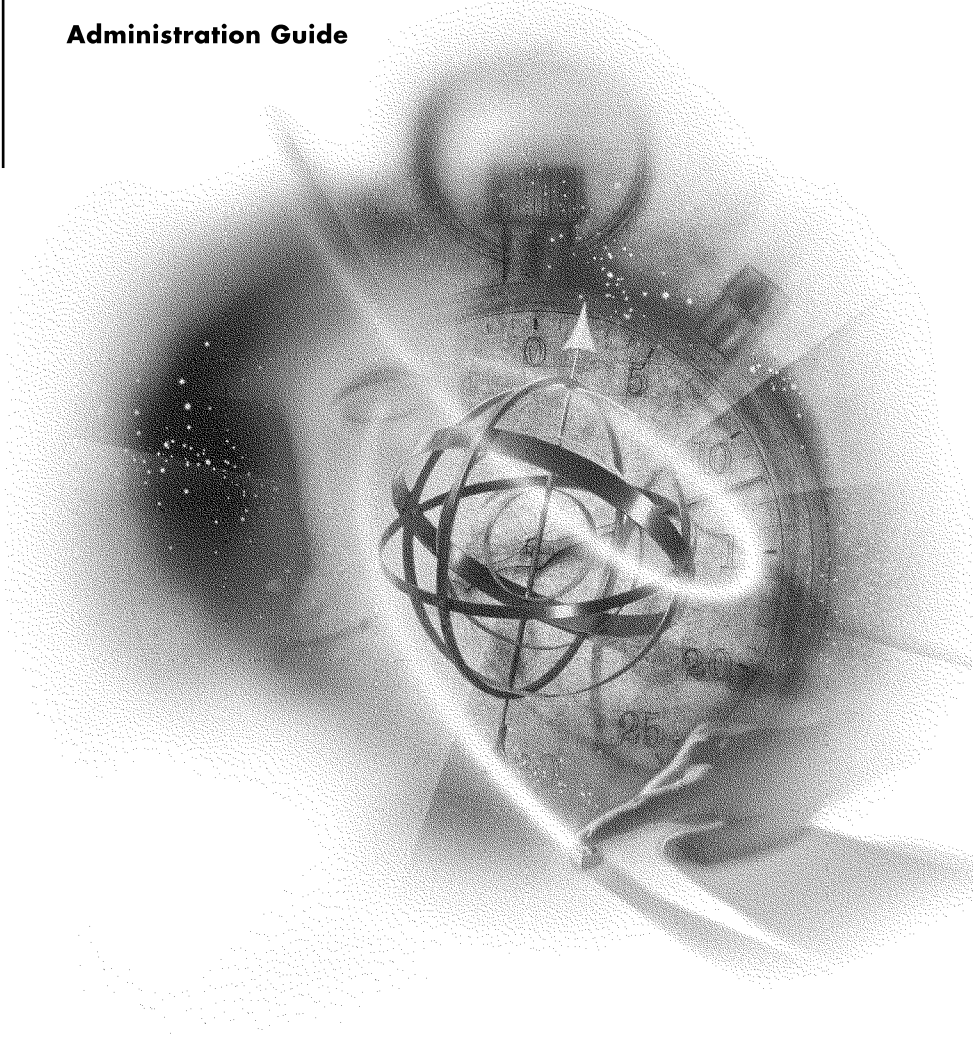**Novell Distributed Print Services**

**Administration Guide**

NetWare® 5.1
NETWORKING SOFTWARE

Novell®

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# Contents

**7    Using Third-Party Gateways**. . . . . . . . . . . . . . . . . . . . . .

**A    Novell Trademarks**. . . . . . . . . . . . . . . . . . . . . . . . . . .

# Overview of Novell Distributed Print Services

Novell® Distributed Print Services® (NDPS®) is the result of a development effort by Novell, Hewlett-Packard*, and Xerox*. NDPS offers important improvements over Novell's legacy queue-based print service architecture. It was designed to handle the increased complexity of managing modern printers in a network environment and to exploit the new functionality offered by these printers. The power and versatility of NDPS will help you get the most out of your printing resources, whether you're in a small workgroup or an enterprise-wide system.

