed, type

CAPTURE P=P_1 L=1 NB NFF

If you are using a print job configuration, you do not need to specify other options except to override options in your job configuration:

CAPTURE J=JOB1

Material sent to the LPT1 port (for example, print screens or DOS piping) will now print at printer P1. To end the capture, type

CAPTURE L=1 EC

Table 6 Syntax for Common CAPTURE Tasks

Task	Syntax
Capture to network printer P1.	CAPTURE P=P1
Capture to print queue Q1.	CAPTURE Q=Q1
End a capture.	CAPTURE EC
Hold the print job in the queue.	CAPTURE HOLD
List the printing parameters for the job to be printed.	CAPTURE D
Redirect printer output to a file.	CAPTURE CR=<i>filename</i>
Redirect printer output to a printer.	CAPTURE P=<i>printrname</i>
Use print job configuration Charts.	CAPTURE J=CHARTS
View online help.	CAPTURE /?
View all online help screens.	CAPTURE /? ALL
View help for the Banner option.	CAPTURE /? B
View current capture settings.	CAPTURE SH

Command Parameters for Using CAPTURE

Replace *option* with one or more of the following. The options help you define how a job is printed. Separate options with a space or forward slash (/). Options are not case-sensitive.

Table 7 CAPTURE Options

Option	Syntax	Description
All	ALL	When used with the End Capture (EC) option, it ends the capture of all LPT ports. Used with the /? option, it displays all online help screens.
Autoendcap (End capture automatically)	AU	Specifies that the captured data be closed and sent to the printer when you exit an application. Default: Autoendcap enabled
Banner	B=<i>text</i>	Indicates what will appear in the lower half of the banner page. Limit is 12 characters. Replace <i>text</i> with any word or phrase up to 12 characters long. To allow spaces in a banner name, enclose the name in quotation marks (for example, ON THE GO) Default: The captured port (for example, LPT1)
Cancel	CA	Used in conjunction with the EC option. Ends the capture of data to LPT ports and discards the data that was being captured.
Cancel and end capture	ECCA	Ends the capture of data to LPT ports and discards the data that was being captured. If the CReate (CR=) option was used in the original Capture statement, the file is closed but not discarded.
Copies	C=<i>number</i> (1-65,000)	Specifies the number of copies. CAPTURE allows up to 65,000 copies in NetWare 5™ software. Default is 1 copy.
Create	CR=<i>path and filename</i>	Creates a file in which to store printed data. This option can be used only with the TI=, AU, or NA options.
Details	D	Lists the printing parameters for a capture. It also indicates whether a print job configuration was used.

Option	Syntax	Description
End capture	EC	Ends the capture of data to an LPT port. When used in conjunction with the L=number option, it ends the capture to the port number specified. When used without the L= number option, it defaults to the LPT1 port. When used with the ALL option, it ends the capture for all LPT ports. If data was being captured to a network file, the file is closed. The CA option can be used with this option to end the capture of data to LPT ports and discard the data that was being captured. Running CAPTURE again will end the current capture and assign new values.
Form	F=name or number	Specifies the form that the printer will use. (You must define forms using NetWare Administrator before users can use form names or numbers.) With an invalid name or number, CAPTURE gives a warning message. Default: F=0
Form feed	FF	Enables form feed after your print job has been printed. FormFeed enabled means that the printer starts printing the next job at the top of the next sheet of paper. However, if an application automatically enables form feed at the end of a file, adding this option causes an extra blank page to be fed through. Default: FormFeed enabled
Help	/? or /H	Displays general help information. Specific options are displayed for certain utilities on the initial help screen.
Hold	HOLD	Allows you to send a print job to a queue without having it print. To release the hold on the job, use NetWare Administrator.

Option	Syntax	Description
Job configuration	J = <i>name</i>	Indicates the print job configuration to use; does not require other options except to override print job configuration options. If no job configuration is specified and a default job configuration exists, it will be used. (Use the Details option to see what job configuration is being used.) If no default print job is used, you will need to specify either a printer or queue in the command line. You can also use this option to specify the context in which to look for a print job configuration if it is outside the current search path by identifying the container or user owning the configuration.
Keep	K	Ensures that the NetWare server keeps all data it receives from your workstation if your workstation hangs or loses power while you are capturing data to the server. When the server notices your workstation is no longer connected, it sends the data it received from your workstation to a print queue for printing. Use this option if you plan to capture data over several hours. If you do not include the Keep option and your workstation hangs while sending data to the captured port, the NetWare server discards the data it has received.
LPT port	L = <i>number</i> (1-9) or LPT <i>number</i>	Indicates the local LPT port you want captured. You can set network printers in your NET.CFG file by using the command NETWORK PRINTERS=number (1-9). You can specify LPTn instead of L=n.
Name	NAM = <i>text</i>	Indicates what will appear in the upper half of the banner page. Limit = 12 characters. Default: The username you used to log in
No autoendcap (Continue capture)	NA	Specifies that the captured data not be closed and sent to the printer when you exit an application. This allows more information to be added to the print job. When this option is used, the capture will not close unless you also specify TI= in the command. Otherwise, you must issue an EC command to close the capture.
No banner	NB	Suppresses banner page.
No form feed	NFF	Suppresses form feed at the end of a print job.

Option	Syntax	Description
No notify	NNOTI	Specifies that the user not get a message after the print job prints. Do not confuse this option with the notification option that informs designated users when the printer is having problems. Default: NoNOTIfy enabled
No tabs	NT	Specifies that tabs are not converted to spaces in a print job. This is also called byte stream. This option ensures that all the tab characters in your print job arrive at the printer unchanged. Use this option for most network printing situations, especially when printing graphics. Default is NT (byte stream).
Notify	NOTI	Specifies that the user get a message after the print job prints. This option does not notify you if the printer has a problem or if your job cannot be printed.
Printer	P=name	Indicates to which printer the print job should be sent; you may set a default in a print job configuration. Do not use this option with the Q= option.
Queue	Q=name	Indicates to which print queue the print job should be sent; you may set a default in a print job configuration. Do not use this option with the P= option.
Server	S=name	Specifies the NetWare server if you want the print job sent to a bindery print queue. Not used for Directory Services print queues. Default = current tree or server.
Show	SH	Shows the current status of LPT (parallel) ports. Do not use with other options.
Tabs	T=number (1-18)	Specifies the number of spaces to be substituted for each tab in a print job (default=8). Specify NT (No tabs) for byte stream print jobs.
Timeout	TI=number (0-1000)	Specifies the number of seconds to wait after the last data is received before closing the print job. If your timeout is not long enough, you may have problems printing some files, especially files with graphics. Increase the timeout if only parts of files are being printed or if the files do not print at all. Default: TI=0 (TImeout disabled)

Option	Syntax	Description
Version	<code>/VER</code>	Displays version information for this utility. Also lists the names and version number of all files required to run this utility.

Using CAPTURE When Printing to a Network Printer

To print to a network printer from an application that is not designed to run on a network, follow these steps.

- 1 Type the following at the command line:

```
CAPTURE P=prntername TI=number LPT1
```

- 2 Enter your application.
- 3 Either open or create the files you want to print.
- 4 Print your data using the print keys for your application.

Your application sends the print job to the parallel ports. Before the print job arrives at the port, CAPTURE sets flags that redirect the job to the appropriate queue.

- 5 When you have finished printing the files you need, exit the application.

In most applications, printing begins immediately after you send the job.

- ♦ If Autoendcap (AU) is enabled, your job is queued when you exit the application.
- ♦ If Timeout (TI) is enabled, the job is sent to the print queue in the specified number of seconds.

Printing Data without Exiting an Application

In most applications, printing begins immediately after you send the job.

- ♦ You can use the Timeout (TI) option to delay printing for a specified number of seconds without closing the print job and exiting the application.

If your timeout is not long enough, you may have problems printing some files, especially files with graphics. Increase the timeout if only parts of files are being printed or if the files do not print at all. The default is TI=0 (Timeout disabled).

- ♦ You can use the Notify (NOTI) option if you want to know when your job has been printed. For example, if a default print job configuration is being used, type

```
CAPTURE P=prntername TI=2 NOTI
```

Two seconds after the application last writes to the file, CAPTURE sends your print job to the print queue. A message appears across the bottom of your screen indicating that your job has been printed.

Printing Data to Different Parallel Ports

Suppose you often use CAPTURE to print from two different applications: AppA and AppB. AppA does *not* allow you to designate which parallel port to send print jobs to; therefore, its print jobs are sent to LPT1. However, AppB has a SETUP program that allows you to designate a parallel port.

Suppose also that AppA requires a different form than AppB and that you want to put form A (for AppA) in printer P_1 and form B (for AppB) in printer P_2.

Use the SETUP program in AppB to send your data through LPT2 to printer P_2. When you capture data from AppA, type

```
CAPTURE LPT1 P=P_1
```

When you capture data from AppB, type

```
CAPTURE LPT2 P=P_2
```

You can add other options to these commands.

Printing Screen Displays

To print information displayed on your screen, follow these steps.

- 1 Before you access the screen you want to print, type

```
CAPTURE P=prntername TI=number LPT1
```

You can include any of the CAPTURE options except SHow.

- 2 Access the screen you want to print.
- 3 Press Shift+Print Screen.

NOTE: DOS redirects print jobs to the port. If no printer is attached or port captured, your machine may hang. To prevent this, include the following line in the NET.CFG file on your workstation boot diskette:

LOCAL PRINTERS = 0

Saving Data from Several Applications or Files to a Single File

Suppose you want to move in and out of applications or files, saving data from each, and store all the data in one file called TEST on a network drive.

Use the Create (CR) and the No autoendcap (NA) options. Specifying No autoendcap allows you to move in and out of applications or files without prematurely closing the file you are creating.

To save data to a file to your current directory, type

```
CAPTURE CR=TEST NA TI=0
```

To save data to a file called TEST that is located in the REPORTS directory, type

```
CAPTURE CR=COUNT_SYS:SALES\REPORTS\TEST NA TI=0
```

To end the capture, type

```
CAPTURE EC
```

Saving Data to a NetWare Server You are Not Attached To

If you specify a NetWare server you are not attached to in your CAPTURE command, CAPTURE attaches you as user GUEST unless GUEST requires a password. In this case, you are prompted to enter both a username and a password before you continue with the capture.

Using CAPTURE When Printing to a Different NDS Context

If you want to print to a printer or print queue in an NDS™ context different from your current context, you can accomplish this in one of the following ways:

- ♦ If the printer or print queue you want to use is in a different context from your current context in the NDS tree, you can specify the location of the printer in your CAPTURE or NPRINT command.

Note that the example shows the CAPTURE command. You can do the same thing with NPRINT.

For example:

```
CAPTURE P=.P_1.DALLAS.SWRGN.NOVELL
```

(The period at the beginning indicates that the entire context is being specified.)

To view all container objects in the tree below your current context, type

CX /T

- ♦ Change your context to the one containing the printer or print queue object you want to access. You can use CX to change to the correct context.

To view the names of all printers or print queues in and below the current context, type whichever one of the following commands is applicable:

NLIST PRINTER /N /S

NLIST QUEUE /N /S

Using CAPTURE When Using Print Job Configurations in a Different Context

Occasionally, you may want to send print jobs using a print job configuration in another context.

In releases prior to NetWare 4.02, searches for print job configurations were limited to your current context and the context immediately above it in the NDS tree.

Beginning with NetWare 4.02, a new feature was added to the J= flag in CAPTURE and NPRINT that allows you to use a print job configuration anywhere in your NDS tree, so long as you have the rights to do this.

By using this feature, you can limit your search for the specified job configuration to a specific context or to the owner of the database that contains the configuration.

Note that the examples show only the CAPTURE command. You can do the same thing with NPRINT.

The syntax for this feature is as follows:

CAPTURE J=*jobname:context*

For example, to use printer P_1 to print a document using print job configuration RPT located in container object .DALLAS.SWRGN.NOVELL, your command would be as follows:

CAPTURE P=P_1 LPT1 J=RPT:.DALLAS.SWRGN.NOVELL

NOTE: Placing the period in front of the container name indicates that you are specifying an absolute context path; that is, you are showing the context all the way up to the root. If you want to specify only a relative context path (one that does not go all the way to the root) you should not use the period.

You can specify any context anywhere in the tree, so long as you have rights to the context or user you specify.

If you specify a user rather than a context, the command syntax is as follows:

```
CAPTURE J=JOB1:CN=username.SALES.NOVELL
```

Adding CAPTURE to Login Scripts

You can add a CAPTURE command to the container login script or to a user login script. For example, in the login script, type

```
#CAPTURE Q=queuename TI=n
```

or

```
#CAPTURE Q=queuename AU
```

You can include any other command options you want. If you include the TImeout or Autoendcap option in the login script, to print a screen display for example, you only need to press Shift+Print Scrn.

If you type a CAPTURE command at the DOS prompt, it overrides the command in your login script if you capture the same port.

Container Login Script

Suppose you want to include a CAPTURE command in the container login script for group SALES so they can use printer P_0. Add the following lines to the container login script:

```
IF MEMBER OF SALES THEN BEGIN  
#CAPTURE P=P_0 options  
END
```

Note that in the above example, if you are using a bindery queue, you would have to add a server name to your parameters (for example, **S=SALES-PRINT**).

User Login Script

Suppose a user often prints from a non-network application by using CAPTURE. The user wants to send a file to printer P_1, which is servicing

queue Q_1. The user wants to print the file without a banner or a form feed and releases this job to the print queue five seconds after the application last writes to the file.

Add the following lines to the user login script:

```
#CAPTURE P=P_1 NB NFF TI=5
```

Tips on Using CAPTURE

- ♦ You do not need to use CAPTURE if you use a NetWare-aware application that is configured to send print jobs to printers or print queues.
- ♦ When setting up your NDS directory structure, keep printers, print job configurations, and users as close together in the tree as possible. CAPTURE is normally a very fast utility, but performance slows considerably if it is searching all around the network for objects and databases.
- ♦ For optimal performance, use the *Q=queue* option instead of the *P=printer* option. If you specify the printer name, CAPTURE will still have to find the queue.
- ♦ Use the *S=servername* option only if you are going out of your current NDS tree, not if you are capturing within your current tree. This option is intended primarily for use with NetWare 3™ (bindery) servers.
- ♦ If a print job is defined, CAPTURE will use all of the options in that job except those in the command line. The command line options override all other configuration options.
- ♦ Default options include a banner page, automatic endcap, one copy, no tabs, and form feed. You can set options by specifying a print job configuration or options at the command line.
- ♦ All options function with a preceding forward slash (/), but none require it except /VER and /?. No options are needed if a default printer or print queue is specified in a default print job configuration.
- ♦ Because CAPTURE settings must be reset each time you reboot your computer, consider placing the command in the system or individual login scripts.
- ♦ NetWare 5 allows you to specify the printer name instead of a print queue. You can still capture to print queues.
- ♦ CAPTURE only sets up redirection from parallel (LPT) ports; you cannot specify a serial (COM) port in CAPTURE.

- ♦ The NET.CFG file now includes a NETWORK PRINTERS=*number* option. Replace *number* with the number of printers (logical ports) you would like to capture at the same time (0-9). The default is 3.

For example, if you set

NETWORK PRINTERS=9

the CAPTURE command can be **CAPTURE L=9** even though the physical port doesn't exist.

- ♦ If you specify a print job configuration that has a large printer mode, you may need to increase the bytes (default 64, range 0 to 254) in the PRINTER HEADER=*number* option.

4

Optimizing

NetWare® 4™ and NetWare 5™ print services represent substantial performance gains over the performance of previous NetWare releases. However, network printing can be complex; printing performance on any network can be no faster than the throughput of the slowest component of the system.

Optimizing Network Printing Performance

Most performance problems you may encounter in a queue-based printing environment will result from causes unrelated to NetWare software. The following topics identify many of these causes and offer some recommendations for alleviating them.

- ♦ “Parallel Versus Serial Ports” on page 82
- ♦ “Software Version Incompatibilities” on page 84
- ♦ “Document Type” on page 84
- ♦ “Printer Configuration” on page 84
- ♦ “Computer Type” on page 86
- ♦ “Overburdened Servers or High Network Traffic” on page 88
- ♦ “Application and Driver Software” on page 88
- ♦ “Printer and Data Type” on page 89
- ♦ “Improving Output by Adding Resources” on page 90

Parallel Versus Serial Ports

The primary factor that affects network printing speed is whether you connect the printers to parallel ports or serial ports. Parallel ports normally are about two times faster than serial ports at 9,600 baud, and up to four times faster than serial ports at 4,800 baud. Unless distance requires the use of a serial port, use the parallel port for best performance.

Selecting the Best Type of Printers for Your Setup

The following information compares parallel and serial printers.

Parallel Printers

Parallel port speeds vary greatly, but for the most part they are much better than serial port speeds. Here are some characteristics of parallel printing:

- ♦ Much faster than serial
- ♦ Ten feet maximum standard distance; some cables guarantee 150 feet
- ♦ Limited error checking but relatively error-free
- ♦ Interrupts set by the installer
- ♦ Universally compatible

Laser printers that seem otherwise similar may have varying maximum parallel port speeds. Consult with your printer vendor if this is a major issue for you.

NPRINTER.EXE software for NetWare 5 and RPRINTER for releases after NetWare 3.11 can send data to a printer's parallel port as fast as most laser printers can receive it. The current limit is about 35KB per second and will increase as new versions take advantage of new hardware that is likely to appear.

Serial Printers

Here are some characteristics of serial printing:

- ♦ Transmits data more slowly than parallel
- ♦ Standard maximum distance 25 feet; some cables guarantee 500 feet
- ♦ Has better error checking capability
- ♦ May require less expensive cabling

- ♦ The installer sets interrupt, XON/XOFF, parity, baud rate, data bits and stop bits

Serial ports are essentially limited by the baud rate used. In general, the data rate in bytes per second will approximate the baud rate divided by ten. At 9600 baud, the maximum data throughput is about 0.96K bytes per second. NPRINT.EXE for 4.0 and RPRINTER for releases after NetWare 3.11 support 19.2K baud and 38.4K baud, which yield maximum data throughputs of about 1.92K bytes and 3.84K bytes per second, respectively.

Estimating Data Transmission Rates

With bit-mapped graphic images, including text output from many word processing configurations, printer speed may be limited solely by how fast the data can pass through the workstation's print port to the printer.

Choose an interface that is fast enough to keep up with the bulk of the print jobs to be run on a particular printer. To do this, you will need to estimate the data transmission rate for that printer.

- ♦ For printers rated in characters-per-second (CPS), use the CPS rating for the preferred font and point size as the estimated data transmission rate. Assume that only print engine limitations will limit printer output.
- ♦ For page-per-second rated printers, estimate print data transmission this way:
 - ♦ For a representative print job, count the number of pages to be printed.
 - ♦ Print the job to a file and record the finished file size in bytes.
 - ♦ Divide the total pages (pages-per-job) by the pages-per-minute and multiply by 60 to yield seconds-per-job.
 - ♦ Divide the total bytes (bytes-per-job) by seconds-per-job to yield the bytes-per-second needed to keep up with the print engine.

For example, a six-page job would take a minimum of 60 seconds on a 6-page-per-minute laser printer. If the job printed 12,000 bytes (a likely low end for plain text), the target throughput is 0.2KB per second. The same job on a 17-page-per-minute printer would yield a target throughput of 0.6KB per second.

For another example, a one-page graphic of 1 million bytes would target the 6-page-per-minute printer at 100KB per second and would target the 17-page-per-minute printer at 283KB per second.

This method of estimating data transmission is not useful for PostScript or other page description language printing which requires print job formatting at the printer.

If possible, use an interface that can provide print data transmission rates as fast as the target throughput calculated above.

Software Version Incompatibilities

The factor having the next greatest impact on printing performance after port type is the application and print driver version. To avoid difficulties with either, you should maintain a record of all versions, configurations, and type of applications for each of your installations.

Many printing problems can be resolved by updating to the latest queue-based print services files. Check Novell Support Connection for updates:

<http://support.novell.com/>

Test all updates and note changes in performance before distributing new versions to end users.

Document Type

The third most important factor affecting printing performance is the type of documents you are printing. Files containing graphics require considerably more time to print than files consisting of straight text.

Printer Configuration

Polled versus Interrupt Mode

When configuring printers in NetWare 5, the default is polled mode. Polled mode, while theoretically not as fast as interrupt mode, still sends data faster than most printers can process it.

The advantage of polled mode is that it eliminates any possibility for interrupt conflicts with different hardware configurations. However, on complex printing setups with multiple printers running off a single workstation, polled mode may noticeably slow the execution of other tasks running on that workstation.

On a workstation that is running only NPRINTERR with no other operations assigned to it, interrupt mode should be faster than polled mode.

On a non-dedicated workstation, polled mode usually provides the best performance.

Buffer Size

On workstations running NPRINTERR, throughput is affected by the buffer size defined for the printer. On dedicated workstations, no non-printing resources require memory on the machine, so larger buffers will speed up your printing without degrading the performance of other workstation tasks.

With no load on the network, maximum data rate can be achieved with any buffer size larger than 5KB. The default buffer size is 3KB. As network traffic increases, packet delays decrease throughput for any buffer size. For very busy networks, a buffer size of 20KB may be desirable to ensure having enough data stored to carry over long packet delays. The buffer size needed for maximum data throughput will range from 6KB to 20KB depending on the traffic load on any particular network.

On non-dedicated workstations, you should normally use the default buffer size of 3 KB. A high buffer size may slow down your workstation because it requires more memory, even though printing speed may increase.

Try different settings to get the best performance from your own setup. For example, if the printer is printing a lot of graphics data, you may want to increase the buffer size.

Timer Tick Values

If your workstation is bogging down due to printing, increase the timing interval when you load NPRINTERR. This is done by adding the /T=1-9 option to the NPRINTERR command.