NDPS is fully compatible with your existing queue-based printing resources, which means that you can make the transition from your legacy printing setup gradually.

The advantages of using NDPS will become increasingly apparent as you begin the transition process. Queue-based print services are a challenge to manage and to use. 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 jobs to be sent and queued to the printer. While this complicated system works well, it is time-consuming, and troubleshooting printing problems can be tedious. NDPS eliminates many of these complications while enhancing the overall versatility of your printing environment.

For more information, 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**

Novell® Distributed Print Services® (NDPS®) is the default and preferred print system in NetWare® 5™. It is designed to handle the increased complexity of managing printing devices in any type of network environment, ranging in size from small workgroups to enterprise-wide systems. NDPS allows you to use NetWare Administrator to create, configure, and manage printers without having to go to the server console. You can also designate those printers for automatic installation on user workstations, without any action by your users.

NDPS replaces the existing queue-based technology. You don't have to set up print queues, printer objects, or print servers, and link them together. Instead, all of your management tasks are focused on the printer itself, which can be configured as an NDS® object and accessed through NetWare Administrator.

To understand how NDPS works, you should first become acquainted with the following:

  ◆ The basic features of NDPS

  ◆ The differences between NDPS and legacy, queue-based print services

  ◆ The different types of NDPS printers

  ◆ The architectural components of NDPS

## Overview of NDPS

Novell® Distributed Print Services™ (NDPS™) is the default and preferred print system in NetWare® 5™.  Novell's legacy, queue-based print system is also fully supported in NetWare 5, which allows your users to continue printing as they always have until you complete the transition to NDPS. NDPS provides full support for IP-based as well as IPX™-based printing,

giving you a wide variety of system configuration options to fit your organization's specific needs.

Some of the most significant features of NDPS are described in the following topics:

- "Centralized, Simplified Single-Point Administration" on page 16
- "Bi-directional Feedback and Control" on page 17
- "Configurable Event Notification" on page 18
- "Tight Integration with NDS" on page 19
- "Automatic Printer Driver Download and End-User Convenience" on page 19
- "New Printer and Job Configuration Options" on page 20
- "New Job Scheduling Options" on page 20
- "Protocol Independence" on page 21
- "Compatibility with Multiple Clients, Applications, and Operating Systems" on page 21
- "Support for Existing Printers (Full Backward Compatibility)" on page 22

## Centralized, Simplified Single-Point Administration

Novell Distributed Print Services takes advantage of the single network view provided by NetWare, so you can save time by managing all of your printing resources from NetWare Administrator. For example, from your workstation you can create and configure printers, and designate printers to be automatically installed on user workstations.

NDPS provides a single view of network-
and server-attached printers from within
NetWare Administrator
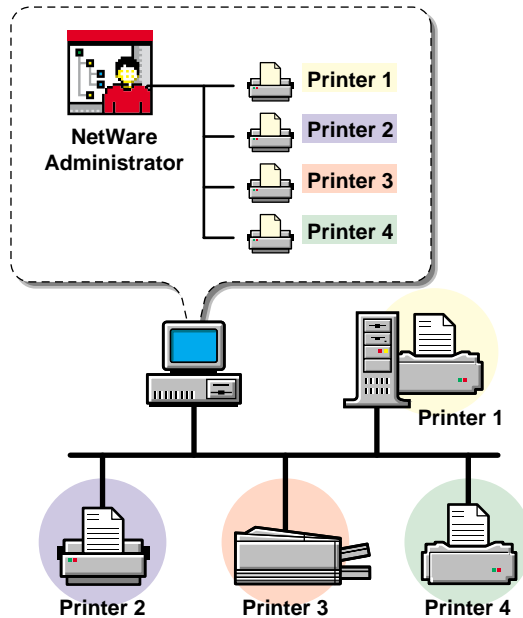


## Bi-directional Feedback and Control

Novell Distributed Print Services lets clients and printers exchange
information about printers and print jobs. For example, this interchange
allows users and administrators to get real-time information about a printer
such as

- Its status

  For example, it reports such information as whether the printer needs
  toner or paper, whether it is online, and whether the lid is open.

- Its configuration properties and features

  For example, does it support color? Duplexing? How many pages has it
  printed since it was last serviced?

NDPS also lets you view information about a print job's properties and status,
including

- The number of copies being printed

- Job hold and scheduling information

• Notification when the job has actually been completed

| is the printer available? | printer is available |
| what is the status of the printer? | toner is low |
| what features are available? | duplex, tabloid-size, color, . . . |
| how many copies are printing? | five copies will be printed |
| what media is being used? | upper tray, transparency |
| has the job actually printed out? | job has been printed |
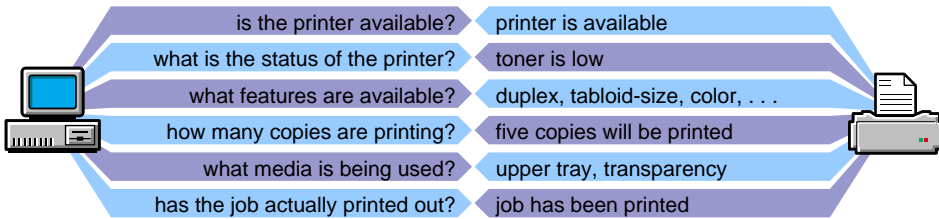
The bi-directional feedback provided by NDPS is limited only by the bi-directional capabilities of the printer itself. In many cases, NDPS actually enhances information provided about printers that do not have bi-directional capabilities.

## Configurable Event Notification

With NDPS, you can customize event notification. Event notification allows you to specify who should be notified of an event or problem, and how that person should be notified. It also allows you to identify the specific events or problems that you want notification messages sent for. For example, you can configure notification so that the owner of a print job will receive a screen pop-up message when the job has actually been printed.

Print 5 copies of this job at the color printer on the second floor at 3 p.m. and notify the department admin when it is complete.
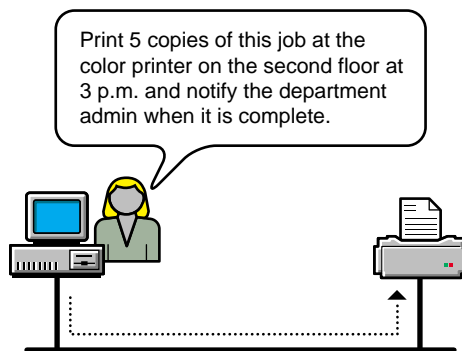
You can also ensure that the printer operator is notified when a problem such as a paper jam occurs on the printer. Notification methods provided by NDPS include pop-up screen messages, e-mail (GroupWise®), and log file records, while third-parties can develop other mechanisms such as beeper notification if they wish.

## Tight Integration with NDS

Novell Distributed Print Services is designed to take full advantage of NDS™. Integration with NDS allows administrators to create a single NDS object—an NDPS Printer object—to represent each printer on the network. As a Printer object, printers become as secure as the other objects in the NDS tree, and they are just as easy to manage.

In the NDS tree, printers can be conveniently grouped. For example, you can group and manage all of your printers by department, by workgroup, or by location. You can also search for printers with specific capabilities, because those capabilities are properties of the NDPS printer object.



**NetWare Administrator**     **Printer Object**

NDPS technology allows you to configure
the printer as a Directory object and access
it through NetWare Administrator
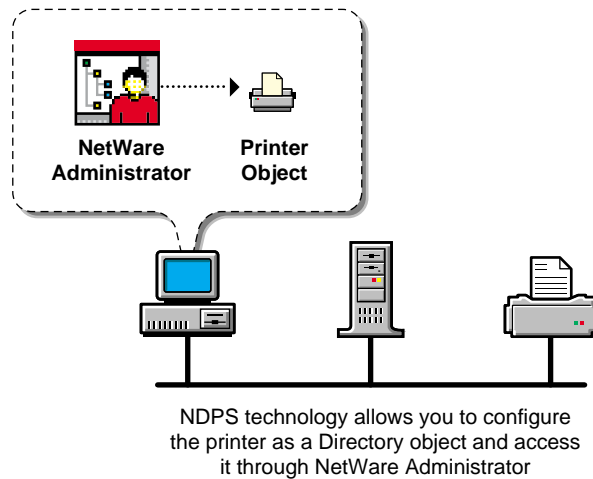
## Automatic Printer Driver Download and End-User Convenience