The higher the tick setting, the faster the overall workstation performance, but with this increase in overall performance comes a decrease in printing performance.

A timer tick value of 2 takes twice as long to service a job as a timer tick value of 1. The allowable range is 1-9.

The timer tick value in polled mode is proportional to the length of time a job will take to print, assuming that the printer is capable of printing at the data throughput speed.

Queue Sampling (Polling) Interval

Set the queue sampling (polling) interval in your printer configuration to fit your network's usage patterns

The delay between the time a job enters an empty queue and when it starts printing is determined by the printer's Sampling Interval setting. In NetWare 5, this parameter can be set in NetWare Administrator. The default is 5 seconds. The maximum is 255 seconds.

When a printer is idle, the print server assigned to that printer queries the assigned queue at regular intervals. The sampling interval is the number of seconds between each query.

This interval also represents the maximum wait-to-start time for a print job once it enters an empty queue (assuming no other queues are involved and the printer is ready). On average, the wait will be half of the maximum time. For single-page, text-only jobs, this delay may be the bulk of the total wait time.

If such jobs are common, try lowering this setting. However, many idle printers making frequent queries can add noticeably to network traffic. A reasonable compromise must be reached, based on your network's configuration and usage characteristics.

Computer Type

Performance may be limited by slower computers. Use faster machines whenever possible on your system, especially for servers that will be handling the most traffic and workstations tied to fast printers.

NPRINT for NetWare 5 is a fast print utility. Using older, slower machines with fast printers can result in situations where printer data throughput is so high as to impose noticeable delays on foreground tasks.

These delays will be more noticeable on machines with slower processors and slower clock speeds.

In such situations, these delays can be reduced or eliminated by setting the buffer size to 3KB to limit throughput. (This the default setting.) This can be done in NetWare Administrator.

The least influential factors for low-end network systems are the type of hardware you use (for the file server, print server, and workstation) and the NetWare print service configuration you select. By low-end, we mean a

network where the print queue typically contains only one job at a time. You can increase printing speed by increasing the speed of the workstation CPU. However, remember that printing one job in a queue requires the application to finish before the print service takes over and sends the job to a printer.

Make sure that file server and workstation hardware are appropriate for the tasks to be performed. Upgrading any component, such as replacing a slow hard drive with a faster hard drive, can usually increase performance, but may not if the upgraded component is limited by some other bottleneck in the system.

The performance of NetWare servers can be degraded by excessive file activity. Adding random access memory (RAM) to a server for use by NetWare file caching may increase performance on busy servers.

Printer Languages

In the printer, a formatter converts the print data to dot patterns, storing enough dots to make a complete physical cycle, usually a single pass of a print head or a single page. The formatter accepts print data in one or more forms, sometimes called printer languages. Formatters that handle more than one such language may include commands to switch between languages, or they may switch automatically by analyzing the data stream.

Such languages fall into two general categories:

Printer languages such as PCL, HPGL, and ESC-P. These languages use data streams in which the data consists of (1) text bytes, (2) 2-5 byte command strings for horizontal and vertical spacing and line- image (vector) graphics, and (3) strings of bit-image (raster) graphics. This data is easily and quickly converted.

Page description languages (PDLs), such as PostScript (PS) and PCL-V. These languages are actually a subset of the printer languages group, but they use much more complex data streams. Consisting largely of verbose English phrases and programmatic constructions, PDLs allow more complex data manipulations than the simpler printer languages, but require more time to convert.

Choosing the right printers for your network involves more than determining a printer's output speed. PostScript printers can accommodate most inconsistencies that PCL printers cannot, so if possible, make sure your printers are PostScript compatible.

Overburdened Servers or High Network Traffic

Performance may be limited by too few servers or an excessive amount of traffic on the network itself. Additional servers may reduce the load on an overburdened server.

As network use increases, delays in delivery of data packets may increase.

- ♦ Increased Ethernet traffic increases packet-start delays and the possibility of packet collisions.
- ♦ Packet collisions require data to be retransmitted, possibly slowing delivery of print job data to the printer.
- ♦ On a token-ring network, traffic directly increases the delay in receiving tokens and the start of data transmission.

Proper planning of the total network using individual segments separated by routers and bridges can keep localized network traffic at reasonable levels.

Effective network administration, including the careful division of print resources among file servers and workstations to reduce multi-hop links on common paths, also can help reduce print job delays.

Application and Driver Software

Generating print data is often the most time-consuming stage of the printing process. In the simplest situations, such as printing directly from DOS, data generation is essentially instantaneous. However, word processors may take from several seconds to several minutes per page to generate data, with delays increasing with the addition of graphics and complex fonts or formatting. Generating graphical data using AutoCAD software or other types of visualization applications may take from several seconds to many hours per page.

Using different drivers can result in dramatic differences in both the speed at which data is generated and the quality of the data generated. While sometimes these differences are a trade-off between speed and quality, there are other cases where one driver will supply both better quality and faster performance than another.

For example, AutoCAD output using an HPGL driver is usually several times faster than output using a PCL driver. If the target printer can use either driver,

using the HPGL driver will increase data generation speed while providing output of equal or superior quality.

Be sure to match application and driver for best performance. When possible, choose application software and print drivers that are efficient for the tasks to be performed.

- ♦ Install the applications that take the most time and are used the most often on the fastest workstations available.
- ♦ Investigate the driver/application options available for a particular task. Be sure to consider drivers produced by third-party manufacturers.
- ♦ Test the efficiency of each option with one or two representative tasks.

Select the best possible combination from your tests.

Printer and Data Type

Another important printing bottleneck is in the printer itself and the type of data being sent to the printer.

For most jobs on non-laser (head-pass cycle) printers and for printing plain text jobs on laser (page cycle) printers, the physical printer engine is usually the limiting factor. The speed of the printer is rated in pages per minute for page cycle (such as laser) printers and characters per second for head cycle printers.

When a page description language (PDL) such as PostScript is used, the formatter in the printer may be the limiting factor. The speed of PDL formatting varies greatly between printers. Unfortunately, the technical specifications for most printers seldom address this parameter.

Non-PDL print jobs that include a lot of graphics or formatting may send so many bytes per page that the interface may become the limiting factor. This is discussed in the following section.

It matters little whether you connect network printers directly to the NetWare server, to an external queue server, or to a workstation. One notable exception to avoid is running NetWare 2 core print services on a loaded 286 NetWare server.

Printing to a local printer from a network workstation is not much faster than printing to a network printer. The reason for this is that once printing port limitations are equalized, the application controls speed more than the

network does. More precisely, in many instances the lag time between the print request and transmission on the network is greater than the transmission time on the network.

Suggestions

Use a printer that is appropriate for your needs.

- ♦ Make sure laser, thermal transfer, and other advanced printers have NetWare print device definition (a .PDF file) available prior to purchase, unless one comes with the printer.
- ♦ If printing is frequent and if time and quality are paramount, a fast laser printer may be necessary.
- ♦ If you use PostScript or another high-level PDL for the majority of your print jobs, the speed of the printer's formatter becomes more important.
- ♦ If the mix of your print jobs contains mostly plain text, the speed of the print engine (as described in pages per second or characters per second) is of primary importance.
- ♦ Advanced printers, such as laser and thermal transfer printers, may require complex drivers to handle printer control information. Since software is now available to drive most of these printers, there should be no problem.

Improving Output by Adding Resources

In some situations, you can increase the printing output on your network by using additional resources.

- ♦ More than one printer may service a single queue. This can be useful when you have similar printers in close proximity by providing increased throughput and avoiding work stoppage if one printer fails.
- ♦ More than one queue may be assigned to a single printer. Among other things, this allows a full queue attached to a failed printer to be assigned to a running printer, which will then print jobs from both the original and the newly added queue.
- ♦ While only one print server can run on a NetWare file server at a given time, that single print server can service up to 255 printers under NetWare 5.

Performance factors, however, may limit the number of printers that one print server can service effectively.

Preventing Printer Problems

The following suggestions are not intended to be prescriptive or comprehensive. Always refer to the documentation accompanying your printer before attempting any preventive maintenance on the machine.

- ♦ Vacuum around inside occasionally to prevent a build-up of loose paper particles.
- ♦ Make sure that any belts used are at the proper tension.
- ♦ Clean the paper and ribbon paths periodically. Use a dry lint-free cloth. Plastic gloves will protect your hands from ink residue build-up.
- ♦ Clean the corona wires and rollers on a laser.
- ♦ Do *not* lubricate any moving parts, except as directed by your owner's manual.
- ♦ Try to maintain a narrow range of temperature and humidity around printers. Some printer components may be sensitive to environmental changes.

For suggestions about specific kinds of printers, see the following topics:

- ♦ “Preventing Problems with Laser Printers” on page 91
- ♦ “Preventing Problems with Dot Matrix Printers” on page 92

Preventing Problems with Laser Printers

- ♦ Toner cartridges can open in transit and create a mess. Always ship them in their protective sealed packaging and separately from the printer.
- ♦ Be sure to take the time to clean the corona wire and the roller every time you change the print cartridge.
- ♦ Laser printers need to dissipate a lot of heat. Give them adequate ventilation.
- ♦ Refilled toner cartridges work fine and save money, as long as they have only been refilled once. After that, they can become unreliable. Patronize only reputable vendors that you know refill them only once.

- ♦ Be careful when using envelopes and address labels in laser printers that are not intended for laser use. If the glue melts during fusion, there could be expensive damage.

Preventing Problems with Dot Matrix Printers

- ♦ Make sure the print head has enough free air around it to dissipate heat. Do not place other electronics too close to it.
- ♦ Use good quality ribbons. The cheap ones may use ink that lacks needed lubricants or uses an acid that can hurt your print head over time.
- ♦ Do not turn the platen head using the knob when the printer is on. This can damage the stepper motor. A network administrator may wish to use the knob when first loading a new box of paper and then remove it from the machine.
- ♦ Dot matrix printer ribbons will dry out eventually if they are not used.
- ♦ Some dot matrix printers do not have the strength of impact to deal effectively with multi-part forms.
- ♦ Check with the Seiko Epson Corporation before trying to replace the print head on its older dot matrix models. Some of these routinely burned out the main circuit board when the print head failed.
- ♦ It is often cheaper to get a standard stepper motor from a local electronics store than to order it by part number from the printer's manufacturer.
- ♦ A dot matrix printer has more control of its dot placement up-and-down than right-to-left. Its right-to-left motion is precise to 1/216th of an inch. Vertical spacing is accurate to 1/240th. This will effect the appearance of detailed graphics.

5

Managing

After you have completed the initial setup and configuration tasks described in the Setting Up section, you may want to further optimize your printing resources to meet the specific needs of your users. In addition to optimizing the way you have set up your printers, print queues, and print servers, you may also want to optimize the way you have set up job configurations, printer forms, print device definitions and modes, and event notification.

Overview of Queue-Based Printing Tasks

The following table lists the printing tasks you can accomplish in NDS with NetWare Administrator.

Table 8 Printing Tasks Performed with NetWare Administrator

Object Class	Task	Procedure Location
Print Queue	Assign a print queue to a printer	"Viewing the Assignments for Printing Objects" on page 96
	Assign queue operator flags	"Assigning Queue Operator Flags" on page 110
	Create a print job configuration	"Creating Print Job Configurations" on page 133
	Create a print queue	"Creating Print Queues" on page 33
	Reference a bindery queue	"Referencing Bindery Queues" on page 63
	Delete a print queue	"Viewing the Assignments for Printing Objects" on page 96

Object Class	Task	Procedure Location
Printer	View or modify print jobs	"Viewing or Modifying Print Jobs" on page 110
	View or modify a print queue	"Managing Print Queues" on page 110
	View print queue assignments	"Viewing the Assignments for Printing Objects" on page 96
	Assign a print queue to a printer	"Assigning Print Queues to Printers" on page 40
	Move a printer	"Moving Printing Objects" on page 96
	Rename a printer	"Renaming Printing Objects" on page 97
	View or modify a printer	"Managing Printers" on page 98
	View printer status	"Viewing or Modifying a Printer's Status" on page 101
Print Server	Assign a printer to a print server	"Assigning Printers to Print Servers" on page 42
	Audit a print server	"Enabling and Viewing the Print Server Auditing Log" on page 119
	Create a print server	"Setting Up Print Servers" on page 37
	Delete a print server	"Deleting Printing Objects" on page 97
	View status of a print server	"Viewing Your Printing Layout and Status" on page 117
	Move a print server	"Moving Printing Objects" on page 96
	Unload a print server	"Unloading Print Servers" on page 123
	View print server assignments	"Viewing the Assignments for Printing Objects" on page 96
	View your current printing layout	"Viewing Your Printing Layout and Status" on page 117
	Modify a print server	"Managing Print Servers in NetWare Administrator" on page 117

Object Class	Task	Procedure Location
Container object	Create print job configurations to simplify using CAPTURE and NPRINT.	"Creating Print Job Configurations" on page 133
	Create a print device definition for use in print job configurations	"Creating Print Device Definitions" on page 144
	Create or modify printer forms	"Creating Printer Forms" on page 138
	Import a print device definition for use in print job configurations	"Importing Print Device Definitions" on page 148
	Modify a print device definition for use in print job configurations	"Viewing or Modifying Print Device Definitions" on page 145
	View your current printing layout	"Viewing Your Printing Layout and Status" on page 117
User	Create print job configurations to simplify using CAPTURE and NPRINT	"Creating Print Job Configurations" on page 133

Managing Your Printing Objects

NetWare print services has a dialog in NetWare Administrator for each of the three types of printing objects: Print Queue, Printer, and Print Server.

You access printing objects using the same method used for other objects in the browser.

WARNING: Because the pages are all part of one dialog, do not choose OK or Cancel until you are finished with all pages and are ready to close the object dialog. If you specify changes in several pages and decide you do not want to keep some of the changes, remember the following:

1. You must manually delete unwanted information from the fields.
2. If you choose Cancel, you can choose whether you want to save changes or not. If you choose not to save changes, you'll lose the changes you *want* to keep in the other pages.

Like other NDS leaf objects, you can move, delete, or rename printing objects.

You cannot copy NDS objects, but you can create aliases to reference objects in other contexts.

For specific information, see the following:

- ♦ “Moving Printing Objects” on page 96
- ♦ “Viewing the Assignments for Printing Objects” on page 96
- ♦ “Renaming Printing Objects” on page 97
- ♦ “Deleting Printing Objects” on page 97

Moving Printing Objects

To move an object, select the object in the browser and choose Move from the Object menu, or hold down Ctrl while dragging a leaf object and dropping it onto another container.

When an object is moved, the name is changed to reflect the new context.

Moving an object is like changing part of the object's complete name or like changing its context.

When you move an object, all references and assignments to the object are automatically changed as well.

Viewing the Assignments for Printing Objects

The Assignments pages for the Print Queue, Printer, and Print Server object dialogs show the current assignments for those printing objects. Use the following steps to view printing assignments.

- 1** Select the printing object you want to view in the browser.

The dialog for that object appears.

- 2** Select the Assignments page, as shown in the following figure.

Figure 15 Typical Printing Object Assignments Page

Printer : P1

Assignments

Print Server:
PS-Sales.Sales.Novell

Print Queues:

Queue	Priority
Q1.Sales.Novell	1

Default Print Queue:
Q1.Sales.Novell

Priority: 1

Buttons: Add... Delete

Right Sidebar Tabs: Identification, Assignments, Configuration, Notification, Features, See Also, Printer Status

Bottom Buttons: OK Cancel Help

NOTE: A complete graphical representation of your printing setup can be obtained by viewing the Printing Layout page available from the Organizational Unit or Print Server dialog accessed from the browser.

Renaming Printing Objects

When you rename an object, all references and assignments to the object are automatically changed as well.

To use rename, select an object in the browser and choose Rename from the Object menu. If you select the option to save the old name, it is stored as a value in the Other Names property.

Deleting Printing Objects

When you delete an object, all references and assignments to the object are automatically deleted as well. Delete cannot be undone.

To use delete, select an object in the browser and choose Delete from the Object menu.

Managing Printers

NetWare Administrator allows you to perform the following printer management functions.

- ♦ “Configuring Printers” on page 98
- ♦ “Viewing or Modifying a Printer's Status” on page 101
- ♦ “Changing Printer Type” on page 104
- ♦ “Managing Printer and Job Event Notification” on page 107
- ♦ “Specifying Printer Features” on page 105
- ♦ “Changing a Print Queue's Priority” on page 109
- ♦ “Designating a New Default Print Queue” on page 109

Configuring Printers

The default printer configuration uses polled mode and LPT1 of the NetWare server running the print server.

- 1** From the browser, select the Details dialog for the printer you want to configure by double-clicking on the printer object.

The printer Identification page appears.

- 2** Complete or modify the fields as needed.

These fields are optional.

- ♦ **Other name** lists identification information associated with this printer that helps you search for and identify specific printers.
- ♦ **Description** describes the function the printer performs (such as print Sales documents).
- ♦ **Network Address** lists the 16-digit (8-byte) number associated with the NetWare Server or workstation that this printer is cabled to.
- ♦ **Location** specifies the printer's physical location (such as a person's office).
- ♦ **Department** shows the department or division that generally uses the printer.
- ♦ **Organization** lists the organization that can use the printer.

3 Select the Configuration page.

A printer Configuration page appears similar to the following shown for a parallel printer. This page allows you to store or define information about the hardware configuration of this printer and how it is used in the network.

Figure 16 Printer Configuration Page

The screenshot shows a window titled "Printer : P1" with a "Configuration" tab. The main area contains several fields: "Printer Type:" with a dropdown menu showing "Parallel" and a "Communication..." button; "Banner Type:" with a dropdown menu showing "Text"; "Service Interval:" with a numeric field set to "15" and up/down arrows; "Buffer Size in KB:" with a numeric field set to "3" and up/down arrows; "Starting Form:" with a numeric field set to "0"; "Network Address Restriction:" with an empty text field and a "Set..." button; and "Service Mode for Forms:" with a dropdown menu showing "Minimize form changes within print queues". To the right of the main area is a vertical sidebar with buttons for "Identification", "Assignments", "Configuration" (which is highlighted), "Notification", "Features", and "See Also". At the bottom of the window are "OK", "Cancel", and "Help" buttons.

4 Complete the configuration fields as required by your printer type.

- ♦ **Printer Type** displays the printer type. Selecting this field displays the list of types from which you can select. Types of printers currently appearing in this menu are

Parallel

Serial

UNIX[®] Printer

AppleTalk Printer

Other/Unknown (for example, configured by NPRINT)

XNP

AIO

Parallel, serial, XNP (eXtended NetWare Printer protocol)
AppleTalk, UNIX and AIO printers require unique settings.

The default values are for a parallel printer that is cabled to the LPT1 port of a NetWare Server running PSERVER.NLM.

- ♦ **The Communication parameter windows** allow you to view and modify the values defined for the selected printer type. Different dialogs are used depending on which printer type is selected. The appropriate window appears automatically whenever you change the printer type except when Other/Unknown or XNP (eXtended NetWare Printer protocol) is selected.

Communication can be used to access these parameter windows.

- ♦ **Banner Type** shows whether the printer produces banner pages in text or PostScript mode. The banner type must match the default printer type.
- ♦ **Service Interval** shows how often the print server checks the print queue for print jobs going to this printer. The default is every 5 seconds. Values from 1 to 255 are allowed.
- ♦ **Buffer Size in KB** shows how large each piece of data sent to this printer can be. The default is 3 KB (3,072 bytes). Values from 3 to 20 are allowed.
- ♦ **Starting Form** shows the number of the printer forms that this printer will service when the NetWare port driver is loaded. Printer forms are defined in the Organization or Organizational Unit object above this printer. Any Form Number defined there can be used here (values from 0 to 254 are possible).
- ♦ **Network Address Restrictions** shows the network addresses that this printer can use. Set is used to add an IPX network address to this field.
- ♦ **Service Mode for Forms** determines how forms needed for print jobs affect the order in which the print server processes those jobs. Selecting this field displays the list of service modes from which you can select.

When a print job requests a printer form other than the form currently mounted in the printer, the print server does not service the job until a print server operator reports that the new form is mounted. A print

server operator can use NetWare Administrator to mount the new form.

The following service mode options determine how often the print server requires you to change printer forms:

Change forms as needed. The priority of each print queue and the order of print jobs in the print queue determine which print job to service next. You might have to change forms often.

Minimize form changes within print queues. The print server requires you to mount a new form for a print job before servicing print jobs with the currently mounted form in a print queue with a lower priority.

Minimize form changes across print queues. The print server services all print jobs requiring the currently mounted form before requesting a form change. Print jobs in lower priority print queues that require the mounted form are serviced before print jobs in a high priority print queue that require a different form.

Service only currently mounted form. The print server never requests a form change. If no print job requiring the current form is available, nothing is printed.

- 5 When you are finished, select OK.

Viewing or Modifying a Printer's Status

You must be an operator or user of a print server that services a printer to be able to see the printer's status.

Use the following procedure to view a printer's status.

- 1 In NetWare Administrator, select the Details dialog for the printer you want to configure.