Not only does NDPS make printer management easier for network administrators, it also makes printing easier for end users. NDPS provides a database that includes drivers for most printers in common use today. From this database, you can select drivers you want to be automatically installed on client workstations when a user adds a printer. This eliminates the need for users to provide the printer driver themselves. You can add drivers to this database as they become available.
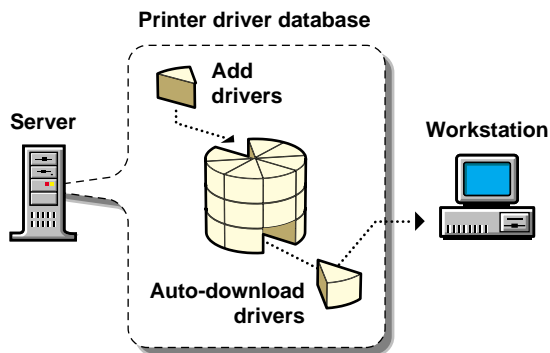
Using the Novell Printer Manager utility, which is included with the NDPS client, users can install additional printers and are not limited to using only the printers selected by the network administrator. This utility also allows users to search for printers with specific characteristics. For example, a user can search Novell Printer Manager for printer characteristics such as color, type, location, or speed to help locate the appropriate printer for the job.

An NDPS client can also modify printer configurations. For example, a user can configure a printer to use a different size paper or to print a cover page. Users can change the properties of any installed printer that the administrator has not locked. Also, using NDPS, users can view the current status of any available printer to see how many print jobs are waiting to be printed before they send their jobs. These NDPS features help make end-user printing easier and more effective than the methods of the past.

From this list, you can select drivers you want to be automatically downloaded and installed on client workstations running with Windows 95*, Windows NT*, or Windows* 3.*x*. You can add drivers to this database as they become available.

## New Printer and Job Configuration Options

The NDPS interface supports many printer options in common use today, while the open architecture of NDPS allows printer manufacturers to add their own custom interfaces for specific printers. This means that as new printer features become available, you can access them through NDPS.

## New Job Scheduling Options

NDPS allows you to configure and schedule print jobs to be processed according to time of day, job size, or media availability.

## Protocol Independence

The entire NDPS architecture is protocol independent. NDPS can be used in an IPX-based environment, a pure TCP/IP environment, or a combination of both. The third-party gateways being developed to work with NDPS are also protocol independent.

**NOTE:** Most printers that support TCP/IP today do not have a discovery protocol like SAP for IPX-based networks. The Service Locator Protocol (SLP) will eventually be embedded in printers and will provide a discovery protocol that can be used with NDPS.

## Compatibility with Multiple Clients, Applications, and Operating Systems

NDPS provides an enhanced client for Windows 95, Windows NT, and Windows 3.*x* to take advantage of all of the advanced features provided by NDPS. In the future, full NDPS functionality will be made available on additional client platforms.

All clients that are not NDPS-aware can still print to NDPS printers, and you can use all of your existing applications with NDPS. Although your queue-based print clients won't be able to take full advantage of the advanced features available in NDPS, they won't lose any of the printing ability they have now. This backward compatibility feature of NDPS makes it well-suited for heterogeneous networks.