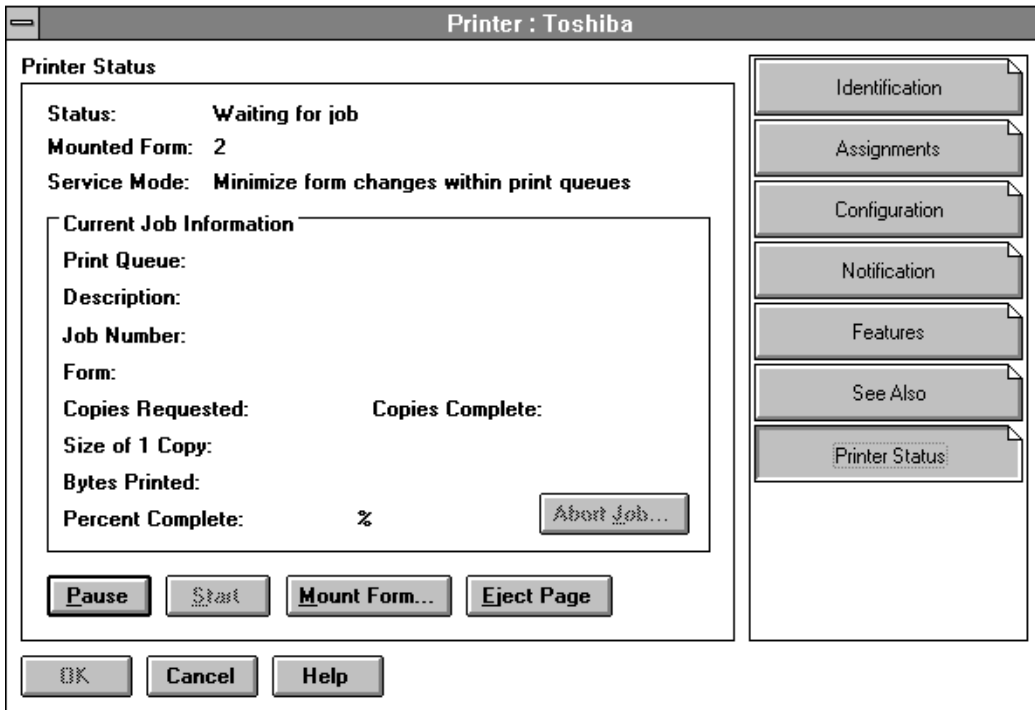
The printer Identification dialog appears.

- 2 Select Printer Status.

A dialog appears similar to the following showing the various status elements for printers.

If the printer status option does not appear, the printer is not connected.

Figure 17 Printer Status Dialog



3 Modify this printer's status as necessary.

- ♦ **Status** shows the current status of this port driver and printer. Possible statuses include the following:

Not connected
Waiting for form
Out of paper
Printing
Paused
Stopped
Off-line
Private
Ready
Waiting for job
Ready to go down

NOTE: The port driver (NPRINTER) status for a defined but unattached serial printer is Waiting for Job even though the printer is not attached, and

the printer status is Running. If a print job is put into the queue for this printer, the port driver status changes to Ready (Waiting for Printer) or Printing Job but the printer status changes to Offline.

Defined but unattached parallel printers show a status of Not Connected.

- ♦ **Mounted Form** shows the number of the form that is currently mounted in the printer. Only print jobs that specify this printer form number can be printed until a new printer form is mounted by selecting Mount Form.
- ♦ **Service Mode** shows which service mode is being used by this printer and its associated print queue. The Service Mode determines how jobs within a print queue are organized for the most efficient use of the printer.
- ♦ **Current Job Information** includes all of the information about the print job that is currently being printed on this printer. Most of this information can only be changed by going to the print queue and selecting this print job from the list of jobs.

Print Queue indicates the print queue that is submitting this print job.

Description indicates the banner name. By default, the banner name with CAPTURE is the port and with NPRINT it is the filename.

Job Number is the print job ID.

Form shows which printer form this print job is using. This print job cannot be printed unless this Form matches the Mounted Form field above the Current Job Information.

Copies Requested indicates the number of copies of this print job that the User who submitted it requested to be printed.

Copies Complete indicates how many of those copies requested have been printed so far.

Size of 1 Copy indicates the size of each copy of this print job. This is like the File Size field when you see the details of a print job within the print queue.

Bytes Printed indicates the total number of bytes in one copy of a print job that have been printed

Percent Complete indicates how much of this print job is completed, which is determined both by the size of one copy and the number of copies requested for this print job.

- ♦ **Abort Job** allows you to cancel this print job and immediately stop printing.
 - ♦ **Pause** changes the status of this printer to Paused. If no jobs are printing and Paused is used, the status is changed to Stopped. Only a print queue operator can perform this action.
 - ♦ **Start** changes the status of this printer from Paused to Printing, Stopped to Printing, or Stopped to Waiting for Job.
 - ♦ **Mount Form** allows you to specify a new printer form that you have mounted on this printer. When you use this option, the Mounted Form field will change to reflect the newly mounted form. Only print jobs that specified the new form can be printed.
 - ♦ **Eject Page** sends a command to this printer to eject the page that is being printed. This is like a Form Feed command.
 - ♦ **Close** closes this dialog and returns to the Identification page of the Printer object dialog.
- 4** Choose Close to return to the Identification page of the Printer object dialog.

Changing Printer Type

Use the following procedure to change your printer type in NetWare Administrator.

- 1** From the browser, select the Details dialog for the printer you want to configure by double-clicking on the printer object.

The printer Identification page appears.

- 2** Choose Configuration.

The printer Configuration page appears.

- 3** Using the down arrow to the right of the Printer Type field, choose the correct printer type from the list.

For printers that attach directly to the network, select type Other/Unknown.

A dialog appears where you must check the communication values for the selected printer type. (Other/Unknown and XNP do not have a dialog; they are configured elsewhere.)

- 4** Make any necessary changes in the communication parameters dialog for this printer type.

See “Configuring Printers” on page 98 for information on these parameters.

- 5** Choose OK.

You return to the Configuration page.

Specifying Printer Features

The printer Features page allows you to store information about your printer, including the following:

- ♦ Printer language
- ♦ Amount of memory
- ♦ Supported typefaces
- ♦ Supported cartridges

You can access this information through searches. For example, you can search for printers with at least 4 MB (4096 KB) of memory and the Futura font.

- 1** From the printer's Identification dialog, select the Features page.

A page similar to the following is displayed:

Figure 18 Printer Features Page

Printer : p1

Features

Page Description Language:

Memory in KB:

Supported Type Faces:

Supported Cartridges:

OK Cancel Help

Identification

Assignments

Configuration

Notification

Features

See Also

Printer Status

2 On this page, specify the information you want to store:

- ♦ **Page Description Language** shows the languages supported by the printer. To add a language, choose the button to the right of the Page Description Language field and then choose Add for each language the printer supports.

A printer language is a protocol or type of printing that this printer can receive (for example, PCL, PCL-V, or PostScript).

Enter the main printer languages that this printer supports so that users can search for printers that support the language they need.

To enter other printer languages for this printer, choose the button to the right of the Page Description Language field. Add other descriptions in the Add Value dialog that appears.

- ♦ **Memory in KB** shows the amount of RAM installed in the printer.

- ♦ **Supported Type Faces** shows the fonts that the printer can use. You must enter the correct typefaces; they are not read from the printer.

A typeface is a collection of fonts in different stroke weights and sizes that this printer can produce (for example, Helvetica and Times Roman).

Enter the typefaces that this printer supports so that users can search for printers that support a typeface they need.
- ♦ **Supported Cartridges** lists the font cartridges that the printer can use. You must enter the correct cartridges; they are not read from the printer.
- ♦ **OK** saves changes in all pages of this dialog.
- ♦ **Cancel** closes this dialog without saving changes in any page.

Managing Printer and Job Event Notification

The printer's Notification page controls the objects that are notified when the printer requires servicing (for example, when it is out of paper or jammed). You can do the following:

- ♦ Add or delete User or Container objects that receive printer error messages
 - ♦ Specify how soon and how frequently printer error messages arrive
 - ♦ Specify that the print job owner receive the printer status messages
- 1** From the printer's Identification dialog, select the Notification page.

A page similar to the following is displayed:

Figure 19 Printer Notification Page

Printer : p1

Notification

Notification:

Notify	First	Next	
(Print job owner)	1	1	

← →

Add... **Delete**

☒ **Notify Print Job Owner**

Notification Settings

First [in Minutes]: 1

Next [in Minutes]: 1

Identification

Assignments

Configuration

Notification

Features

See Also

Printer Status

OK **Cancel** **Help**

2 On this page, configure your notification options.

The Notification list box shows objects that are notified about this printer.

- ♦ **Add** allows you to add objects to the Notify list.
- ♦ **Notification Settings** allow you to specify how long (in minutes) after an event that a first notice is sent to the objects in the Notify field and how long (in minutes) after the first notification of an event that subsequent notices are sent to the objects.
- ♦ **Delete** lets you delete the selected object from the Notification list box. If you delete the (Print job owner) entry, you can add it to the list by selecting the Notify Print Job Owner check box.)
- ♦ **Notify Print Job Owner** enters the print job owner as an object in the Notification list, so that the object that sends the print job receives

notifications. By default, this object is included in the Notification list.

- ♦ **OK** saves changes in all pages of this dialog.
- ♦ **Cancel** closes this dialog without saving changes in any page.

Changing a Print Queue's Priority

A print queue's priority determines whether the print server will send print jobs from that print queue to the printer before or after print jobs in other print queues assigned to the printer.

Use the following procedure to modify a print queue's priority.

- 1** Select a Printer object from the browser and go to the Assignments page.

The priority of the selected print queue is shown in the Priority field.

- 2** Enter the new priority for the selected print queue in the Priority field.

You can select a number from 1 to 10, inclusive. Print queues with lower priority numbers will be serviced before print queues with higher numbers.

- 3** Choose OK.

The priority is changed, and you return to the browser.

Designating a New Default Print Queue

Use the following procedure to designate a new default print queue.

- 1** Choose the arrow to the right of the Default Print Queue field.

The print queues listed above in the Print Queues list appear in the drop-down list box.

- 2** Select a print queue from the list.

The selected print queue appears in the Default Print Queue field.

The default print queue will be used for print jobs that specify a printer but do not specify a print queue (for example, with the CAPTURE command).

Managing Print Queues

NetWare Administrator allows you to perform the following print queue management functions.

- ♦ “Assigning Queue Operator Flags” on page 110
- ♦ “Viewing or Modifying Print Jobs” on page 110
- ♦ “Viewing Details of Print Jobs” on page 111
- ♦ “Viewing or Changing the List of Users for a Print Queue” on page 112
- ♦ “Viewing or Changing the List of Operators for a Print Queue” on page 113

Assigning Queue Operator Flags

By selecting the Details page from the Print Queue object dialogue, a print queue operator with appropriate rights can set flags that limit access to the selected print queue:

- ♦ **Allow Users To Submit Print Jobs** allows queue users to submit print jobs to the queue if the option is set to Yes.
- ♦ **Allow Service By Current Print Servers** allows assigned print servers to service print jobs in the queue if the option is set to Yes.
- ♦ **Allow New Print Servers To Attach** allows print servers to attach to the queue if the option is set to Yes.

Viewing or Modifying Print Jobs

Use the following steps to view or modify print jobs.

- 1** From the browser, select a print queue object.

The Print Queue object dialog appears.

- 2** Select Job List.

A list of print jobs in the print queue appears.

- 3** Do one of the following:

- ♦ **To view information about a print job**, select it. Then see the next section, “Viewing Details of Print Jobs” on page 111.
- ♦ *To hold a print job in the queue without printing it*, highlight it and select Hold.

- ♦ *To activate a print job currently on Hold status in the queue so that it can be printed, highlight it and select Resume.*
- ♦ *To delete a print job, highlight it and select Delete.*

NOTE: Most applications can send print jobs to a network printer or print queue. This is usually the easiest way to create print jobs with the correct format for your printer, etc.

Viewing Details of Print Jobs

You must be an operator of this Print Queue to change a print job that you did not submit.

- 1** From the browser, select a Print Queue object.

The Print Queue object dialog appears.

- 2** Select the Job List page.

A list of print jobs in the print queue appears.

- 3** Select the print job you want to view details about.

If you are an operator, or you submitted the print job that you are viewing, you can change any of the fields that are not grayed.

- ♦ **Print Job** shows the job number of this print job.
- ♦ **File Size** shows the file size, in bytes, of this print job.
- ♦ **Client** shows the name of the user that submitted this print job.
- ♦ **Description** shows a description that was entered for this print job.
- ♦ **Status** shows the status of this print job. For example: Ready, Held, or Active.
- ♦ **User Hold** indicates that the print job has been put on hold by the user who submitted the print job.
- ♦ **Operator Hold** indicates that the print job has been put on hold by the Queue operator.
- ♦ **Service Sequence** shows this print job's position in line to be printed.
- ♦ **Number of Copies** shows how many copies of this print job the print server will send to the printer.
- ♦ **File Contents** shows the type of file that was sent for this print job.

- ♦ **Byte Stream** indicates that this print job consists of a byte stream file, such as a graphic, or PostScript* file.
- ♦ **Text** indicates that this print job consists of a text file, containing only ASCII characters.
- ♦ **Tab Size** is used only with text files, and indicates how many spaces are sent to the printer each time a Tab character is received as part of the print job.
- ♦ **Form Feed** shows whether or not a form feed character is sent to the printer at the end of this print job.
- ♦ **Notify When Job is Printed** shows whether users are notified when this print job has been completed.
- ♦ **Entry Date** shows the date that this print job was submitted to the Queue.
- ♦ **Entry Time** shows the time that this print job was submitted to the Queue.
- ♦ **Form** shows which printer form will be used to print this print job. You can select from available printer forms using the drop-down box.
- ♦ **Print Banner** shows whether or not a banner page with identification information will be printed as the first page of this print job.
- ♦ **Name** indicates what will be printed as the name of the user who sent this print job. This is only valid if a banner page is printed.
- ♦ **Banner Name** indicates what will be printed as the name of the print job. This is only valid if a banner page is printed.
- ♦ **Defer Printing** indicates that the printing of this job is to be delayed until a later date and time.
- ♦ **Target Date** shows the date that this print job will be printed. This field is valid only if Defer Printing is selected.
- ♦ **Target Time** shows the time that this print job will be printed. This field is only valid if Defer Printing is selected.

Viewing or Changing the List of Users for a Print Queue

Objects that are listed as users of a print queue are allowed to submit print jobs to that print queue and to manage jobs that they submit.

The Users page lists users of the print queue. This list is created and maintained by the network supervisor.

Viewing or Changing the List of Operators for a Print Queue

Operators of a print queue are allowed to manage the print jobs in the print queue. This includes activities such as deleting print jobs or changing their order. Use the Operators page to record operators of a print queue.

Managing Print Server Functions

A print server is a *software* program that monitors and manages printers and print queues. PSERVER is the native NetWare print server that takes jobs from a NetWare® print queue and directs them (via NPRINT) to the assigned printer. In NetWare 5™ software, PSERVER is available only as a NetWare Loadable Module™ (NLM) program that can be loaded on a NetWare server.

Multiple print servers (PSERVER.NLMs) cannot run concurrently on the same NetWare server.

Third party print devices that connect directly to the network are also available. These products, when operated in either remote printer or queue server mode, provide similar functionality to PSERVER. For more information, see “Setting Up Network-Attached Printers” on page 60.

PSERVER typically uses about 27 KB of NetWare server RAM for each configured printer, depending on your buffer configurations.

After the print server is loaded, a port driver (NPRINT.EXE, NPTWIN95.EXE, or NPRINT.NLM) must be loaded for each network printer. The print server (PSERVER.NLM) must be loaded before an NPRINT can be loaded.

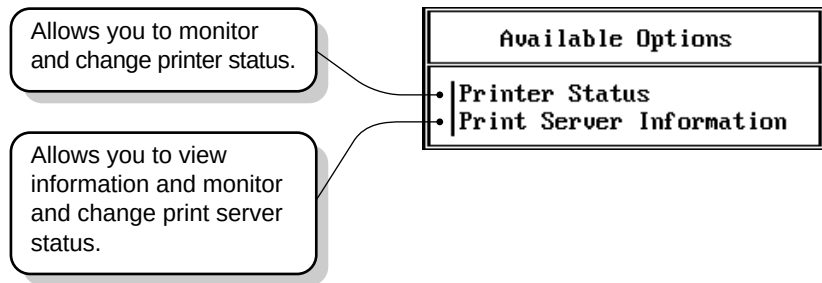
For specific information, see the following discussions:

- ◆ “Printing Tasks Handled through the Print Server” on page 114
- ◆ “New Print Server Features Since NetWare 3” on page 114
- ◆ “System Requirements for Managing the Print Server” on page 117
- ◆ “Managing Print Servers in NetWare Administrator” on page 117
- ◆ “Managing Print Servers at the Server Console” on page 123

Printing Tasks Handled through the Print Server

The following figure shows you the tasks you can do with PSERVER.NLM.

Figure 20 Available Options Menu



Keep in mind that only one print server (PSERVER.NLM) can be loaded on a NetWare server. If you need to service more than 255 printers, you can also load PSERVER.NLM at another NetWare server.

New Print Server Features Since NetWare 3

PSERVER.NLM for NetWare 5 represents a significant advancement over NetWare 3. This section describes the most important changes that have occurred.

Support for 255 Printers

The print server in NetWare 5 supports up to 255 printers. How effectively it can support a large number of printers depends primarily on the speed of your printers. The faster your printer, the greater the likelihood you will notice that performance has been affected by a large number of printers. For example, network-attached printers running in remote printer mode are usually capable of high printing speeds if the print server is not heavily loaded.

If the print server cannot service multiple fast printers without falling behind, you may notice that printing has slowed down. The print server is more capable of keeping up with multiple slower printers; therefore, you would probably not notice a difference except with the faster printers.

Another factor that may affect performance is how heavily loaded the NetWare server is to begin with, and how often the printers are required to perform. If most of your printers are frequently idle, you can support more printers than would be possible if the printers are constantly in use.

Increased Performance

In NetWare 5, the communication between PSERVER.NLM and remote printers is considerably faster than it was in NetWare 3™ software.

In most cases, the speed of the communication even in NetWare 3 was faster than data could travel through a parallel or serial port. So if you have a printer running that is attached to a workstation (using NPRINT or RPRINT), you probably will not notice much change. But the change should be noticeable with network-connect printers running in remote printer mode.

This improved communication means that network-connect printers can now be run in remote printer mode with little or no negative effect on performance. In NetWare 3, these printers had to be configured in queue server mode for highest efficiency.

An additional performance enhancement is the configurable queue polling interval feature described in the following section.

Configurable Queue Sampling Interval

Previously, queue sampling (polling) always occurred at 15 second intervals. If a query was made and no job was in the queue, the queue would not be queried again for 15 seconds. (As long as there were jobs in the queue, continual queries would be made.)

In NetWare 5, the default queue sampling interval is 5 seconds. This interval is configurable for up to 255 seconds, but the lower default setting will increase printer performance in most cases, especially when using a fast printer.

Support for Macintosh and UNIX

In NetWare 5, Macintosh and UNIX® printers can be serviced by PSERVER.NLM.

PSERVER Console

There is now a console on the print server that allows you to administer printers and print jobs. See “Managing Printers from the Print Server Console” on page 127.

Auto-Reconnect

In previous NetWare releases, if the print server was servicing queues on a file server that went down, the queue list was lost.

Now, if a queue resides on a remote NetWare server and that server goes down for any reason, service for that queue resumes automatically when the server comes back up.

Address Restrictions for Remote Printers

When you configure a print server, you have the option of putting an address restriction specifying that a printer must run from a specified address (a node address and network segment) in order to connect to the print server. If you retain the unrestricted option (which is the default), the print server will allow the remote printer to connect to it from any address.

Support for PostScript Banner

You can now configure a printer so that PostScript banners will be generated for that printer. When using this option, you must be sure to select a banner type that matches your default printer type.

Auditing Log

The auditing log provides tighter security and billing information about all jobs that have been printed. It can be read through NetWare Administrator.

In designing the auditing log, Novell® recognized that companies do accounting in a variety of ways. For this reason, the auditing log provides a basic default format based on ASCII and a fixed record length. Both characteristics are designed to make it as easy as possible to write a customized program to retrieve the information it needs in a format determined by a particular company.

The auditing log is sufficiently flexible to record whatever information a printer sends to it. Regardless of printer type, the log will record how many bytes a job took to print, the user who submitted the job, when the job entered the print queue, when the job was printed, and what printer serviced the job.

If the printer is an XNP type used by Macintosh or UNIX, the log might also indicate how long it took to print the job, and how many pages were printed.

System Requirements for Managing the Print Server

Before completing any tasks, you need the following:

- ☐ NetWare 5 server.
- ☐ Printer(s) functioning properly in their current environment. If a printer functions properly in its current environment (non-network or otherwise), it will work with NetWare print services. If your printer is not functioning properly, see “Troubleshooting General Printing Problems” on page 159.
- ☐ Print server, print queue, and printer that have been created and assigned.

NOTE: If a print server is running, you must bring it down and up again in order for certain changes to take effect, for example, when creating a new printer, assigning a printer to another print server, or enabling auditing. However, you do not have to reload the print server if you change print queue assignments for printers, create a print queue, etc.

Managing Print Servers in NetWare Administrator

NetWare Administrator allows you to perform the following print server management functions.

- ♦ “Viewing Your Printing Layout and Status” on page 117
- ♦ “Enabling and Viewing the Print Server Auditing Log” on page 119
- ♦ “Adding, Changing, and Removing Print Server Passwords” on page 122
- ♦ “Unloading Print Servers” on page 123

Viewing Your Printing Layout and Status

The Print Layout page in NetWare Administrator shows a map of your printing setup. You can see which print objects are assigned to each other and the status of each object. This information can help you quickly determine if printing is operational or which print objects may have problems.

The Print Layout page can be accessed from two locations in NetWare Administrator.