**Non-enhanced clients**

OS/2    DOS

NDPS printer

Mac    Unix

NON-NDPS PRINT JOBS

Queue

**Enhanced clients**

Windows NT    Windows 3.1    Windows 95

NDPS-aware printer

Server

ADVANCED NDPS FEATURES
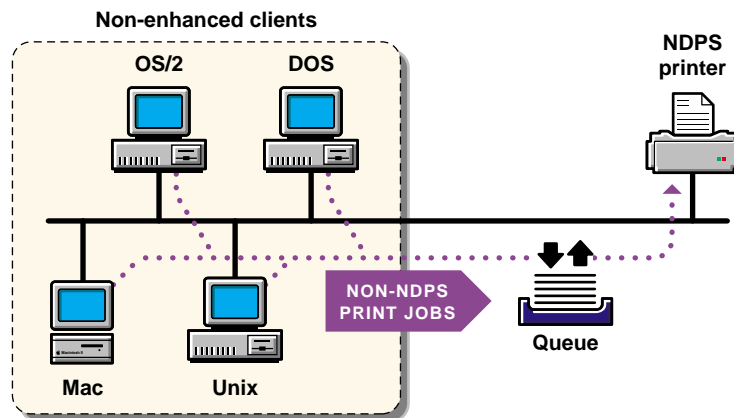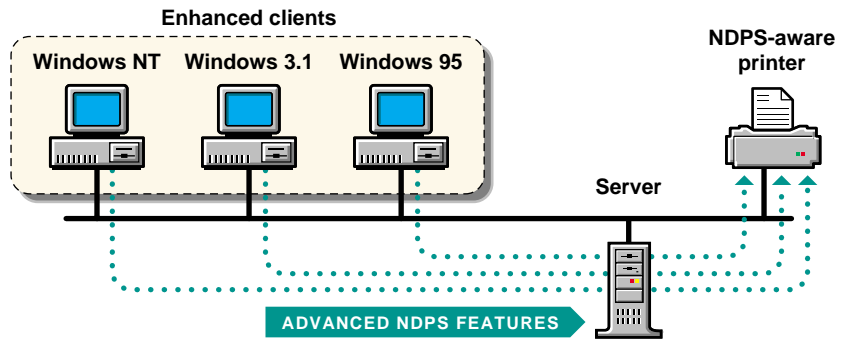
## Support for Existing Printers (Full Backward Compatibility)

NDPS lets you preserve your investment in your existing printing resources. All clients can print to legacy printers. All currently available printers can be used in NDPS environments. In fact, major printer manufacturers have developed gateways for their existing printers to enable them to take advantage of many new features available with NDPS. In the future, a new generation of printers will be available with embedded NDPS functionality so that they will be immediately ready to exploit the full range of NDPS features.

# Comparing NDPS with Queue-Based Print Services

The architecture of Novell® legacy queue-based print services was based on the creation and linking of three components: printers, print queues, and print servers. Setting up queue-based printing was often a complex task. In order to print, users first had to capture the printer port. Then the client would redirect the data to a file in a print queue, where it was stored while waiting to be sent to a printer by the print server.
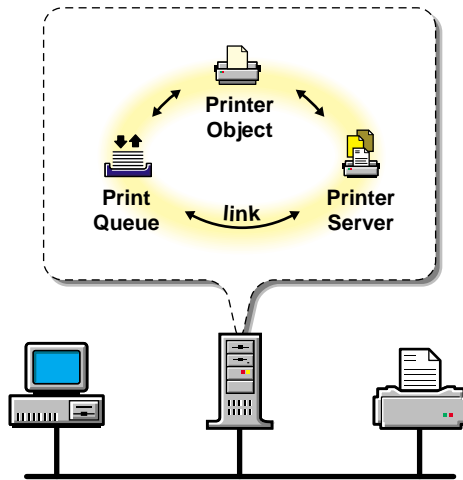
Queue-based technology requires you to
create print queues, printer objects, and
print servers, and link them together.

With Novell Distributed Print Services™ (NDPS™), printer, print queue, and print server functions are combined into a single entity called a Printer Agent. The need to create print queues has been eliminated, and users send print jobs directly to printers.

Even though NDPS does not require queues, your networks may continue to include queue-based printers and clients not currently supported by NDPS. The backward compatibility of NDPS allows you to continue using these queue-based services and resources transparently, as is illustrated in the following scenarios:

- You can print through NDPS to an existing queue, allowing you to access systems that require a queue connection (for example, mainframe systems using NetWare HostPrint® and certain proprietary systems).

- NDPS can service existing queues, allowing you to use NDPS on the server even though your client platform is not currently running NDPS. This allows you to install and run NDPS while you are changing your client workstations to NDPS.