- ♦ The Details or object dialog box for a Container object
- ♦ The Details or object dialog box for a Print Server object

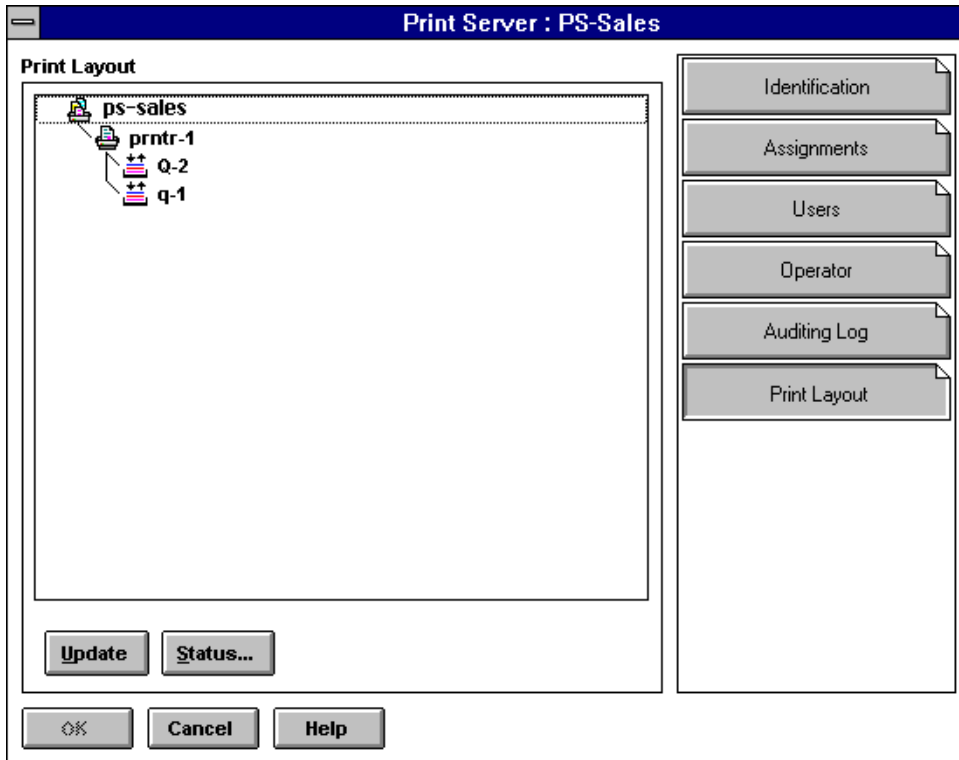
Print Layout Features

- ♦ A dashed line between objects means the connection is established for the current print server session only rather than configured to connect every time the print server is loaded.
- ♦ The status of the print server and each element on the display is represented visually through trouble icons along the left margin.
- ♦ You can invoke information about each object by highlighting the object and clicking on the right-hand mouse button.
- ♦ You can view print jobs in a queue by double-clicking on that queue's icon.
- ♦ You can expand and collapse an object by double-clicking on the left-hand mouse button.
- ♦ Update refreshes the print layout tree to reflect any changes with the print objects.
- ♦ Status provides a brief summary of the selected print object's details. For complete detail information, select the object in the browser and choose Details.

Status for print jobs is not available in the Print Layout page. You must manage print jobs from the Queue object the job is stored in.

The following figure shows a typical Print Layout page for a Print Server object.

Figure 21 Print Layout Page for Print Server



Enabling and Viewing the Print Server Auditing Log

The PSERVER auditing log provides information about all jobs that have been printed. Auditing records are retained as ASCII files so that they can be read with any text editor.

By default, no audit log is created. When you enable the audit log feature you can do the following:

- ♦ **View the log.** Use the scroll bars to browse through the current log.
- ♦ **Limit the log size.** By default, the log has no size limitations. The log's current size is displayed in the dialog.

- ♦ **Delete the log.** Deleting an audit log destroys the current log and, if auditing is enabled, starts a new log by the same name in the same directory.

In designing the auditing log, Novell has recognized that companies do accounting in a variety of ways. For this reason, the auditing log provides a basic default format based on ASCII text and a fixed record length. Both characteristics are designed to make it as easy as possible to write a customized program to retrieve the information it needs in a format determined by a particular company.

The auditing log is sufficiently flexible to record whatever information a printer sends to it. Regardless of printer type, the log will record how many bytes a job took to print, the user who submitted the job, when the job entered the print queue, when the job was printed, and what printer serviced the job.

If the printer is an XNP type used by Macintosh or UNIX, the log might also indicate how long it took to print the job, how many pages were printed, when the job was printed, and when the job was submitted.

To enable the auditing log from NetWare Administrator or to modify the log, use the following procedure.

Procedure

- 1** From the browser, choose the Print Server object you want to audit and, from the Object menu, select Details.
- 2** Select Auditing Log.

An Auditing Log dialog similar to the following appears.

Figure 22 Print Server Auditing Log

Print Server : PS-Sales

Auditing Log

Status: Enabled

Location of Auditing Log:
SALES\SYS:SYSTEM\56080007\PSERVER.LOG

Current Size: 715 KB

☐ Limit Size: 0 KB

Maximum Print Jobs: 0

Printer: CN=prntr-1.0=novell
client: CN=Admin.0=novell
print job: AUTOEXEC.BAT job id: 00616001 form: 00000
print queue: SALES/CN=Q-2.0=NOVELL
submitted: 4-06-94 3:49:45pm printed: 4-06-94 3:50:14pm
pages: 00000000 bytes: 00000262 duration: 000 minutes

Buttons: Disable Auditing, View, Delete

Buttons: OK, Cancel, Help

Right Sidebar: Identification, Assignments, Users, Operator, Auditing Log, Print Layout

3 Select Enable Auditing.

If you enable auditing, the print server maintains a log of the operations it performs. If the print server is already running, it needs to be brought down and loaded again for this change to take effect.

If you do not enable auditing, the print server will not write to the log. If the print server is already running, it needs to be brought down and loaded again for this change to take effect.

If the auditing log file becomes full, either by using all available disk space or by reaching the size limit set with the Limit Size option, the print server ceases storing auditing information. To avoid losing valuable accounting information, process or archive the information and delete the auditing log file on a regular basis.

4 Specify whether you want to Limit Size of the log file.

In this field, you should specify the maximum size (in kilobytes) that the auditing log file can reach before the print server stops appending auditing information. Without this limit it is possible for the file to grow until all available disk space is used.

- 5** After auditing has been enabled, unload and then reload the print server.
- 6** (Optional) Submit a print job to ensure that the log is recording information on print jobs properly.
- 7** To view the auditing log, select View.
- 8** To delete the auditing log, select Disable Auditing.
- 9** Select OK.

Adding, Changing, and Removing Print Server Passwords

For added security, you can limit access to your print server by assigning a password to it. Use the following procedure to do this with NetWare Administrator.

- 1** From the browser, choose the Print Server object you want to modify, and, from the Object menu, select Details.

The print server Identification page appears.

- 2** Select Change Password.

The Change Password window appears. (The Old Password field is permanently grayed.)

- 3** Complete the fields as needed.

- 3a** To assign a new password, type the new password in both the New Password and Retype New Password fields. Then select OK.

Only alphanumeric characters and underscores are valid. Passwords are not case sensitive.

- 3b** To remove a password, make sure that the fields are blank, then select OK. When prompted, confirm that you want to remove the password assignment by selecting Yes. (Cancel is the default.)

Unloading Print Servers

A print server can be created in NetWare Administrator, but it must be loaded at the server console. However, an active (Status: running) print server can be unloaded in NetWare Administrator with the following procedure.

If Unload is not activated, the print server may not be running. If it is running, you are not designated as an operator for that print server. In order to proceed, a designated print server operator must be logged in to the workstation you are using.

- 1** From the browser, choose the Print Server object you want to unload and, from the Object menu, select Details.
- 2** Select Unload.
- 3** Do one of the following:
 - ♦ Select Unload Print Server Immediately if you want the print server to go down without completing any current print jobs.

Print jobs in the queue will remain in the queue until the print server is reloaded or they are manually deleted.
 - ♦ Select Unload Print Server After Current Jobs if you want a print job already being printed to be completed before the print server goes down.

Other jobs in the queue will remain in the queue until the print server is reloaded or they are manually deleted.

Managing Print Servers at the Server Console

The procedures for performing print server management tasks at the server console are presented in the following discussions:

- ♦ “Command Syntax for Managing the Print Server at the Console” on page 124
- ♦ “General Print Server Management Functions Available at the Console” on page 124
- ♦ “Managing Printers from the Print Server Console” on page 127
- ♦ “Servicing NetWare 5 Clients and Queues with a NetWare 3 Print Server” on page 131

Command Syntax for Managing the Print Server at the Console

To load PSERVER.NLM, type the following at the NetWare server console:

```
LOAD PSERVER
```

The Enter Print Server Name window appears. Press Enter to browse the NDS tree for existing print servers in the Contents of Current Context window. Select the print server.

NOTE: If you have a bindery context set, it will be shown in the window. If the print server is in the bindery context, insert the print server name at the beginning of the bindery context. If the print server is not in the bindery context, use Backspace to clear the window, and then press Enter to browse.

If you know the name of your print server, provide the name in your command line. You may need to include the context path:

```
LOAD PSERVER [.CN=printservername.  
OU=container.O=container]
```

For example, to load print server PS-SALES in the Sales context of organization Novell, type

```
LOAD PSERVER .PS-SALES.SALES.NOVELL
```

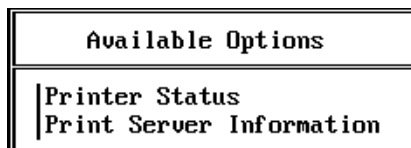
For automatic execution, place this command in your AUTOEXEC.NCF file.

To unload a print server at the command line of your console, type the following at the DOS prompt:

```
UNLOAD PSERVER
```

General Print Server Management Functions Available at the Console

When you load PSERVER.NLM, the Available Options menu appears:



The Print Server Information option brings up a window similar to the following:

Figure 23 Print Server Information and Status Window

Print Server Information and Status	
Version:	4.10
Type:	Netware Loadable Module
Advertising name:	SALES_PS
Number of printers:	1
Queue service modes:	4
Current status:	Running

Only the Current Status field can be modified from this window.

Version

This field shows the version of PSERVER.NLM being used with this Print Server object to control Print Services.

Type

The type of this print server. If it is not running, the type is shown as Unavailable.

A print server running on a NetWare 5 file server is of type NetWare Loadable Module (NLM).

NetWare 3 print servers might be either NLM™ or Dedicated DOS types.

NetWare 2 print servers might be NetWare Server VAP or Bridge VAP.

Advertising name

This field shows the name the print server uses in network communications.

Number of printers

This field shows the number of printers serviced by this print server.

Queue service mode

This field shows the number of the current mode that controls the order in which the print server services print jobs in the queue according to the printer forms the jobs are to be printed on. You can change this mode in NetWare Administrator.

Printer forms include information about the length and width of different types of paper used in your printer. You can designate printer forms to prevent your print jobs from printing on the wrong paper. The print server operator is notified when a form change is needed. Printer forms are configured in NetWare Administrator.

When a print job requests a printer form other than the form currently mounted in the printer, the print server does not service the job until a print server operator reports that the new form is mounted. A print server operator can use NetWare Administrator to mount the new form.

The following service modes determine how often the print server requires you to change printer forms:

- ♦ **Change forms as needed**

The priority of each print queue and the order of print jobs in the print queue determine which print job to service next. You might have to change forms often.

- ♦ **Minimize form changes within print queues**

The print server requires you to mount a new form for a print job before servicing print jobs with the currently mounted form in a print queue with a lower priority.

- ♦ **Minimize form changes across print queues**

The print server services all print jobs requiring the currently mounted form before requesting a form change. Print jobs in lower priority print queues that require the mounted form are serviced before print jobs in a high priority print queue that require a different form.

- ♦ **Service only currently mounted form**

The print server never requests a form change. If no print job requiring the current form is available, nothing is printed.

Current status

Pressing Enter at the Current status field produces a menu from which you can unload the print server if you wish. You can either unload the print server immediately or unload it after active print jobs have been completed.

NOTE: Do not change the status from Running unless you really want to bring down the print server. You do not receive a confirmation prompt.

- ♦ **Running**

The print server is currently running.

- ♦ **Unload after active print jobs**

The print server finishes any print jobs currently being printed; then it goes down.

- ♦ **Unload**

The print server is going down; current print jobs are returned to their print queues.

Managing Printers from the Print Server Console

The Printer Status option provides a list of printers that can be serviced by this print server. When you select the printer you want to monitor, the Print Server Console screen appears similar to the following.

Figure 24 Print Server Console Screen

NetWare Print Server v4.10		NetWare Loadable Module
Print server: SALES_PS.Novell		Status: Running
Printer: printer1.Novell		
Type: Automatic load (Local), LPT1	Printer control	
Current status: Waiting for job		
Queues serviced: (See list)		
Service mode: Minimize form changes within print queues		
Mounted form: 0		
NetWare server:		
Print queue:		
Print job ID:		
Description:		
Print job form:		
Copies requested:	Finished:	
Size of 1 copy:	Finished:	
Percent complete:		

In addition to monitoring the configuration and status of your printers, you can perform a number of administrative tasks from the Print Server Console as well.

On the following pages, some of the items in “Print Server Console Screen” on page 127 are explained.

Printer

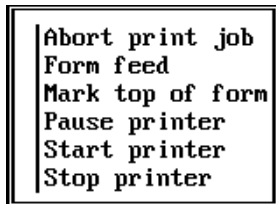
Shows the name and context of the printer being serviced.

Type

Indicates whether the printer is configured for automatic or manual loading, and shows the port number.

Printer Control

Provides access to a menu of printer functions. The following figure shows the menu that appears when the printer is attached to a server.



When you select the option you want, the change is reflected in the Current Status field of the Print Server Console.

- ♦ **Abort print job** allows you to stop the current print job and remove it from the print queue.
- ♦ **Form feed** ejects a page from a paused or stopped printer.
- ♦ **Mark top of form** allows you to print a line of asterisks (*) across a row of continuous paper in a paused or stopped printer to help you align the paper in the printer.
- ♦ **Pause printer** allows you to temporarily stop a printer, but it will continue to service the active print job where it left off when the printer is restarted.
- ♦ **Start printer** allows a stopped or paused printer to be restarted.

- ♦ **Stop printer** stops the printer and returns the current print job to the queue.

If your printer is attached to a workstation or directly to the network running in remote printer mode, a Private/Shared option is also displayed. This option indicates whether remote (manually loaded) printers attached to workstations can be used by network users (Shared) or by the workstation user only (Private).

Current Status

Status shows the current status of this port driver and printer. Possible statuses include the following:

Not connected

Waiting for form

Out of paper

Printing

Paused

Stopped

Off-line

Private

Ready

Waiting for job

Ready to go down

NOTE: The port driver (NPRINTER) status for a defined but unattached serial printer is Waiting for Job even though the printer is not attached, and the printer status is Running. If a print job is put into the queue for this printer, the port driver status changes to Printing Job but the printer status changes to Offline.

Defined but unattached parallel printers show a status of Not Connected.

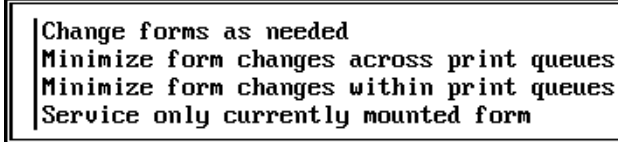
Queues Serviced

Selecting this option takes you to a list of print queues the printer you selected can service. If you want to add a queue to the list and you have the proper rights, press Ins. At the Enter Queue Name window, press Ins again to browse for the queue you want to add. Select the queue you want to add and press Enter.

You can also delete queues from this list.

Service Mode

This field allows you to access the following menu of service modes.



This menu allows you to specify how form changes will be handled by the printer.

- ♦ **Change forms as needed** indicates that all print jobs will be serviced as they arrive, without considering how the printer form currently in use compares with the printer form of the next print job. You may have to change printer forms often.
- ♦ **Minimize form changes across print queues** indicates that the print server will service print jobs in print queues with lower priorities before it will require you to mount a new form for a print job in a higher priority print queue.
- ♦ **Minimize form changes within print queues** indicates that the print server will require you to mount a new form for a print job before servicing print jobs with the currently mounted form in a print queue with a lower priority.
- ♦ **Service only currently mounted forms** holds any print jobs that specify a printer form other than the one currently in use on this printer. In this mode, the printer will never request a form change. If no print job requiring the current form is available, it will not print anything.

Mounted Form

This option allows you to change the number of the form the printer is currently using.

Nonconfigurable Information

The following information is displayed on the print server console Printer Status screen, but cannot be modified from this location.

- ♦ **NetWare server** identifies the server where the volume resides that stores all data for the queue currently submitting print jobs.

- ♦ **Print queue** identifies the print queue currently submitting print jobs.
- ♦ **Print job ID** indicates the number assigned to this print job.
- ♦ **Description** indicates the banner name. By default, the banner name with CAPTURE is the port and with NPRINT it is the filename.
- ♦ **Print job form** shows which printer form this print job is using. This print job cannot be printed unless this Form matches the Mounted Form field above the Current Job Information.
- ♦ **Copies requested** indicates the number of copies of this print job that the user who submitted it requested to be printed.
- ♦ **Finished** indicates how many of those copies requested have been printed so far.
- ♦ **Size of 1 copy** indicates the size of each copy of this print job. This is like the File Size field when you see the details of a print job within the print queue.
- ♦ **Finished** indicates the total number of bytes in one copy of a print job that have been printed
- ♦ **Percent Complete** indicates how much of this print job is completed, which is determined both by the size of one copy and the number of copies requested for this print job.

Servicing NetWare 5 Clients and Queues with a NetWare 3 Print Server

A NetWare 3 print server can service queues on a NetWare 5 server. Queues to be serviced must be created in the context designated as the bindery context. These queues are then visible to the bindery.

Managing Print Job Configurations

Print job configurations are groups of print job options that simplify the use of CAPTURE and NPRINT. You can use NetWare Administrator to create or modify print job configurations. These configurations may specify a default printer or other options for users who send print jobs to a network printer or print queue.

You can create print job configurations with NetWare Administrator. See the following sections for specific information:

- ♦ “Creating Print Job Configurations” on page 133

- ♦ “Viewing or Modifying Print Job Configurations” on page 136
- ♦ “Selecting a Default Print Job Configuration” on page 137

New Print Job Configuration Features Since NetWare 3

The format of the job configuration databases changed with the release of NetWare 4.

If you are not using any applications or management tools that require the NetWare 3™ database, we recommend that you delete it (SYS:MAIL\username\PRINTCON.DAT).

Public Print Job Configurations Allowed

In NetWare 3, all print job configurations were *private*, that is, owned by the individual user. In NetWare 5, administrators can also create *public* print job configurations that can be shared by all users on your network.

Users still have the option of adding their own private configurations. But with public print jobs, the network administrator only has to do it once.

Limit of 37 Print Job Configurations Removed

The 37 print job configuration limit in NetWare 3 has been removed. There is no limit now.

Location of Print Job Configuration Databases

Both the format and location of the database for print job configurations have changed as of NetWare 4.

- ♦ In NetWare 3, the job configuration database was
SYS:MAIL\username\PRINTCON.DAT.
- ♦ In NDS, the database is an attribute of a container object or User object. Configurations can be modified through the Print Job Configurations dialog for the Container object in NetWare Administrator.
- ♦ In NetWare 5 bindery mode, the public database is
SYS:PUBLIC\PRINTJOB.DAT.

The private database is

SYS:MAIL\username\PRINTJOB.DAT

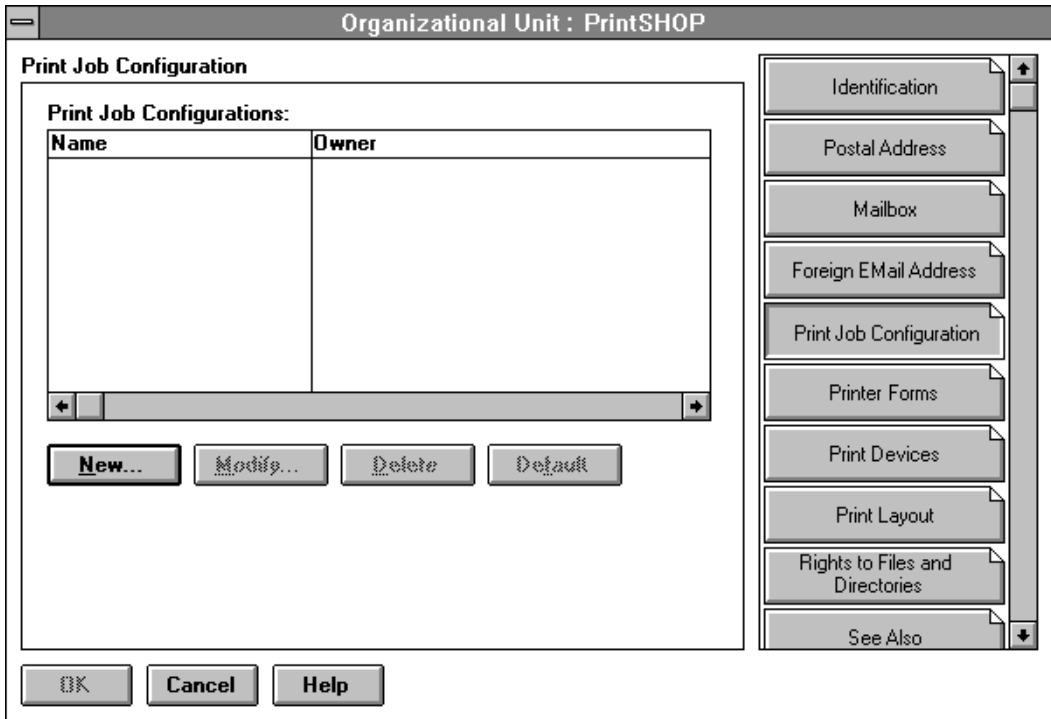
Creating Print Job Configurations

Use the following procedure to create a print job configuration.

- 1 Choose the Print Job Configuration page of a User, Organization or Organizational Unit dialog.

The Print Job Configuration dialog appears, similar to the following figure.

Figure 25 Print Job Configuration Dialog



- ♦ **Name** lists the names of the print job configurations that can be used. Print job configurations that were defined in any Organization or Organizational Unit above this object are included in this list.
- ♦ **Owner** lists the object where each configurations was defined.
- ♦ **New** opens the Print Job Configuration page, where you can enter a name and parameters for a new print job configuration.

- ♦ **Modify** opens the Print Job Configuration page for a highlighted print job configuration, where you can view and modify the parameters of the configuration.
- ♦ **Delete** removes the selected print job configuration from the list. It can no longer be used.
- ♦ **Default** marks the selected print job configuration as the default configuration, as noted by the printer icon.
- ♦ **OK** saves changes in all pages of this dialog.
- ♦ **Cancel** closes this dialog without saving changes in any page.

2 Select New.

The Print Job Configuration page appears, similar to the following figure.

Figure 26 Print Job Configuration Page

3 Select and complete the fields appearing on this page.

The following fields are on this page:

- ♦ **Print Job Name** lists the name of this print job configuration (as listed in the Job Configuration list box) that you specify to be used for a printing job. This field cannot be changed when you modify other fields later.
- ♦ **Number of Copies** indicates how many copies of the file to print. The number of copies can range from 1 to 65,000.
- ♦ **File Contents** allows you to choose either Text or Byte Stream (the default).

Choose Text when you want tabs to be converted to spaces. Also choose Text to print ASCII text.

Choose Byte Stream if you are printing from within an application and you want the application to handle the formatting commands. Also choose Byte Stream if you will be downloading fonts on a laser printer.

- ♦ **Tab Size** is the width in characters that each tab character should be expanded to. This field is only available if you select Text in File Contents.
- ♦ **Form Feed** determines whether a form feed is sent when a job is completed.
- ♦ **Notify When Done** determines whether a message is sent to the workstation of the print job originator when the job has finished printing.
- ♦ **Local Printer** specifies which of your computer's parallel ports will be captured. The values listed are LPT1 through LPT9.
- ♦ **Auto end cap** determines whether the CAPTURE command automatically ends when a print job is completed.
- ♦ **Printer/Queue** allows you to select the Printer or Queue object that the print job configuration should use. The Select Object dialog appears when the browser button is selected.
- ♦ **Device** allows you to select which print device definition this print job configuration uses.
- ♦ **Mode** allows you to select the mode this print job configuration uses. The modes listed are defined by the device definition you selected.
- ♦ **Form Name** allows you to select which printer form this print job configuration uses.

- ♦ **Print Banner** determines whether this print job configuration includes a banner page at the beginning of each print job. If this check box is selected, the next two fields are available.
- ♦ **Name** identifies the user who sent this print job. This is only valid if a banner page is printed.
- ♦ **Banner Name** indicates the name of the print job. This is only valid if a banner page is printed.
- ♦ **Enable Timeout** determines whether each print job will time out after a specified period of time. If this is selected, Timeout Count can be set.
- ♦ **Timeout Count** is the number of seconds that must pass without data being sent to the queue before the print job is closed. You must select Enable Timeout to enter a value here. Timeout can range from 1 to 1000 seconds.

4 Choose OK.

NOTE: The NET.CFG file now includes a network `PRINTERS=number` option that you may specify if you choose. This option allows you to specify the number of logical ports (0-9) you would like to be able to capture. The default is 3.

If you specify a print job configuration that has a complex printer mode, you may need to increase the bytes (default 64, range 0 to 255) in the `PRINTER HEADER=number` option.

Viewing or Modifying Print Job Configurations

The Print Job Configuration page lists the names of different print job configurations you can use. You can add new job configurations or modify the parameters of existing configurations.

- 1** Choose the Print Job Configuration page of a User, Organization or Organizational Unit dialog.

The Print Job Configuration page appears.

- 2** Select the name of the print job configuration you wish to modify.

The Print Job Configuration page appears.

- 3** Follow the procedures described in the previous section, “Creating Print Job Configurations” on page 133, starting at Step 3.
- 4** To delete a configuration, choose the Delete option.

Selecting a Default Print Job Configuration

You can select a default print job configuration from the Print Job Configuration page to have your most frequently used print job configuration automatically used in CAPTURE and NPRINT.

The default configuration is identified by a printer icon in the margin to left of the print job.

Use the following procedure to change to a new default print job configuration.

- 1** Select the print job configuration that you want to make the default configuration from the Print Job Configurations list box.
- 2** Choose Default.

The printer icon to the left of the configuration names moves to the selected configuration. That configuration is now the default.

Managing Printer Forms

Printer forms can be designated in an effort to prevent your printer from printing a print job on the wrong paper. The printer forms you define are used as you set up print job configurations. For example, you might want some jobs to be printed on letter-size sheets of paper and others on green-bar continuous-feed paper.

Printer forms include information about the length and width of different types of paper used in your printer. You can designate printer forms to prevent your print jobs from printing on the wrong paper. The print server operator is notified when a form change is needed. Printer forms are configured in NetWare Administrator.

When a print job requests a printer form other than the form currently mounted in the printer, the print server does not service the job until a print server operator reports that the new form is mounted. A print server operator can use NetWare Administrator to mount the new form. For information on mounting a printer form, see “Mounting Printer Forms” on page 140.

Printer form names must begin with an alphabetic character and can have up to 12 alpha-numeric characters. Numbers can range from 0 to 255. Length can range from 1 to 255. Width can range from 1 to 999. These numbers are for your reference only.

NOTE: Printer forms are stored in the NDS database. In bindery mode, printer forms are stored in a file named PRINTDEF.DAT in SYS:PUBLIC.

See the following discussions for more information:

- ♦ “Creating Printer Forms” on page 138
- ♦ “Mounting Printer Forms” on page 140
- ♦ “Viewing or Modifying Printer Forms” on page 141
- ♦ “Deleting Printer Forms” on page 142

Creating Printer Forms

To create a printer form, use one of the following procedures:

- 1** From the browser's Object menu, select a Container object and then choose Details.
- 2** At the Object dialog, press the Printer Forms page.

The Printer Forms page appears, similar to the following figure.

Figure 27 Printer Forms Page

Organizational Unit : PrintSHOP

Print Forms

Number	Name:
0	Form_1
1	SalesForm

Create... Modify... Delete...

Identification
Postal Address
Mailbox
Foreign EMail Address
Print Job Configuration
Printer Forms
Print Devices
Print Layout
Rights to Files and Directories
See Also

OK Cancel Help

3 Choose Create.

The Create New Form dialog appears.

4 Enter a name for the form in the Name field.

The name must begin with a letter and must be unique. It can be up to 12 characters long. Spaces are converted to underscores (_).

5 Enter a number from 0 to 255 for the form in the Number field.

6 Enter a number from 1 to 255 for the form in the Length field.

This is the length of the printer form you are defining, measured in lines of text.

7 Enter a number from 1 to 999 in the Width field.

This is the width of the printer form you are defining, measured in characters.

8 Choose OK.

A printer form with the name that you entered is listed in the Printer Forms list box.

NOTE: The width field of the printer form is for information only. The length field is primarily for information only, also, but the information is also used by the rewind function for the printer. The primary functionality forms provide is to notify the operator when a different form is required (that is, different paper should be loaded in the printer).

Mounting Printer Forms

Printer forms can be designated in an effort to prevent your printer from printing a print job on the wrong paper. When the print server detects a print job in the queue, and that print job calls for a form different from the one currently mounted in the intended printer, the print job will not be serviced until a new form is mounted. Each printer form has a unique name and number.

Mounting a printer form consists of two elements:

- ♦ **Changing the paper.** NetWare has no way of determining whether the paper was actually changed or not. It relies on information it receives from the operator.
- ♦ **Mounting the form through the software.** This is the information that NetWare receives from the operator and that is required in order for printing to continue.

To mount a printer form, you need the following prerequisites:

- ♦ The print server must be loaded and accessible.
- ♦ The printer must be installed, assigned to the print server, and connected.
- ♦ A queue must be created and assigned to the printer.
- ♦ At least one printer form must have been created.

Procedure Using NetWare Administrator

To mount a printer form with NetWare Administrator, use the following procedure.

- 1 From the browser, select the Details dialog for the printer you want to configure by double-clicking on the Printer object.

The printer Identification page appears.

2 Select Printer Status.

The Printer Status page appears similar to that shown in “Printer Status Dialog” on page 102.

If Printer Status does not appear, the printer is not connected.

3 Select Mount Form.

The Mount Form window appears. A list of existing forms appears in the Defined Forms field.

4 Select the form you want to mount.

The form number appears in the box below.

5 Select OK.

Procedure Using PSERVER

At the NetWare Server console, use Alt+Esc to toggle to the Print Server screen. Choose a specific printer from the Printer Status option of the Available Options menu. Highlight the Mounted Form field in the printer information screen and type the number of the form you wish the printer to service. Print jobs using that form in the print queue will now print.

Viewing or Modifying Printer Forms

Use the following procedure to view or modify a printer form.

1 From the browser's Object menu, select a Container object and then choose Details.

2 At the Object dialog, press the Printer Forms page.

The Printer Forms page appears, listing all current forms in that container.

3 Highlight the form you wish to modify and select Modify.

The Modify Printer Form dialog appears. The values for the printer form that you selected appear in the fields of the dialog. You can change any of the fields.

4 (Optional) Enter a new name in the Name field.

The name must begin with a letter, and must be unique. It can be up to 12 characters long. Spaces are converted to underscores (_).

5 (Optional) Enter a number from 0 to 255 in the Number field.

6 (Optional) Enter a number from 1 to 255 in the Length field.

This is the length of the printer form you are redefining, measured in lines of text.

7 (Optional) Enter a number from 1 to 999 in the Width field.

This is the width of the printer form, measured in characters.

8 Choose OK.

The form is now modified. You do not have to choose OK in the object dialog to complete the action.

You return to the Printer Forms list. The printer form that you selected in Step 1 is still selected. It may appear with a different name if you changed the Name field in Step 2.

Deleting Printer Forms

Use the following procedure to delete a printer form.

1 Select a printer form from the Printer Forms list box.

2 Choose Delete.

The Delete Printer Form dialog appears. The values for the printer form that you selected appear in the fields, but are grayed. You can see what values you are deleting as part of this printer form, but you cannot change them here.

3 Choose OK.

You return to the Printer Forms list box. The printer form that you selected is deleted from the list of printer forms. You do not have to choose OK in the object dialog to complete the action.

NOTE: The Delete operation cannot be undone. To replace a deleted form, you must add a new printer form with the deleted values.

Managing Print Device Definitions

If your application does not have the print driver for your printer, NetWare supplies print device definitions for many common printers.

Print device definitions are sets of functions and modes found in files with .PDF extensions that correspond to printers, plotters, and other peripherals.

The two primary purposes of these definitions are to set the printer up so that the job is printed properly and to ensure that the printer is left in a known state after completing a print job.

Printer functions (also referred to as *control sequences*, *escape sequences*, or *printer commands*) give instructions to the printer. Print device definitions contain the necessary control sequences for such items as boldface type, underlining, and other printer controls.

Print device definitions do not necessarily represent the full functionality of the printer. A print device definition can be modified to change the functions the machine will actually perform.

To define a printer's functions, you enter control sequences or printer commands into the print device database. To do this, you need the technical reference manual that came with your printer.

NOTE: Print device definitions are used by print job configurations. You must create and use a print job configuration to specify a print device mode for print jobs. See "Managing Print Job Configurations" on page 131.

To see the print device definitions included in NetWare, change to the SYS:PUBLIC directory and type

```
NDIR *.pdf
```

Location of Print Device Databases

The print device definitions (.PDF files) supplied in NetWare 5™ software are copied to the SYS:PUBLIC directory during installation. Additional device definitions that you create are also stored in this directory unless you specify another location.

Both the format and location of the print device database changed as of NetWare 4:

- ♦ In NetWare 3™ software, the database for print device definitions was
SYS:PUBLIC\NET\$PRN.DAT
- ♦ In the NDS, the database is an attribute of a Container object accessed through the Print Devices dialog for the Container object in NetWare Administrator.
- ♦ In NetWare 5 bindery mode, the database is

SYS:PUBLIC/PRINTDEF.DAT

NOTE: To see the print device definitions included in NetWare, change to the SYS:PUBLIC directory and type

NDIR *.pdf

New definitions are added periodically.

Print device definitions can be created and modified in NetWare Administrator.

More Information

For more specific information, see the following discussions:

- ♦ “Creating Print Device Definitions” on page 144
- ♦ “Viewing or Modifying Print Device Definitions” on page 145
- ♦ “Creating or Modifying Print Device Functions” on page 147
- ♦ “Importing Print Device Definitions” on page 148
- ♦ “Exporting Print Device Definitions” on page 150

Creating Print Device Definitions

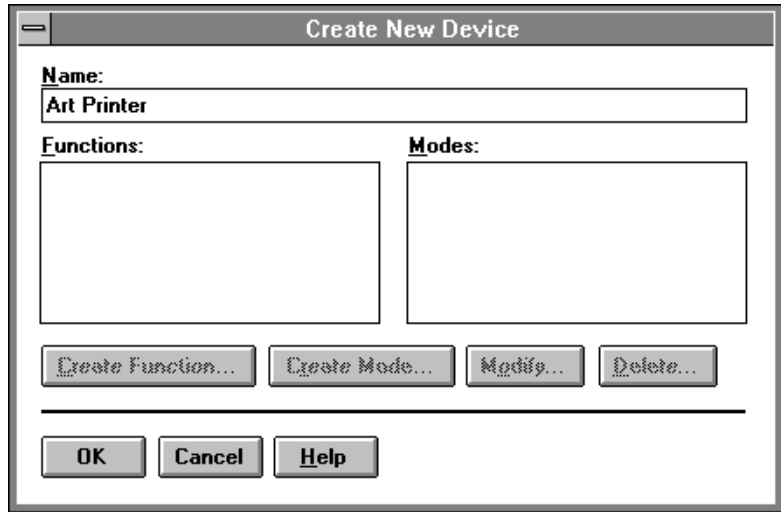
If your printers are not included among the definitions provided with your application or with NetWare, you need to create your own definitions consisting of functions and modes for each printer you will be using.

You can use the Print Devices page for the Organization or Organizational Unit dialog to create a new print device definition. The correct escape sequences are normally found in your printer's documentation.

- 1** From the browser's Object menu for the Organization or Organizational Unit, choose Details.
- 2** At the Object dialog, select the Print Devices page.
The Print Devices page appears.
- 3** Choose Create.

The Create New Device window appears similar to the following figure.

Figure 28 Create New Device Window



- 4 Enter a device name in the Name field.

You can use up to 32 characters. The name must begin with an alphabetic character. Spaces are allowed in the name.

- 5 Choose OK.

The name of the print device you entered is added to the list. You will need to use Modify to define functions and modes for this print device before using it.

Viewing or Modifying Print Device Definitions

The following procedure is used to modify an existing print device definition that was previously created. You can add, change, or delete the existing functions and modes that are defined for this print device.

You can also change the name of the print device, and the name of any of the print device's functions or modes.

A *function* is an action that the printer can perform, such as creating bold text or using proportional spacing.

A *mode* is a combination of functions that you define to prepare the printer for specific printing needs. For example, you might define a print mode called Title that includes functions for bold, double-wide, and letter-quality printing.

Procedure

- 1 From the browser's Object menu for the Organization or Organizational Unit, choose Details.
- 2 At the Object dialog, select the Print Devices page.
The Print Devices page appears. A list of existing print device definitions is displayed in the Name field.
- 3 Highlight the print device definition you want to modify.
- 4 Select Modify.

The Modify Existing Device page appears similar to the following figure.

Figure 29 Modify Existing Device Page

The screenshot shows a window titled "Modify Existing Device". It contains a "Name:" label and a text box with "HP LaserJet 4". Below this are two lists: "Functions:" and "Modes:". The "Functions:" list has items: "Big Font", "Character Set - IBM USA", "Character Set - Line Draw", "Character Set - Roman Extensi", "Character Set - Roman-8", "Character Set - USASCII", and "End-of-Line Wrap - Disable". The "Modes:" list has items: "(Re-initialize)", "Condensed", "Force 300 DPI", "Force 600 DPI", "Letter Head", "Letter Quality", and "Listing". At the bottom are buttons: "Create Function...", "Create Mode...", "Modify...", "Delete...", "OK", "Cancel", and "Help".

- 5 Complete the fields and options as needed:
 - ♦ **Name** shows the name of this print device.
 - ♦ **Functions** shows the functions that have been entered for this print device. These include all of the capabilities of this print device, such as compressed or letter-quality printing.

- ♦ **Modes** shows the modes that have been entered for this print device. A mode is a combination of functions that you define to serve a specific printing need.
- ♦ **Create Function** allows you to add a function to the Functions list. See “Creating or Modifying Print Device Functions” on page 147.
- ♦ **Create Mode** allows you to define a new mode and add it to the Modes list.
- ♦ **Modify** allows you to change the selected mode or function by adding or removing functions or control sequences, respectively, from its definition.
- ♦ **Delete** deletes the selected mode or function. The functions that were a part of a selected mode are not affected; they are still part of the print device definition.

6 Make the desired changes and select OK.

Creating or Modifying Print Device Functions

This feature allows you to enter a name and the necessary control sequences to define or modify a print device function. The necessary control sequences (also called control codes or escape sequences) are described in the operator's manual of your printer.

A function is an action that the print device can perform, such as bold text or proportional spacing. You cause the print device to perform the function by sending control codes to the print device.

When you select the Create Function page of the Modify Print Device dialog, the name of the print device is at the top of the page.

Procedure

- 1** Enter a name for the function you wish to modify or create in the Function Name field.

You can use any name that you want to, but you should choose names that represent the printer's actions. Function names must be unique (no two names can be the same) and no longer than 32 characters. Function names are not case sensitive. You can use both letters and numbers.

For detailed information on naming and defining print device functions, use the online help.

- 2** Enter the characters used by this printer as a control sequence to engage this function.

If a character in the control sequence has an ASCII value less than 33 or equal to 127, the character is displayed as a delimited acronym, as listed below. If the character's ASCII value is greater than 127, it is displayed as a delimited ASCII value. The value is a decimal number.

The space character can be entered as a space or as a delimited token. A space is displayed as a delimited token.

Except for delimited tokens, characters in a function follow the used as is rule. This means that the characters you see displayed are the actual characters that make up the function.

Detailed information on creating and modifying functions can be found in Help.

- 3** Choose OK.

You return to the Modify Existing Device dialog. The function that you entered is listed in the Functions list.

Importing Print Device Definitions

The print device definition Import feature allows you to import a definition for a new print device into the device database so that can be used by objects in this container. A definition consists of a name, functions, and modes.

With NetWare, Novell ships a set of commonly used .PDF files, which are found in the SYS:PUBLIC directory. In order to use these definitions in your job configurations, they must be imported.

Import allows you to use an existing definition without re-entering all of the functions and modes. You may import a definition that was provided with NetWare or that was created for another container.

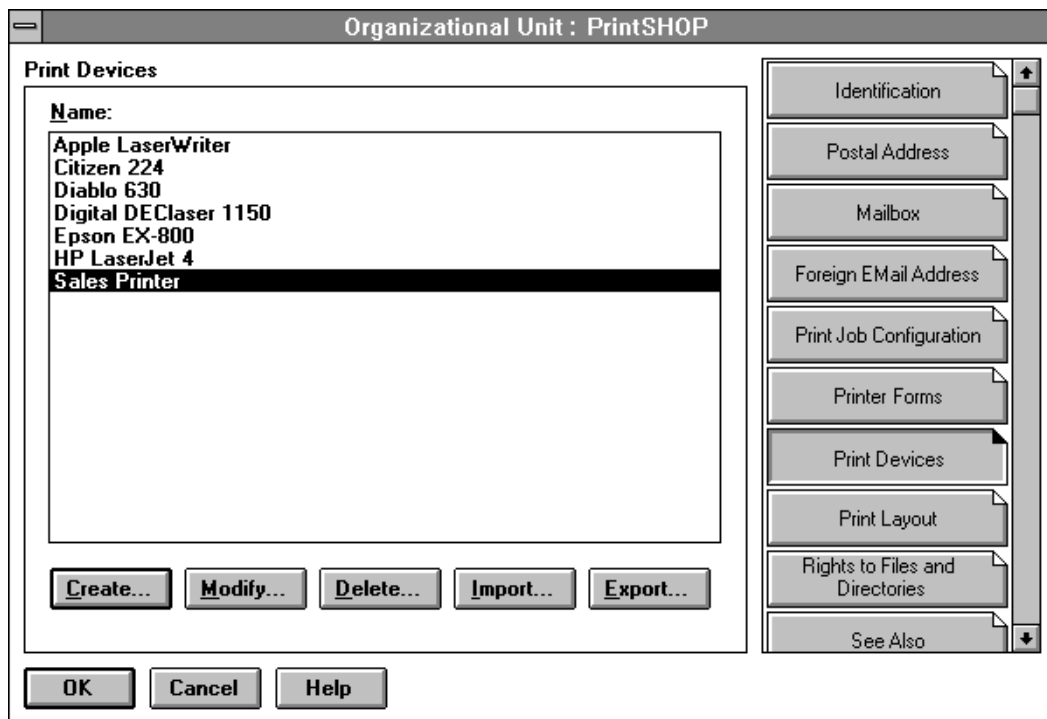
You can import a print device definition by using the following procedure.

Procedure

- 1** From the browser's Object menu for the Organization or Organizational Unit, choose Details.
- 2** At the Object dialog, select the Print Devices page.

The Print Devices page appears, similar to the following figure.