For a discussion of NDPS support for legacy printing, see .

The following table summarizes the major differences between NDPS and queue-based printing services.

| Queue-Based (Legacy) Print Services | Novell Distributed Print Services |
|---|---|
| Administrators create and link print queues, printers, and print servers, and users submit print jobs to the queues. These three objects must be maintained separately once the system is in place. | Administrators create Printer Agents, allowing users to submit print jobs directly to printers. All management functions are centered on the printer itself. |
| Uni-directional communications only. Feedback consists of pop-up windows reporting a nonconfigurable set of events. | Bi-directional communications supported. Configurable event notification includes e-mail, pop-up windows, event logs and other methods, including third-party methods, such as beepers and faxes. Events reported are limited only by a printer's capability. |
| Does not accommodate add-ons or extensions from third parties. | Extensible framework for print devices, including snap-in interfaces. |
| Administrators must create and configure Printer objects manually. Plug-and-print public access printing not available. | Plug-and-print option available for installing public access printers using specially designed third-party gateways. |

# Understanding NDPS Printers

Novell® Distributed Print Services™ (NDPS™) printers can be any of the following types:

- Network-direct printers using a gateway provided by a third-party printer manufacturer
- Remote printers using RP, LPR, or queue-based protocols
- Local printers attached directly to a file server

Any printer, regardless of its physical type or connection mode, can be configured as either a public access printer or a controlled access printer.

The following table compares the two types of printers.

Table 1    Differences between Public Access Printers and Controlled Access Printers

| Issue | Public Access Printers | Controlled Access Printers |
|---|---|---|
| Integration with NDS™ | Not associated with an NDS Printer object. | Associated with an NDS Printer object. |

| Issue | Public Access Printers | Controlled Access Printers |
|-------|------------------------|----------------------------|
| Availability | Immediately available to everyone on the network. Can be made automatically available through third-party gateways or embedded solutions. | Available only to network users who have rights assigned to them. |
| Administration | Require minimal administrative action. Managed through the Tools menu of NetWare Administrator. | Created and administered through NetWare Administrator as an NDS object. |
| Network security | No network security. | Full range of network security options through NDS. |
| Event notification | Provide only job event notification. | Full range of event and status notification options including e-mail, pop-up windows, event logs and third-party methods, such as beepers and faxes. |

# Understanding the Architecture of NDPS

The architecture of Novell® Distributed Print Services™ (NDPS™) ensures the scalability of the printing environment, allowing you to print in LAN, WAN, and enterprise document production environments. It also allows you to print to devices ranging from simple dot-matrix printers to laser printers and large-scale production devices.
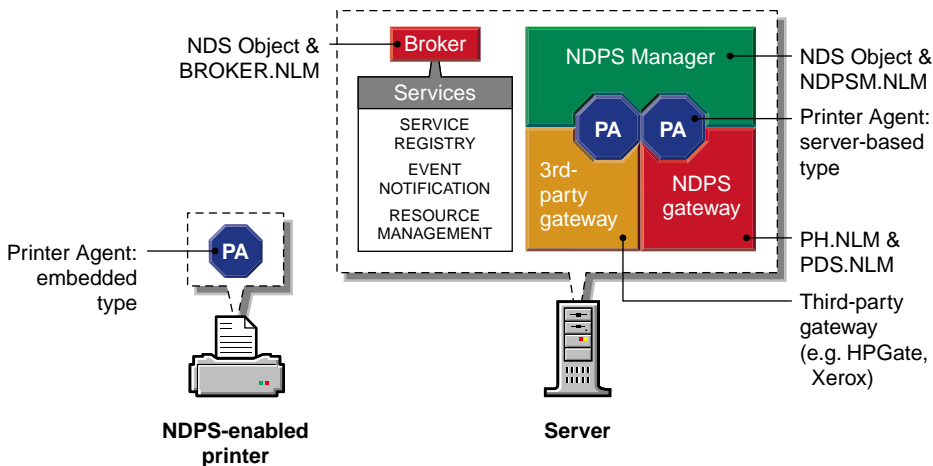
To understand exactly how NDPS works, you need to understand its major architectural components. See the following discussions for information on the various components.