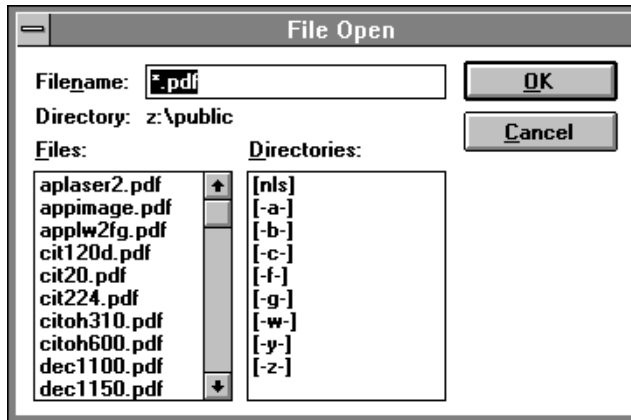
Figure 30 Print Devices Page



3 Choose Import.

The print device definition File Open dialog, similar to the following figure, appears with a list of print device definitions (.PDF files) available in your current directory.

Figure 31 File Open Dialog



- 4 Use the Files selection list to locate the file for the print device definition that you want to import.

The file extension .PDF is used for print device definition files.

- 5 Select the filename that corresponds to the printer you want to import into the device database, and then press OK.

The print device definition is added to the Print Devices list box, and the definition contained in the file can now be used by objects in this container.

Exporting Print Device Definitions

This feature allows you to export a definition for a print device from a database in one container so that it can be imported for use in databases in other containers without re-entering all functions and modes.

Use the following procedure to export a print device definition.

- 1 Select a print device definition from the Print Devices window.
- 2 Choose Export.

The File Save As window appears.

- 3 Find the directory where you want to create a file containing this print device definition.

The file extension .PDF is used for print device definition files.

The name of the print device is used as the filename when you export a definition. All spaces are removed and the first eight characters of the print device are used.

4 Choose OK.

The print device definition is saved with the same filename as the definition that is listed. All functions and modes are included in the definition.

The definition can now be imported to a database in another container.

Managing Print Device Modes

After you define the functions for a print device definition, you can combine these functions into modes.

A mode is a combination of functions that you define to allow the print device to meet specific printing needs.

For example, you could create a Final Printout mode for the HP LaserJet that would include the functions for 10 cpi, Emphasized printing, and Near-letter quality printing.

As a network supervisor, you must determine what your printing needs are and then define the modes you will need.

NOTE: In most printers, the order of the functions is important. See your printer's documentation for more details.

For specific information, see the following discussions:

- ♦ “Creating Print Device Modes” on page 151
- ♦ “Viewing or Modifying Print Device Modes” on page 152

Creating Print Device Modes

Use the following procedure to create a new mode.

1 From the Modify Existing Device page, select Create Mode.

The Create New Mode page appears.

2 Enter a name for the new mode in the Mode Name field.

You can choose any 8-character name that begins with a letter. You should use names that reflect the purpose of the print device mode.

For example, you might have modes for different types of documents like memos or reports, or for different user's preferred settings, or for the requirements of different papers or forms that you use.

- 3** Select the function that you want to be executed first from the Device Functions list; then choose Add Below.
- 4** Select the function that you want to be executed next from the Device Functions list; then select Add Below.

You can select the same function more than once if the mode requires it.

- 5** Repeat Step 4 until all of the functions that you want as part of this mode are listed in the correct order in the Mode Functions list box.

If you make a mistake, use Delete or Add Above to rearrange the functions listed in Mode Functions.

- 6** Choose OK.

You return to the Modify Existing Device dialog.

Viewing or Modifying Print Device Modes

This feature allows you to modify a print device mode that you previously entered.

You can change the name of the mode or change the functions executed from this mode.

A mode is a combination of functions that you define to allow the print device to meet specific printing needs. For example, you might define a print device mode called Title that includes functions for bold, double wide, and letter-quality printing.

Use the following procedure to modify an existing print device mode.

Procedure

- 1** From the Modify Existing Device dialog, select the mode you want to modify and choose Modify.
- 2** (Optional) Enter a new name for the mode in the Mode Name field.

- 3** Select the function that you want to add to the mode from the Device Functions list.
- 4** Select the function in the Mode Functions list next to where you want to insert the new function.
- 5** Choose Add Below or Add Above to insert the selected device function in the correct place in the Mode Functions list.
- 6** (Optional) Select any mode function that you want to delete from the definition of this mode; then choose Delete.

The selected function is no longer part of this mode. The function is still a part of this print device definition, but is not used for this mode.
- 7** Repeat Steps 2 through 5 as needed.
- 8** Choose OK.

You return to the Modify Print Device dialog.

Sending Jobs to Printers Using NPRINT

NPRINT is used to send a file to a printer. This would include plain text (ASCII) files such as AUTOEXEC.BAT and any application software output already formatted for a printer.

For specific information about using NPRINT, see the following discussions:

- ♦ “Command Syntax for Using NPRINT” on page 153
- ♦ “Command Parameters for Using NPRINT” on page 154
- ♦ “Tips on Using NPRINT” on page 157

Command Syntax for Using NPRINT

Unlike CAPTURE, where options may be entered in any order, NPRINT requires that the filename be specified immediately after you type NPRINT according to the following format:

```
NPRINT filename [P=printername | Q=queue name]  
[/option...]
```

For example, to print file JANUARY.RPT in the current directory to printer P_1 with no banner or form feed, type

```
NPRINT JANUARY.RPT P=P_1 NB NFF
```

Multiple filenames can be entered in the same command by separating them with commas.

```
NPRINT JANUARY.RPT,FEBRUARY.RPT P=P_1 NB NFF
```

Table 9 **Syntax for common NPRINT tasks**

Task	Syntax
Print file MARCH.PRJ using print job configuration REPORTS.	NPRINT MARCH.PRJ J=REPORTS
Print five copies of file MARCH.PRJ on printer P1 with no banner.	NPRINT MARCH.PRJ P=P1 C=5 NB
Print all files beginning with MA with extension .PRJ.	NPRINT MA*.PRJ
Hold the print job MARCH.PRJ in the queue.	NPRINT MARCH.PRJ HOLD
List the printing parameters for the print job MARCH.PRJ.	NPRINT MARCH.PRJ J=REPORTS D
Send file MARCH.PRJ to network printer P1 in the same context.	NPRINT MARCH.PRJ P=P1
Send file MARCH.PRJ to print queue Q1 in the same context.	NPRINT MARCH.PRJ Q=Q1
View online help.	NPRINT /?
View all online help screens.	NPRINT /? ALL
View specific help for the Banner option.	NPRINT /? B
View the version number of this utility	NPRINT /VER

Command Parameters for Using NPRINT

Replace *filename* with the name of the file you want to print. Include wildcard characters, drive letters, and directory paths if necessary.

Replace *option* with any of the options listed in the following table. You do not need to use options if a default print job configuration specifies a printer or print queue.

Table 10 NPRINT Options

Option	Syntax	Description
All	ALL	Used after the <i>/?</i> option, it displays all online help screens.
Banner	B=name	Indicates what will appear in the lower half of the banner page. Limit = 12 characters. Replace <i>name</i> with any word or phrase up to 12 characters long. To allow spaces in a banner name, enclose the name in quotation marks (for example, ON THE GO). Default: The print job file name
Copies	C=number (1-65,000)	Specifies the number of copies. NPRINT allows up to 65,000 copies. The default is 1.
Delete	DEL	Automatically deletes the file after it is printed. The default is not to delete the file of files.
Details	D	Lists the printing parameters for the job to be printed. It also indicates whether a print job configuration was used.
Form	F=name or number	Specifies the form that the printer will use. (You must define forms using NetWare Administrator before users can use form names.) Default: 0.
Form feed	FF	Enables form feed after your print job has been printed. FormFeed Enabled means that the printer starts printing the next job at the top of the next sheet of paper. However, if an application automatically enables form feed at the end of a file, adding this option causes an extra blank page to be fed through. Default: FormFeed Enabled
Help	/? or /H	Displays context-sensitive online help.
Hold	HOLD	Allows you to send a print job to a queue without having it print. To release the hold on the job, use NetWare Administrator.

Option	Syntax	Description
Print job configuration	J=name	Indicates the print job configuration to use; does not require other options except to override print job configuration options. If no job configuration is specified and a default job configuration exists, it will be used. (Use the Details option to see what job configuration is being used.) If no default print job is used, you will need to specify either a printer or queue in the command line. You can also use this option to specify the context in which to look for a print job configuration if it is outside the current search path by identifying the container or user owning the configuration.
Name	NAM=text	Indicates what will appear in the upper half of the banner page. Limit = 12 characters. Default: The username you used to log in
No banner	NB	Suppresses banner page.
No form feed	NFF	Suppresses form feed at the end of a print job.
No notify	NNOTI	Specifies that the user not get a message after the print job prints. Do not confuse this option with the notification option that informs designated users when the printer is having problems. Default: NoNOTIfy enabled
No tabs	NT	Specifies that tabs are not converted to spaces in a print job. This is also called byte stream. This option ensures that all the tab characters in your print job arrive at the printer unchanged. Use this option for most network printing situations, especially when printing graphics. Default is NT (byte stream).
Print queue	Q=name	Indicates to which print queue the print job should be sent; you may set a default in a print job configuration.
Printer	P=name	Indicates to which printer the print job should be sent; you may specify a default in a print job configuration.
Server	S=name	Specifies the NetWare server if you want the print job sent to a bindery print queue. Not used for NDS print queues. Default = current tree or server.
Tabs	T=number (1-18)	Specifies the number of spaces to be substituted for each tab in a print job (default=8). Specify NT (No tabs) for byte stream print jobs.

Option	Syntax	Description
Version	<code>/VER</code>	Displays version information for this utility. Also lists the names and version number of all files required to run this utility.

Tips on Using NPRINT

- ◆ Default options include a banner page, no tabs, and form feed. You can override the default options by specifying options at the command line.
- ◆ If you use an application that does not format print jobs for your printer, NetWare supplies 58 printer definitions for printers. Import one of these or create your own using NetWare Administrator. Each printer definition contain the functions and modes for the printer.

Printer definitions can only be referenced in print job configurations. To print a non-ASCII file that is not formatted for the printer, NPRINT must use the *J=name* option to specify the print job configuration that includes the printer definition unless the correct job configuration is the default.

- ◆ If you specify a print job configuration that has a large printer mode, you can increase the bytes (default 64, range 0 to 255) in the `PRINTER HEADER=number` option.
- ◆ Options with no filename specified require a preceding forward slash (/), including `/D`, `/H`, `/?`, and `/VER`.
- ◆ No options are needed if a default printer or print queue is specified in a default print job configuration.
- ◆ NetWare 5 allows you to specify the printer name instead of a print queue. You can still print to print queues.
- ◆ If you print to a print queue on the same NetWare server, an asterisk (instead of a whirligig) will appear with Please Wait and will remain until all the data is transferred. For example, 12 MB of information may take some time. The whirligig appears if the source file and the destination queue are on different NetWare servers. In this case, the data does not transfer as quickly.

If you have multiple printers assigned to one print queue, the printer and print queue options will not guarantee what printer services your print job. Novell recommends that you have one print queue assigned to each printer unless all the printers are the same.

6

Troubleshooting

This section presents guidelines and suggestions for performing a variety of troubleshooting tasks when you experience network printing problems.

Troubleshooting Print Server Problems

The first step in troubleshooting print server-related printing problems is to use NetWare Administrator or the print server console to monitor what is happening with your printers and print server.

- ♦ You can check on a printer that is not working by using the Information and Status option from the Print Server Information menu. This option will tell you whether the print server is running. You can also view printer status at the print server console.
- ♦ You can stop, pause, and start the printer, as well as abort or rewind a print job or realign the paper in NetWare Administrator.

For a comprehensive discussion of printing troubleshooting strategies, see “Troubleshooting General Printing Problems” on page 159.

Troubleshooting General Printing Problems

These sections will assist you in resolving printing problems, which may exist on three levels:

Hardware problems. These problems involve hardware configurations or malfunctions. The printer might be out of paper, jammed, off-line, broken, or not cabled correctly.

Logical problems. These problems involve improper or incomplete configurations or corrupted software. The queue might be assigned to the

wrong printer, the queue might not be serviced by a print server, or the wrong printer number is used when loading NPRINTERR.

Procedural problems. These problems usually result from typing errors or unfamiliarity with the printing environment. The wrong port may be captured, the wrong queue may be specified, or the print job parameters may be taken from a different object than expected.

The flow charts and notes in the following topics provide a basic approach to resolving network printing problems.

If you cannot solve your printing problem and you decide to call your Novell Authorized ResellerSM representative, write down details such as error messages, procedure to reproduce the failure, configuration, etc. before you call. Referring to these notes should help technical support personnel solve your problem faster.

Troubleshooting Flow Charts

- ◆ “No Printer Output: Troubleshooting Flowchart” on page 162
- ◆ “Incorrect or Slow Printer Output: Troubleshooting Flowchart” on page 163

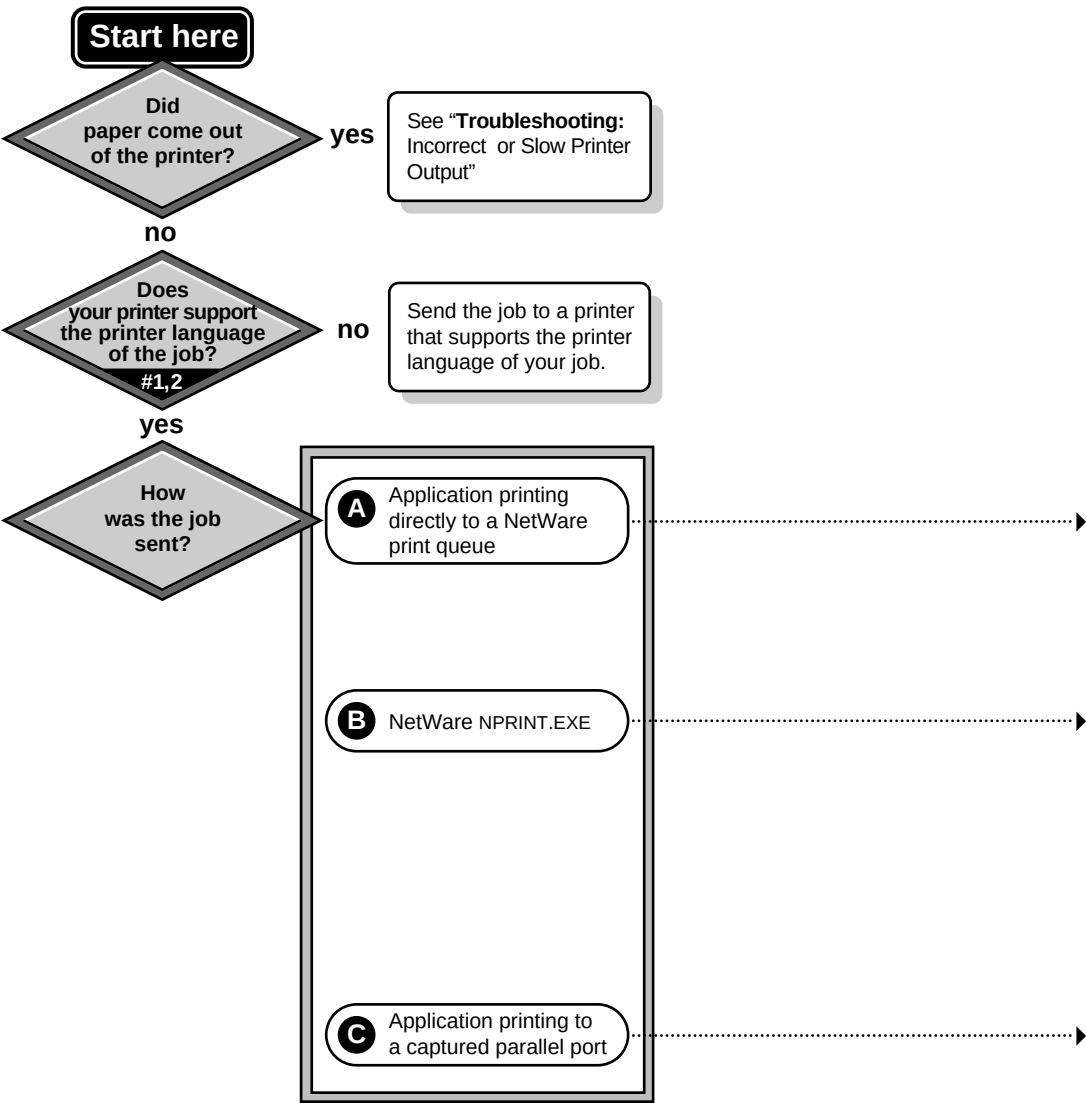
Troubleshooting Notes

- “1. Determining the Printer Language of Your Print Job” on page 164
- “2. Determining the Printer Languages Your Printer Supports” on page 165
- “3. Checking Your Non-Network (Local) Printer Setup” on page 165
- “4. Determining Whether Your Job is an ASCII Text File” on page 167
- “5. Checking the Contents of Your Job for Incorrect Control Sequences” on page 168
- “6. Determining Whether Your Job is Currently in the Print Queue” on page 169
- “7. Determining Whether Your Job Ever Reached the Print Queue” on page 169
- “8. Determining Where Your Job Was Sent” on page 170
- “9. Activating Jobs on Hold Status” on page 170
- “10. Troubleshooting Jobs Stuck in Active Status” on page 171
- “11. Troubleshooting Jobs Stuck in Ready Status” on page 172
- “12. Troubleshooting Jobs Stuck in Adding Status” on page 172
- “13. Using CAPTURE to Redirect Parallel Ports to Network Queues” on page 172

- “14. Troubleshooting Jobs Printed Slowly” on page 173
- “15. Determining Whether a Printer is Connected as a Network Printer” on page 173
- “16. Troubleshooting Jobs Printed in Pieces on Separate Pages” on page 174
- “17. Determining the Status of Your Print Job” on page 174
- “18. Solving NetWare Printing Problems When Running MS Windows” on page 174
- “19. Isolating Bad Hardware or Corrupt Software” on page 175

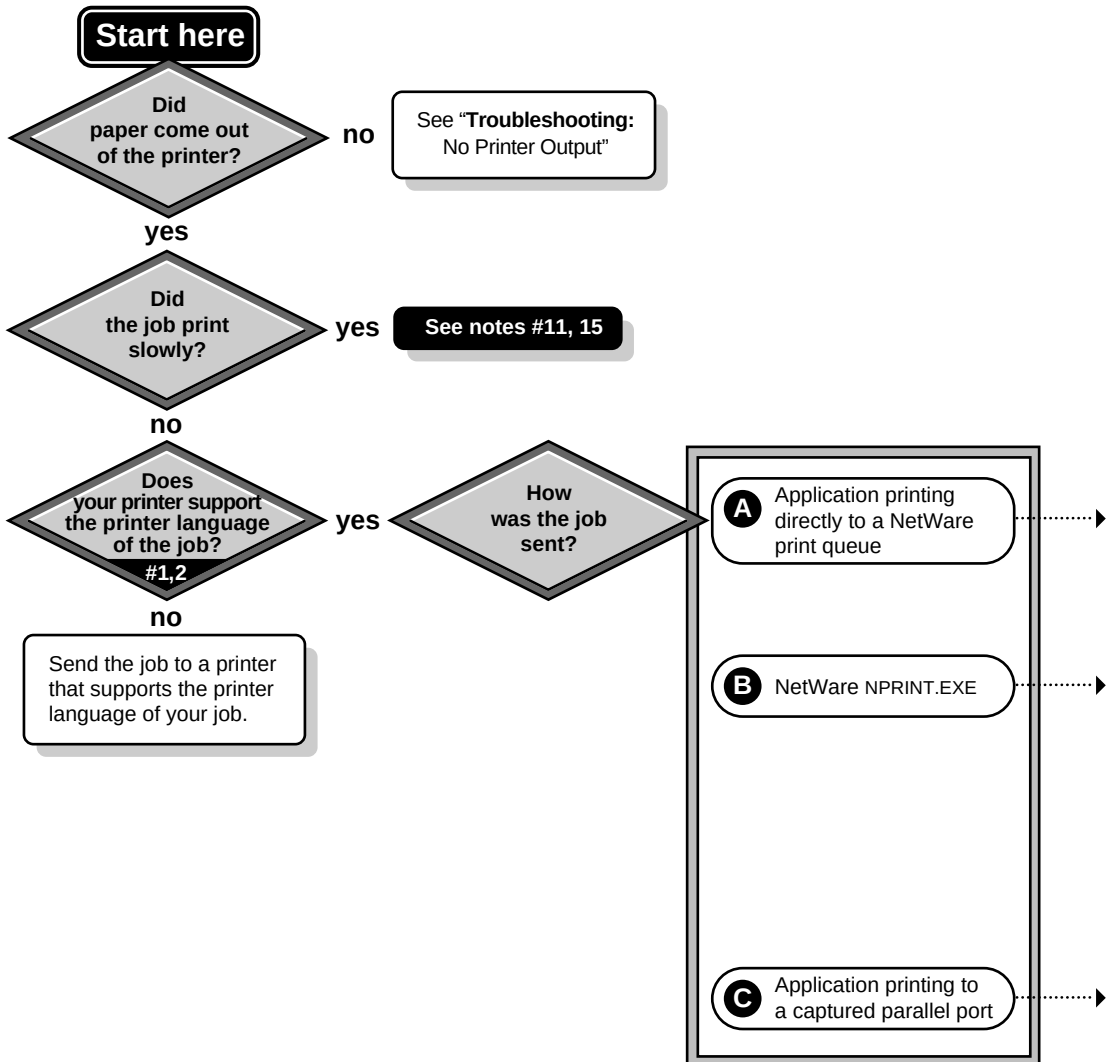
No Printer Output: Troubleshooting Flowchart

Troubleshooting: No Printer Output



Incorrect or Slow Printer Output: Troubleshooting Flowchart

Troubleshooting: Incorrect or Slow Printer Output



1. Determining the Printer Language of Your Print Job

Print jobs can be generated in a variety of printer languages. See “Printer Languages” on page 87 for a discussion of the various types. Different applications with printing capability will generate print jobs using different languages. Similarly, certain printers support some languages but not others. For example, many PCL printers do not support PostScript printing. (See “2. Determining the Printer Languages Your Printer Supports” on page 165 for more information.)