- "Understanding Printer Agents" on page 26
- "Understanding the NDPS Manager" on page 28
- "Understanding Printer Gateways" on page 29
- "Understanding the Broker" on page 33

# Understanding Printer Agents

Before a printer can be incorporated into a Novell® Distributed Print Services™ (NDPS™) printing environment, it must be represented by a Printer Agent. No Printer Agent can represent more than one printer, and no printer can be represented by more than one Printer Agent.

The Printer Agent lies at the heart of NDPS, combining the functions previously performed by a printer, print queue, print server, and spooler into one intelligent and simplified entity.

The Printer Agent can be any of the following:

- A software entity running on a server that represents a printer attached to a server or workstation.
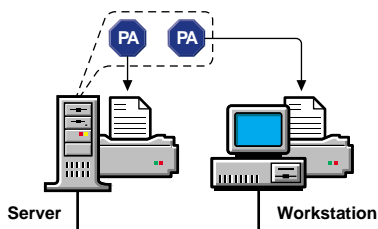


- A software entity running on a server that represents a network-attached printer.
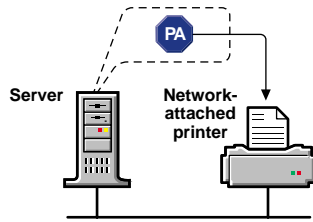
◆ An entity embedded within a network-attached printer.
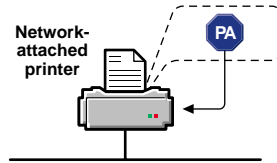


A Printer Agent provides the following services:

◆ It manages the processing of print jobs and many operations performed by the printer itself.
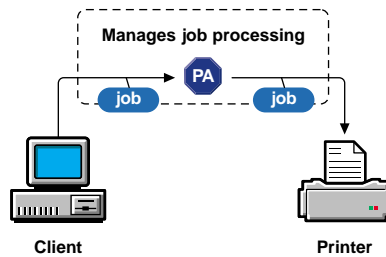


◆ It answers queries from network clients about a print job or document, or about the attributes of the printer.
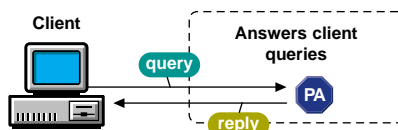


◆ It generates event notification so that interested parties can be notified of job completion, printing problems, errors, or changes in the status of a print job, document, or printer.

Notifies Users

**Client**       **Printer**

For information about other major NDPS components, see the following:

# Understanding the NDPS Manager

A Novell® Distributed Print Services™ (NDPS™) Manager provides a platform for Printer Agents that reside on the server. An NDPS Manager must be created as an object in the NDS™ tree before you can create server-based Printer Agents.



NDPSM.NLM is accessed through . . .

OR

. . . the server console     . . . a workstation running NetWare Administrator

The NDPS Manager object stores information used by the NetWare® Loadable Module™ (NLM™), NDPSM.NLM. You can manually load this NLM at the server console, or it will be automatically loaded when you create a Printer Agent with NetWare Administrator.

A single NDPS Manager can control multiple Printer Agents. (There is no hard limit.)

A specific NDPS Manager can be loaded only on one server. If it controls a local printer, it must be loaded on the server the local printer is attached to.

While you can perform some configuration and management tasks directly through the NDPS Manager console interface, the NetWare Administrator is the main tool for performing these tasks.

For information about other major NDPS components, see the following:
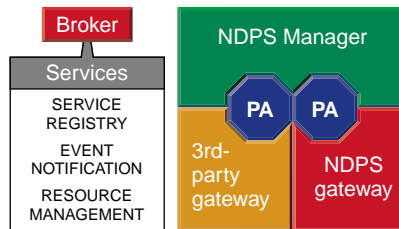
# Understanding Printer Gateways

Gateways allow Novell® Distributed Print Services™ (NDPS™) clients to send jobs to printers that are not NDPS-aware (that is, printers that are not equipped with embedded NDPS Printer Agents). You select and configure a printer gateway when you create a new Printer Agent.