To be sure you are sending your print job to a printer that can support the language used by your application, you must determine the language used by your print job. Sending a print job to a printer that does not support the printer language used in that print job will produce unexpected results varying from no printer output to incorrect printer output.

In MS Windows and DOS applications, the print driver you are using in a specific application can provide information about the type of job the application creates when the document is printed. The name of the print driver can be seen in many applications by choosing the Select Printer option from the file menu.

- ♦ Print drivers that generate PostScript print jobs usually have either the word PostScript or the letters PS in their names.
- ♦ Print drivers that generate PCL print jobs occasionally have the letters PCL in their names but usually make no reference to a the printer language they are using..

If your application does not allow you to select a print driver, it generates an ASCII text print job. In DOS, copying or redirecting a text file to an LPT port prints an ASCII text job. For example, **TYPE filename LPT1** or **DIR > LPT1**.

A large family of printer languages, the page description languages (PDLs), including PostScript, do not support printing this type of job. However, ASCII text files can be printed by non-PDL languages such as PCL.

The language of a print job can also be determined by examining the print job's data. However, an understanding of the characteristics of printer languages is necessary in order to determine the language type. See “5. Checking the Contents of Your Job for Incorrect Control Sequences” on page 168 for information on examining print job data.

2. Determining the Printer Languages Your Printer Supports

The printer languages your printer supports can be determined by reading your printer's documentation. Many printers can support multiple languages. For example, many printers now support both PCL and PostScript print jobs.

Commands can be sent to these printers to cause them to switch languages. For example, to print a PostScript job on a printer that supports both PostScript and PCL jobs, a command sequence may need to be sent with the job that tells the printer to SwitchToPostScript. This command sequence can be referenced in a print job configuration and implemented by using the **J=** option with **CAPTURE** or **NPRINT** using the following syntax:

```
CAPTURE J=SWITCHPS
```

or

```
NPRINT J=SWITCHPS
```

Some printers can detect the language used by a print job and switch to the appropriate language automatically.

3. Checking Your Non-Network (Local) Printer Setup

A printer will not function with NetWare print services if it does not function without NetWare print services.

To determine whether your printer is functioning properly, first print the job to the printer locally. If the printer is connected to a server, issue the server **DOWN** command and bring the machine up as a workstation so you can print the job to a local printer. This will determine whether the problem exists within network printing.

Check for the following problems:

Insufficient Printer Memory

During printing, the printer must have sufficient memory to hold the entire page to be printed. If it does not, it will print the part of the page it has in memory and continue printing on the next page. This problem occurs when printing large graphics jobs.

- ♦ Add more memory to the printer, if possible.

- ♦ If your application allows, configure it for the amount of memory that your printer has. This will allow the application to send data to the printer in a more manageable format.

Incompatible Printer Language Versions

If unexpected strings or characters appear in your printer output, and you are sure that the printer language in your print job is the same as the language supported by your printer (see Notes 1 and 2), you may have different language versions.

If the language version used by the print driver in your application is newer than the version your printer can interpret, some commands may not be recognized by your printer. This can cause unexpected strings or characters to appear randomly throughout your print job.

Try using an older language version to create your job. For example, if this symptom occurs while printing to an HP LaserJet IIIsi and the print driver you are using is for an HP LaserJet 4si, try using a printer driver for an HP LaserJet IIIsi.

Interrupt Conflicts

If your print job is printing slowly, you may have an interrupt conflict between the port and another device.

Reconfigure your printer to run in polled mode. Polled mode is the default in NetWare 5™ software. If printing performance improves, either continue using polled mode or configure your printer to use a unique interrupt. See “Polled versus Interrupt Mode” on page 84 for more information.

Cabling Problems

If random, unexpected characters appear in your printer output, your printer cables may be too long or improperly attached. Make sure that everything is connected properly and that the cabling is within specified lengths and in good condition.

Incorrect Printer Configuration

Run the configuration program supplied with the printer, or use DOS commands like MODE or PRINT to check that the printer settings are accurate. For example, if the printer is cabled to LPT2, make sure to send print jobs to LPT2. Use the documentation supplied with the printer to check other necessary settings.

If you cannot get a printer cabled to a workstation to print locally, check the workstation's NET.CFG file to see if it contains the following line:

```
LOCAL PRINTERS=0
```

If NET.CFG contains this line, temporarily remark it so it is not executed (place a pound sign # in front of it) or change the line to read as follows:

```
LOCAL PRINTERS=number
```

(The *number* should be the number of printers attached to the machine).

Faulty Hardware

The printer may be failing and need service or replacement. If necessary, have faulty hardware repaired. See “Troubleshooting Printers” on page 176 for more information.

4. Determining Whether Your Job is an ASCII Text File

Print jobs that are not ASCII text files should be printed as Byte Stream files. ASCII text files may be printed as Text files. The difference between these two types is whether tab conversion is enabled.

Tab conversion means that as a job is printed, a tab character is replaced by a specified number of spaces. Tab conversion takes place if File contents is set to Text in the print job configuration or if Tabs is set in the CAPTURE command.

If the jobs to be printed are ASCII text files, the File contents should be set to Text. Tab size can then be set to 1 through 18. This is the number of spaces that will be substituted for each full tab that is encountered. This is set in the CAPTURE command using the **T=** parameter.

For example, to set the tab conversion to 6 spaces, the command is as follows:

```
CAPTURE T=6
```

Any job that is not an ASCII text file should be printed with File contents set to Byte Stream. This is because tab conversion usually causes graphics to be printed incorrectly. Text from most word processors is printed as graphics.

Byte Stream is the default setting. It can be manually set in the CAPTURE command using the NT (No Tabs) parameter. The command is as follow:

```
CAPTURE NT
```

To determine if a file is an ASCII text file, the DOS TYPE command can be used to look at it. For example, the syntax for checking the AUTOEXEC.BAT file is as follows:

TYPE AUTOEXEC.BAT

If the file can be read properly when it is displayed, it is probably an ASCII text file.

Another way to determine this is to try printing the file. If the file contains tabs, yet prints out legibly and in the proper format, it is an ASCII text file.

If you have determined that the job is text, yet it will not print properly with File contents: Text (or **T=1 through 18** in the CAPTURE command), change the setting to File contents: Byte Stream (or **NT** in the CAPTURE command.)

5. Checking the Contents of Your Job for Incorrect Control Sequences

Your print job may contain incorrect functions or control sequences. The following procedure explains how to view the contents of your job using the NetWare 4 PCONSOLE utility.

Use a text editor to view the print job.

- 1** Send the print job to a print queue using CAPTURE or NPRINT with the HOLD option.
- 2** In NetWare Administrator, select the print queue servicing the print job.
- 3** At the Print Queue Information dialog, select Information. Write down the Object ID number. This is your print queue number.
- 4** Return to DOS.
- 5** Go to the QUEUES directory. The default location is SYS:QUEUES.
- 6** Change to the queue directory. The name of the queue directory is the Object ID followed by .QDR.
- 7** Type DIR to see a list of the print jobs in the queue.
Print jobs are listed by ID number in the queue.
- 8** Using FILER or a standard text editor, bring up the print job so that you can view all data and control sequences in the job.

If there are multiple jobs in the queue, you will have to look at each one until you find the correct job.

Control sequences assigned to the job by NetWare are attached to the beginning and/or end of the job by the CAPTURE or NPRINT utilities. The control sequences to be attached to the print job are determined by the Device and Mode fields of the print job configuration that was used when CAPTURE or NPRINT were run.

The Details (D) option of CAPTURE or NPRINT will show which print job configuration is being used.

Print job configurations can be created or modified using NetWare Administrator. The print job configuration may reference a print device definition. (Device definitions can be created or modified using NetWare Administrator.)

- 9 Refer to the documentation for your printer to verify that the control sequences in your job are correct for the printer.

Some PostScript print device definitions include modes that are larger than the buffer size for the print header, which is 64 bytes. This buffer can be increased up to 255 bytes by adding `PRINT HEADER=number` to the `NET.CFG` file.

CAPTURE uses this buffer. NPRINT does not.

6. Determining Whether Your Job is Currently in the Print Queue

In NetWare Administrator, select the queue from the Print Queues list and then Print Jobs. The name of the user who sent the job is in the Name column.

If the job is not shown here, either it did not reach the queue or was sent to the printer and then removed from the queue.

7. Determining Whether Your Job Ever Reached the Print Queue

If your print job was sent to the queue but nothing is currently in the queue, you must determine whether the job did not reach the queue or whether it reached the queue and then disappeared without printing.

In order to determine this, you must disable the operator flag for the print queue titled Allow service by current print servers using NetWare Administrator.

To access the queue operator flags in NetWare Administrator, the flags are on the Details page of the Queue object. Disabling this operator flag essentially puts the queue on hold.

Next, print the job again. You can now look to see if the job is in the queue by selecting the Job List page of the Queue object in the NetWare Administrator utility.

If the job does not show up here, it never reached the queue.

8. Determining Where Your Job Was Sent

If the job was printed to a captured port, type **CAPTURE SH** at the command line. The name of the queue being captured to will be shown on the first line.

If the job was printed using NPRINT, type **NPRINT /D** (Details) at the command line. This will show the print job configuration being used. (Note that a slash must precede the Details option when using NPRINT. The slash is not necessary when using CAPTURE.)

You can determine which printer or queue is specified in this job configuration using NetWare Administrator.

The parameters used by CAPTURE and NPRINT are determined by the default print job unless they are overridden in the command. The default print job is configured using NetWare Administrator.

9. Activating Jobs on Hold Status

To release jobs on operator or user hold using NetWare Administrator, the User Hold and Operator Hold fields can be found by selecting Job Details in the Print Queue dialog.

To release jobs on operator or user hold, select Job List from the Print Queue dialog. Highlight the print job and select Resume.

The only way the print job could have been placed on operator hold is for a print queue operator to have manually placed the job on hold using NetWare Administrator.

The print job could have been placed on user hold manually by the user or queue operator using NetWare Administrator, but also could have been placed on hold automatically.

There are several ways a print job can be placed on hold automatically:

- ♦ **CAPTURE.** Issue the CAPTURE command with a HOLD option.
- ♦ **NPRINT.** Issue the NPRINT command with a HOLD option.

10. Troubleshooting Jobs Stuck in Active Status

If your print job is stuck in Active status, one possibility is that the job is being sent slowly. You can usually determine this on a laser printer if the light is blinking to indicate that it is receiving data.

If you press the form feed button on the printer, the printer should print part of the page. (Some graphics jobs may be binary files, which require that the **/B** option be used with CAPTURE.)

If you are using a serial printer, some possible causes are as follows:

- ♦ The baud rate is low.
- ♦ The cable or port is bad.
- ♦ XON/XOFF needs to be enabled or disabled.
- ♦ The printer may have been turned offline.
- ♦ If the printer is configured to use interrupts, there may be a conflict. This will cause slow printing. The configuration of the printer may need to be changed to polled mode.

If you are using a parallel printer, some possible causes are as follows:

- ♦ The cable or port is bad.
- ♦ The printer may have been turned offline.
- ♦ If the printer is configured to use interrupts, there may be a conflict. This will cause slow printing. The configuration of the printer may need to be changed to polled mode.

Another possibility is that the printer has been paused or is out of paper. This can be determined in NetWare Administrator or at the print server console screen.

11. Troubleshooting Jobs Stuck in Ready Status

If your job is stuck in Ready status, the printing configuration may not be complete:

- ♦ The print server may not be set up to service the printer.
- ♦ The print server may not be assigned to the queue.
- ♦ The queue may not be assigned to the printer.
- ♦ An operator flag may be set for the queue to not allow service by current print servers. Select the queue and then Status from the Print Queue Information menu.

Other possibilities include the following:

- ♦ The job may be waiting for a new form to be mounted.
- ♦ Other jobs may be ahead of this job in the queue.
- ♦ The printer may be servicing another queue with a higher priority.
- ♦ The printer may have been stopped. Check the status of the printer in NetWare Administrator or at the print server console.

12. Troubleshooting Jobs Stuck in Adding Status

One reason for jobs to appear stuck while the status is Adding is that the application may be printing slowly. This is likely to happen when the application is generating graphics to be printed.

Another possible explanation is that the CAPTURE command includes the options **NA** (No Autoendcap) and **TI=0** (No Timeout). If this is the case, status will remain Adding until an End Capture command (CAPTURE EC) is issued.

13. Using CAPTURE to Redirect Parallel Ports to Network Queues

Many applications are not designed for network printing. CAPTURE is a command line utility that allows you to print from applications not designed for NetWare print services. It sets up redirection parameters for printing output from your workstation. The NetWare DOS Requester then redirects the workstation output from an LPT port to the specified network printer or file.

14. Troubleshooting Jobs Printed Slowly

There are several explanations for slow printing.

- ♦ The application may be generating the output for the printer. This can cause a long delay before the job is even sent to the queue. Look at the status of the application to determine if this is the case.
- ♦ Interrupt conflicts may exist between the port and another device. Configure the printer for no interrupts (polled mode).
- ♦ The baud rate may be slow (serial printer).
- ♦ XON/XOFF may need to be enabled (serial printers).
- ♦ Your hardware (cable, port, printer) may be faulty.
- ♦ The **/B** parameter may be needed with CAPTURE if the job is a binary file.

15. Determining Whether a Printer is Connected as a Network Printer

In order for a printer to be accessed by the network, ALL of the following must occur:

- ♦ The printer must be properly connected to a server or workstation (or to the network cabling with a network-direct device).
- ♦ The printer must be functional as a local printer (unless it is a network-direct printer). If a printer will not work locally, it will not work as a network printer. See “3. Checking Your Non-Network (Local) Printer Setup” on page 165 for more information.
- ♦ The printer must be configured and have a queue assigned to it (using the NetWare Administrator utility).
- ♦ The server or workstation the printer is connected to must have the port driver loaded (NPRINTER).

16. Troubleshooting Jobs Printed in Pieces on Separate Pages

A print job can be broken and printed on separate pages for several reasons:

- ♦ The CAPTURE timeout setting may be too short. If there is a pause in the flow of data between the application and the port, and it is long enough for the timeout to end the job, the next data that comes will be sent to the queue as a new job. The new job will be printed on a new page because a form feed is issued.
- ♦ Misinterpreted control characters in a job may also cause a form feed in the middle of a job. Sometimes this problem can be corrected by sending the job as Byte Stream (No Tabs).
- ♦ The printer may not have sufficient memory to hold the entire page to be printed. If it does not, it will print the part of the page it has in memory and continue printing on the next page. This problem occurs when printing large graphics jobs.

17. Determining the Status of Your Print Job

To determine the status of your job using the NetWare Administrator utility, click the Job List page in the Print Queue dialog and look in the Status field.

18. Solving NetWare Printing Problems When Running MS Windows

Sometimes printing problems that occur when running Windows can be resolved by any combination of the following, which are set in the Printers option in the Windows Control Panel:

- ♦ Change the printer port connection to print to LPT1.DOS instead of LPT1. This can help to speed up printing.
- ♦ Disable Fast Printing Direct to Port if you get the error Print device is already in use. (This action may slow printing slightly.)
- ♦ Disable Print Manager. This can help to speed up printing but disables the MS Windows spooler.

19. Isolating Bad Hardware or Corrupt Software

If the previous notes do not yield a solution to your printing problem, you may have bad hardware or corrupted printing software.

The following suggestions will help you to isolate the specific location of the problem in your printing setup.

- 1 Use a different method to send the job to the queue.

If a different method works, there may be a problem with CAPTURE.EXE, NPRINT.EXE, or the options that are being used with them.

If you are currently using CAPTURE, try NPRINT. If you are currently using NPRINT, try a DOS COPY to a captured port. Make sure you use similar options with CAPTURE and NPRINT.

- 2 Print the job using CAPTURE or NPRINT using the HOLD option.

- 3 Find the print job name in the queue as described in “5. Checking the Contents of Your Job for Incorrect Control Sequences” on page 168.

- 4 If it is a text file, view the contents of it using FILER.

If the job is corrupt, the problem occurred before or while the job was written to the queue.

- 5 If the job is not corrupt or you cannot tell because it is graphics, make a reference file by copying the job file to a different name or directory.

- 6 Allow the job to print by removing it from hold status.

- 7 Print the reference file by using NPRINT, or by copying it to a captured port.

WARNING: When printing the reference file, do not use a print job configuration that specifies a mode. This will cause the control codes to be duplicated in the job.

- 8 Compare the printout of the reference file to the first printout.

If the two printouts are different, the job is being corrupted after it is written to the queue. There may be a problem with the printer hardware (port, cable, printer) or the print server (PSERVER.NLM), port driver (NPRINT), or printer configuration.

- 9 If the printouts are the same, print the same job from the application again using the HOLD option.

- 10** Use DOS COMP, MS-DOS FC, or a similar utility to compare the reference file and the job that has been reprinted from the application.

If these files do not compare, the job is being corrupted before or while it is being written to the queue.

- 11** If a NetWare utility appears to have a problem, recopy it to ensure that it is not corrupt.

If the problem persists, contact your Novell Authorized Reseller to see if there is an updated version of the utility.

Troubleshooting Printers

See the following topics for help with troubleshooting printers:

- ♦ “General Printer Troubleshooting” on page 176
- ♦ “Troubleshooting Laser Printers” on page 177
- ♦ “Troubleshooting Dot Matrix Printers” on page 178
- ♦ “Troubleshooting Network-Related Printer Problems” on page 179

For a comprehensive discussion of strategies for troubleshooting printing problems, see “Troubleshooting General Printing Problems” on page 159.

General Printer Troubleshooting

- ♦ Make sure the printer has power and is online. If you are using a manual printer sharing device, make sure the switch is set to activate the correct printer.
- ♦ Turn it off and on again to reinitialize any internal settings that may have gone astray.
- ♦ Use the printer's own self-test, according to the manufacturer's recommendation. If it fails, you have verified that the problem is within the printer. If the print head is not moving at all, the transport motor may have failed.
- ♦ If the printer passes the self-test, try a test print using the Print Screen capability within DOS. If the Print Screen fails, you know the problem is in the relationship between the printer and the computer. Inspect the cable and the cable connections. Replacing the cable with a known good cable is worth trying since cables are so frequently the source of printer

problems. Cables can fail with broken wires, loose or broken pins, or incorrect pin-outs.

- ♦ The message out of paper is sometimes erroneously reported when there is plenty of paper, and can indicate a physical problem with the printer.
- ♦ If the Print Screen succeeds, the problem may be with your application or its configuration. For example, your application may be set up to direct output to a file instead of the printer, or you might be directing the output to the wrong communications port.

WARNING: Some printers differ from computers in that they do not have shielded power supplies. That means that a plugged-in printer can expose you to full outlet power, which is enough to kill you. Never open a printer case unless it is unplugged!

Troubleshooting Laser Printers

- ♦ Be sure all dip switches are properly set for your configuration. Laser configuration is sometimes done by a control panel of buttons with an LED display that permits you to alter configuration memory. Be sure that the application being used is properly configured for the printer as set up.
- ♦ Fuzzy laser output could mean you have a dirty corona wire or you are running out of toner. Horizontal lines or splotches indicate possible damaged or dirty print drums or rollers. Since some of these components are part of the cartridge, a useful quick fix is simply to change the cartridge.
- ♦ If laser images seem disproportionately long or short, the drive motor may not be moving the paper through at the correct speed.
- ♦ Failure of a laser printer to go on-line might be a communication interface problem. It could also indicate a faulty control panel. Try powering up the printer with the cable removed. If it now goes to ONLINE (or READY), suspect the cable or its connector.
- ♦ If you are printing totally black pages, suspect a broken or fouled corona wire. If that is not the case, replace the toner cartridge.
- ♦ If the print appears speckled, it is probably the fault of the primary corona grid which is part of the toner cartridge. Replace the toner cartridge.
- ♦ If white streaks appear in your printing, shake the toner cartridge to ensure an equal distribution of powder. If that doesn't work, clean the transfer corona assembly. Contamination on the assembly will prevent it from holding the electrical charge needed to attract toner from the drum.

- ♦ A repetitive pattern of printing defects, such as an identical smudge every 2 inches, may indicate a defective fusing roller. Try cleaning it according to your hardware vendor's instructions. If that does not work, you may need to replace the fusing roller assembly.

Troubleshooting Dot Matrix Printers

- ♦ If the printer self-tests OK but will not print jobs from the computer, check the following:
 - ♦ Dip switch settings
 - ♦ Proper driver for your application software
 - ♦ Bad or disconnected cable
- ♦ Some printers have both serial and parallel connections. If one doesn't work, change cables and try the other. Be sure to change any dip switch settings needed by the printer to acknowledge the change. If this works, you may have had a physical problem with the output port on the computer or the input port of the printer that you tried the first time.
- ♦ If a dot matrix printer shuts down and recovers frequently, it may be having problems with its thermistor. A thermistor is a device used to keep the printer from overheating. Try replacing this part before you replace the entire print head.
- ♦ Some printers can be set by dip switches for unidirectional or bidirectional printing. Bidirectional is normally faster, but might cause problems with graphic output for some combinations of applications and printers. If you suspect this problem, reset your dip switches for unidirectional printing.
- ♦ If your output is double-spaced when you expect single-spaced, you may be getting an extra Carriage Return and Line Feed at the end of every line. Reset the dip switch(es) controlling this.
- ♦ If your print quality is poor, first check the ribbon for wear. Also examine the print head spacing. Your head may be too far away from the platen for your current paper thickness. If adjusting the spacing doesn't solve the problem, clean the print head itself with a cotton swab dipped lightly in alcohol.

Troubleshooting Network-Related Printer Problems

The following information may be helpful in resolving printer problems. For a comprehensive discussion of printing troubleshooting, see “Troubleshooting General Printing Problems” on page 159.

- ♦ If a network printer sometimes goes off-line for no apparent reason and works fine when it is reinitialized, you may have a static problem. Large amounts of static can be generated by certain special papers, such as carbonless forms. Make sure your printer is properly grounded.
- ♦ Plotters need to function much as printers in order to accept a job to plot, but plotters can have no direct interaction between themselves and the application.

For example, the AutoCAD application talks directly to a COM port, then waits for a reply from that port. Since NetWare[®] software only redirects printing to LPT ports, AutoCAD ends up waiting for COM port activity when there won't be any.

You can handle this problem by saving a print job to a file and then using NPRINT to print the job. An alternative would be to plot to a file named LPT1 after capturing the device LPT1 with the CAPTURE command.

Troubleshooting Tips for Administering Printer Stations

For a comprehensive discussion of strategies for troubleshooting network printing, see “Troubleshooting General Printing Problems” on page 159.

The following sections address some problems you might encounter.

- ♦ “Printing is Slow Using NPRINT.EXE as a Remote Network Station” on page 180
- ♦ “The Message Printer is not connected Appears on the Console Screen” on page 180
- ♦ “Remote Serial Printer Self-Tests Successfully But is Not Working as Network Device” on page 180
- ♦ “NPRINT.EXE Does Not Initialize or Hangs Periodically at Random” on page 181
- ♦ “Workstation Hangs When NPRINT Loads” on page 182
- ♦ “Print Jobs are Ruined When Printing Locally” on page 182

- ♦ “NPRINTER Cannot Reconnect to Print Server that was Downed and Loaded on Different NetWare Server” on page 182
- ♦ “Port Driver Status is Waiting for Job But Printer is Not Attached” on page 183
- ♦ “NPRINTER.EXE Does Not Run from Local Drive” on page 183

Printing is Slow Using NPRINTER.EXE as a Remote Network Station

The following are possible reasons why printing with might be substantially slower using NPRINTER.EXE as a remote network station than using the same printer locally from DOS:

- ♦ You may have an IRQ conflict.
Change to polled mode.
- ♦ Your port may not support hardware interrupts.
If this is the problem, use polled mode. (You can get the ability to use interrupts by installing an I/O board that supports them.)
- ♦ You may be using the wrong type of cable or a defective cable.
Try a new cable. Some printers require a non-standard parallel cable. They will work with a standard cable, but not effectively. Examples: IBM 4019 & 4029.

The Message Printer is not connected Appears on the Console Screen

This message may indicate that NPRINTER has not yet been loaded to activate a printer that has been previously defined in NetWare Administrator.

Remote Serial Printer Self-Tests Successfully But is Not Working as Network Device

Serial printers must be configured the same way as they are configured in NetWare Administrator. The printer must be configured through its DIP switches or through menus. See your printer's documentation for details.

The printer configurations must agree on baud rate, data bits, stop bits, XON/XOFF, and parity.

NPRINTER.EXE Does Not Initialize or Hangs Periodically at Random

Sometimes the presence of a router between the NPRINTER station and the print server can cause problems for NPRINTER, causing the printer to hang.

A similar problem may occur when you reboot the workstation to re-establish a lost connection. In this case, you sometimes get a message telling you the printer is still in use. You see this message when the previous SPX connection has not timed out, which usually takes at least 30 seconds.

If you have increased the SPX™ abort and IPX™ Retry counts, the time-out sequence is even longer.

To resolve either of these problems, first make sure the following conditions have been met:

- ♦ Your machine has sufficient memory.
- ♦ You are running current versions of software such as NPRINTER and NetWare VLM™ programs.
- ♦ The PSERVER NLM is running.

Attempts to start NPRINTER when PSERVER is not running will cause an error.

If none of these is the cause of the problem, try increasing the following two parameters in your NET.CFG file:

```
SPX ABORT TIMEOUT= retry_number  
IPX RETRY COUNT= retry_number
```

SPX ABORT TIMEOUT defaults to 540 ticks or approximately 30 seconds. IPX RETRY COUNT defaults to 20.

You can also try loading NPRINTER through a batch file at the workstation. That file can include an IF statement to retry NPRINTER until PSERVER is functioning. For example:

```
:LOOP  
NPRINTER pserver printernumber  
IF ERRORLEVEL 1 GOTO :LOOP
```

ECHO Port driver loaded successfully.

Workstation Hangs When NPRINTERR Loads

Sometimes NPRINTERR conflicts with the network interface board settings and hangs. This problem may be caused by conflicting settings on the LAN adapter board.

Either change to polled mode or change the board settings to avoid the conflict.

Print Jobs are Ruined When Printing Locally

A print job on a printer may be ruined if the user on the station to which the printer is physically attached does not have a CAPTURE invoked and attempts to print locally. To prevent this, capture LPT1 on this workstation so that NetWare handles the job.

Another method is to reverse the Private and Shared printer options so that the printer is designated as Private. This can be done at the print server console from the Printer Control option window or from the PSC command-line utility.

PSC provides the quickest way to do this. Issue the PSC Private (PRI) command from the DOS prompt. You can then issue the PSC Shared (SHA) command to reverse the status for shared network printing again.

NPRINTERR Cannot Reconnect to Print Server that was Downed and Loaded on Different NetWare Server

If you bring down PSERVER.NLM and bring it up on a different NetWare server from the one it was originally loaded on, port drivers that were connected to that print server initially lose their connection.

When NPRINTERR is connected to PSERVER.NLM, the port driver stores the network address of the NetWare server where the print server was loaded. If the print server is then loaded on a different NetWare server, the port driver cannot attach to the print server again unless it is reattached to the new running print server.

If you do not reattach the port driver, and later reload the print server on the original NetWare server, the port driver will connect as before because the network address of the NetWare server and the information stored by the port driver once again match.

Port Driver Status is Waiting for Job But Printer is Not Attached

The port driver (NPRINTER) status for a defined but unattached serial printer is Waiting for job even though the printer is not attached, and the printer status is Running. If a print job is put into the queue for this printer, the port driver status changes to Ready (Waiting for printer) or Printing job but the printer status changes to Offline.

Defined but unattached parallel printers show a status of Not connected.

NPRINTER.EXE Does Not Run from Local Drive

If you want to run NPRINTER.EXE from your local drive, be sure to copy all the necessary files. To get a list of all the necessary files and correct version numbers, type `NPRINTER /VER`.

An alternative is to put them in the LOGIN directory on the network, which is the directory that is accessible prior to logging in. This will eliminate the security risk and user error problems that can occur from leaving a workstation logged in and not supervised.



Novell Trademarks

Access Manager is a registered trademark of Novell, Inc. in the United States and other countries.

Advanced NetWare is a trademark of Novell, Inc.

AlarmPro is a registered trademark of Novell, Inc. in the United States and other countries.

AppNotes is a registered service mark of Novell, Inc. in the United States and other countries.

AppNotes is a registered service mark of Novell, Inc. in the United States and other countries.

AppTester is a registered service mark of Novell, Inc. in the United States and other countries.

BrainShare is a registered service mark of Novell, Inc. in the United States and other countries.

C-Worthy is a trademark of Novell, Inc.

C3PO is a trademark of Novell, Inc.

CBASIC is a registered trademark of Novell, Inc. in the United States and other countries.

Certified NetWare Administrator in Japanese and CNA-J are service marks of Novell, Inc.

Certified NetWare Engineer in Japanese and CNE-J are service marks of Novell, Inc.

Certified NetWare Instructor in Japanese and CNI-J are service marks of Novell, Inc.

Certified Novell Administrator and CNA are service marks of Novell, Inc.

Certified Novell Engineer is a trademark and CNE is a registered service mark of Novell, Inc. in the United States and other countries.

Certified Novell Salesperson is a trademark of Novell, Inc.

Client 32 is a trademark of Novell, Inc.

ConnectView is a registered trademark of Novell, Inc. in the United States and other countries.

Connectware is a registered trademark of Novell, Inc. in the United States and other countries.

Corsair is a registered trademark of Novell, Inc. in the United States and other countries.

CP/Net is a registered trademark of Novell, Inc. in the United States and other countries.

Custom 3rd-Party Object and C3PO are trademarks of Novell, Inc.

DeveloperNet is a registered trademark of Novell, Inc. in the United States and other countries.

Documenter's Workbench is a registered trademark of Novell, Inc. in the United States and other countries.

ElectroText is a trademark of Novell, Inc.

Enterprise Certified Novell Engineer and ECNE are service marks of Novell, Inc.

Envoy is a registered trademark of Novell, Inc. in the United States and other countries.

EtherPort is a registered trademark of Novell, Inc. in the United States and other countries.

EXOS is a trademark of Novell, Inc.

Global MHS is a trademark of Novell, Inc.

Global Network Operations Center and GNOC are service marks of Novell, Inc.

Graphics Environment Manager and GEM are registered trademarks of Novell, Inc. in the United States and other countries.

GroupWise is a registered trademark of Novell, Inc. in the United States and other countries.

GroupWise XTD is a trademark of Novell, Inc.

Hardware Specific Module is a trademark of Novell, Inc.

Hot Fix is a trademark of Novell, Inc.

InForms is a trademark of Novell, Inc.

Instructional Workbench is a registered trademark of Novell, Inc. in the United States and other countries.

Internetwork Packet Exchange and IPX are trademarks of Novell, Inc.

IPX/SPX is a trademark of Novell, Inc.

IPXODI is a trademark of Novell, Inc.

IPXWAN is a trademark of Novell, Inc.

LAN WorkGroup is a trademark of Novell, Inc.

LAN WorkPlace is a registered trademark of Novell, Inc. in the United States and other countries.

LAN WorkShop is a trademark of Novell, Inc.

LANalyzer is a registered trademark of Novell, Inc. in the United States and other countries.

LANalyzer Agent is a trademark of Novell, Inc.

Link Support Layer and LSL are trademarks of Novell, Inc.

MacIPX is a registered trademark of Novell, Inc. in the United States and other countries.

ManageWise is a registered trademark of Novell, Inc. in the United States and other countries.

Media Support Module and MSM are trademarks of Novell, Inc.

Mirrored Server Link and MSL are trademarks of Novell, Inc.

Mobile IPX is a trademark of Novell, Inc.

Multiple Link Interface and MLI are trademarks of Novell, Inc.

Multiple Link Interface Driver and MLID are trademarks of Novell, Inc.

My World is a registered trademark of Novell, Inc. in the United States and other countries.

N-Design is a registered trademark of Novell, Inc. in the United States and other countries.

Natural Language Interface for Help is a trademark of Novell, Inc.

NDS Manager is a trademark of Novell, Inc.

NE/2 is a trademark of Novell, Inc.

NE/2-32 is a trademark of Novell, Inc.

NE/2T is a trademark of Novell, Inc.

NE1000 is a trademark of Novell, Inc.

NE1500T is a trademark of Novell, Inc.

NE2000 is a trademark of Novell, Inc.

NE2000T is a trademark of Novell, Inc.

NE2100 is a trademark of Novell, Inc.

NE3200 is a trademark of Novell, Inc.

NE32HUB is a trademark of Novell, Inc.

NEST Autoroute is a trademark of Novell, Inc.

NetExplorer is a trademark of Novell, Inc.

NetNotes is a registered trademark of Novell, Inc. in the United States and other countries.

NetSync is a trademark of Novell, Inc.

NetWare is a registered trademark of Novell, Inc. in the United States and other countries.

NetWare 3270 CUT Workstation is a trademark of Novell, Inc.

NetWare 3270 LAN Workstation is a trademark of Novell, Inc.

NetWare 386 is a trademark of Novell, Inc.

NetWare Access Server is a trademark of Novell, Inc.

NetWare Access Services is a trademark of Novell, Inc.

NetWare Application Manager is a trademark of Novell, Inc.

NetWare Application Notes is a trademark of Novell, Inc.

NetWare Asynchronous Communication Services and NACS are trademarks of Novell, Inc.

NetWare Asynchronous Services Interface and NASI are trademarks of Novell, Inc.

NetWare Aware is a trademark of Novell, Inc.

NetWare Basic MHS is a trademark of Novell, Inc.

NetWare BranchLink Router is a trademark of Novell, Inc.

NetWare Care is a trademark of Novell, Inc.

NetWare Communication Services Manager is a trademark of Novell, Inc.

NetWare Connect is a registered trademark of Novell, Inc. in the United States.

NetWare Core Protocol and NCP are trademarks of Novell, Inc.

NetWare Distributed Management Services is a trademark of Novell, Inc.

NetWare Document Management Services is a trademark of Novell, Inc.

NetWare DOS Requester and NDR are trademarks of Novell, Inc.

NetWare Enterprise Router is a trademark of Novell, Inc.

NetWare Express is a registered service mark of Novell, Inc. in the United States and other countries.

NetWare Global Messaging and NGM are trademarks of Novell, Inc.

NetWare Global MHS is a trademark of Novell, Inc.

NetWare HostPrint is a registered trademark of Novell, Inc. in the United States.

NetWare IPX Router is a trademark of Novell, Inc.

NetWare LANalyzer Agent is a trademark of Novell, Inc.

NetWare Link Services Protocol and NLSP are trademarks of Novell, Inc.

NetWare Link/ATM is a trademark of Novell, Inc.
NetWare Link/Frame Relay is a trademark of Novell, Inc.
NetWare Link/PPP is a trademark of Novell, Inc.
NetWare Link/X.25 is a trademark of Novell, Inc.
NetWare Loadable Module and NLM are trademarks of Novell, Inc.
NetWare LU6.2 is trademark of Novell, Inc.
NetWare Management Agent is a trademark of Novell, Inc.
NetWare Management System and NMS are trademarks of Novell, Inc.
NetWare Message Handling Service and NetWare MHS are trademarks of Novell, Inc.
NetWare MHS Mailslots is a registered trademark of Novell, Inc. in the United States and other countries.
NetWare Mirrored Server Link and NMSL are trademarks of Novell, Inc.
NetWare Mobile is a trademark of Novell, Inc.
NetWare Mobile IPX is a trademark of Novell, Inc.
NetWare MultiProtocol Router and NetWare MPR are trademarks of Novell, Inc.
NetWare MultiProtocol Router Plus is a trademark of Novell, Inc.
NetWare Name Service is trademark of Novell, Inc.
NetWare Navigator is a trademark of Novell, Inc.
NetWare Peripheral Architecture is a trademark of Novell, Inc.
NetWare Print Server is a trademark of Novell, Inc.
NetWare Ready is a trademark of Novell, Inc.
NetWare Requester is a trademark of Novell, Inc.
NetWare Runtime is a trademark of Novell, Inc.
NetWare RX-Net is a trademark of Novell, Inc.
NetWare SFT is a trademark of Novell, Inc.
NetWare SFT III is a trademark of Novell, Inc.
NetWare SNA Gateway is a trademark of Novell, Inc.
NetWare SNA Links is a trademark of Novell, Inc.
NetWare SQL is a trademark of Novell, Inc.
NetWare Storage Management Services and NetWare SMS are trademarks of Novell, Inc.
NetWare Telephony Services is a trademark of Novell, Inc.
NetWare Tools is a trademark of Novell, Inc.
NetWare UAM is a trademark of Novell, Inc.
NetWare WAN Links is a trademark of Novell, Inc.

NetWare/IP is a trademark of Novell, Inc.

NetWire is a registered service mark of Novell, Inc. in the United States and other countries.

Network Navigator is a registered trademark of Novell, Inc. in the United States.

Network Navigator - AutoPilot is a registered trademark of Novell, Inc. in the United States and other countries.

Network Navigator - Dispatcher is a registered trademark of Novell, Inc. in the United States and other countries.

Network Support Encyclopedia and NSE are trademarks of Novell, Inc.

Network Support Encyclopedia Professional Volume and NSEPro are trademarks of Novell, Inc.

NetWorld is a registered service mark of Novell, Inc. in the United States and other countries.

Novell is a service mark and a registered trademark of Novell, Inc. in the United States and other countries.

Novell Alliance Partners Program is a collective mark of Novell, Inc.

Novell Application Launcher is a trademark of Novell, Inc.

Novell Authorized CNE is a trademark and service mark of Novell, Inc.

Novell Authorized Education Center and NAEC are service marks of Novell, Inc.

Novell Authorized Partner is a service mark of Novell, Inc.

Novell Authorized Reseller is a service mark of Novell, Inc.

Novell Authorized Service Center and NASC are service marks of Novell, Inc.

Novell BorderManager is a trademark of Novell, Inc.

Novell BorderManager FastCache is a trademark of Novell, Inc.

Novell Client is a trademark of Novell, Inc.

Novell Corporate Symbol is a trademark of Novell, Inc.

Novell Customer Connections is a registered trademark of Novell, Inc. in the United States.

Novell Directory Services and NDS are registered trademarks of Novell, Inc. in the United States and other countries.

Novell Distributed Print Services is a trademark and NDPS is a registered trademark of Novell, Inc. in the United States and other countries.

Novell ElectroText is a trademark of Novell, Inc.

Novell Embedded Systems Technology is a registered trademark and NEST is a trademark of Novell, Inc. in the United States and other countries.

Novell Gold Authorized Reseller is a service mark of Novell, Inc.

Novell Gold Partner is a service mark of Novell, Inc.

Novell Labs is a trademark of Novell, Inc.

Novell N-Design is a registered trademark of Novell, Inc. in the United States and other countries.

Novell NE/2 is a trademark of Novell, Inc.

Novell NE/2-32 is a trademark of Novell, Inc.

Novell NE3200 is a trademark of Novell, Inc.

Novell Network Registry is a service mark of Novell, Inc.

Novell Platinum Partner is a service mark of Novell, Inc.

Novell Press is a trademark of Novell, Inc.

Novell Press Logo (teeth logo) is a registered trademark of Novell, Inc. in the United States and other countries.

Novell Replication Services is a trademark of Novell, Inc.

Novell Research Reports is a trademark of Novell, Inc.

Novell RX-Net/2 is a trademark of Novell, Inc.

Novell Service Partner is a trademark of Novell, Inc.

Novell Storage Services is a trademark of Novell, Inc.

Novell Support Connection is a registered trademark of Novell, Inc. in the United States and other countries.

Novell Technical Services and NTS are service marks of Novell, Inc.

Novell Technology Institute and NTI are registered service marks of Novell, Inc. in the United States and other countries.

Novell Virtual Terminal and NVT are trademarks of Novell, Inc.

Novell Web Server is a trademark of Novell, Inc.

Novell World Wide is a trademark of Novell, Inc.

NSE Online is a service mark of Novell, Inc.

NTR2000 is a trademark of Novell, Inc.

Nutcracker is a registered trademark of Novell, Inc. in the United States and other countries.

OnLAN/LAP is a registered trademark of Novell, Inc. in the United States and other countries.

OnLAN/PC is a registered trademark of Novell, Inc. in the United States and other countries.

Open Data-Link Interface and ODI are trademarks of Novell, Inc.

Open Look is a registered trademark of Novell, Inc. in the United States and other countries.

Open Networking Platform is a registered trademark of Novell, Inc. in the United States and other countries.

Open Socket is a registered trademark of Novell, Inc. in the United States.

Packet Burst is a trademark of Novell, Inc.

PartnerNet is a registered service mark of Novell, Inc. in the United States and other countries.

PC Navigator is a trademark of Novell, Inc.

PCOX is a registered trademark of Novell, Inc. in the United States and other countries.

Perform3 is a trademark of Novell, Inc.

Personal NetWare is a trademark of Novell, Inc.

Pervasive Computing from Novell is a registered trademark of Novell, Inc. in the United States and other countries.

Portable NetWare is a trademark of Novell, Inc.

Presentation Master is a registered trademark of Novell, Inc. in the United States and other countries.

Print Managing Agent is a trademark of Novell, Inc.

Printer Agent is a trademark of Novell, Inc.

QuickFinder is a trademark of Novell, Inc.

Red Box is a trademark of Novell, Inc.

Reference Software is a registered trademark of Novell, Inc. in the United States and other countries.

Remote Console is a trademark of Novell, Inc.

Remote MHS is a trademark of Novell, Inc.

RX-Net is a trademark of Novell, Inc.

RX-Net/2 is a trademark of Novell, Inc.

ScanXpress is a registered trademark of Novell, Inc. in the United States and other countries.

Script Director is a registered trademark of Novell, Inc. in the United States and other countries.

Sequenced Packet Exchange and SPX are trademarks of Novell, Inc.

Service Response System is a trademark of Novell, Inc.

Serving FTP is a trademark of Novell, Inc.

SFT is a trademark of Novell, Inc.

SFT III is a trademark of Novell, Inc.

SoftSolutions is a registered trademark of SoftSolutions Technology Corporation, a wholly owned subsidiary of Novell, Inc.

Software Transformation, Inc. is a registered trademark of Software Transformation, Inc., a wholly owned subsidiary of Novell, Inc.

SPX/IPX is a trademark of Novell, Inc.

StarLink is a registered trademark of Novell, Inc. in the United States and other countries.

Storage Management Services and SMS are trademarks of Novell, Inc.

Technical Support Alliance and TSA are collective marks of Novell, Inc.

The Fastest Way to Find the Right Word is a registered trademark of Novell, Inc. in the United States and other countries.

The Novell Network Symbol is a trademark of Novell, Inc.

Topology Specific Module and TSM are trademarks of Novell, Inc.

Transaction Tracking System and TTS are trademarks of Novell, Inc.

Universal Component System is a registered trademark of Novell, Inc. in the United States and other countries.

Virtual Loadable Module and VLM are trademarks of Novell, Inc.

Writer's Workbench is a registered trademark of Novell, Inc. in the United States and other countries.

Yes, It Runs with NetWare (logo) is a trademark of Novell, Inc.

Yes, NetWare Tested and Approved (logo) is a trademark of Novell, Inc.

ZENworks is a trademark of Novell, Inc.