Gateways translate NDPS queries or commands to printer-specific language that the physical printer can use. This is possible because gateways are configured to know the specific type (make and model) of printer being used.

The following diagram illustrates a typical gateway configuration.

Third-party gateway

NDPS client · NDPS server · Existing printer

Third-party gateways are developed by printer manufacturers to support printers directly attached to the network. An example is the HP Gateway that ships with this product. These gateways, because they are developed to interact with specific proprietary printers, can provide a wider array of information and offer options that are not available for the generic Novell gateway. Some third-party gateways provide utilities that can be configured to automatically create Printer Agents when one of their printers is attached to the network.

For more information, see

The Novell gateway (illustrated below) supports local and remote printers, including those using NPRINTER or queue-based technology as well as those configured with RP mode enabled in IPX™ environments or LPR mode enabled in TCP/IP environments.



Printer Agent · Novell Gateway · PA · PDS · PH

NDPS server · Local printer attached to server · NPRINTER attached to workstation or remote server
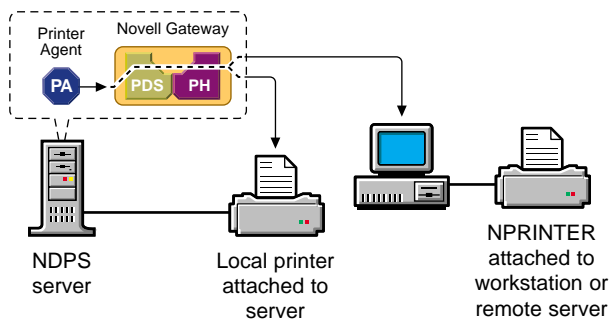
The Novell gateway is designed to be used with printers that don't have an embedded Printer Agent and don't yet have a proprietary, third-party gateway provided for them by their manufacturers.

**NOTE:** RP printers are those that support Novell's legacy Remote Printer protocol. It is supported by many network-attached printers. LPR is a UNIX*-based printing protocol

used by network-attached printers in TCP/IP environments to service jobs submitted to print queues.

The Novell gateway is implemented through a Print Device Subsystem (PDS) and a Port Handler. For more information, see "Understanding the Print Device Subsystem" on page 31 and "Understanding the Port Handler" on page 32.

For information about other major NDPS components, see the following:

- "Understanding Printer Agents" on page 26
- "Understanding the NDPS Manager" on page 28
- "Understanding the Broker" on page 33
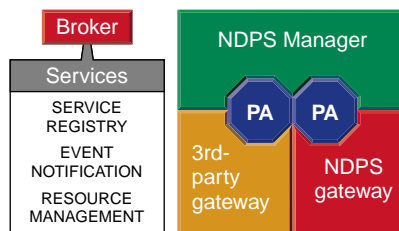


# Understanding the Print Device Subsystem

The Novell® PDS is a component of the Novell Gateway that retrieves printer-specific information and stores this information in a database. The PDS loads automatically when a Printer Agent is created using the Novell Gateway.

You should use the Novell Gateway when you are creating a Printer Agent for either of the following:

- A printer that is directly connected to the network but whose manufacturer does not provide a proprietary Novell Distributed Print Services™ (NDPS™) gateway.
- A printer that is not connected directly to the network. This includes remote printers and local printers. See the following illustration:
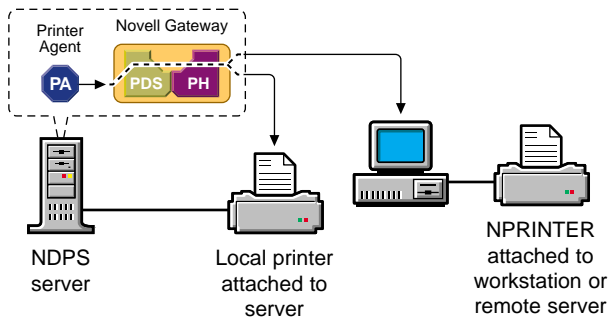
For information about other major NDPS components, see the following:

- "Understanding Printer Agents" on page 26
- "Understanding the NDPS Manager" on page 28
- "Understanding the Broker" on page 33
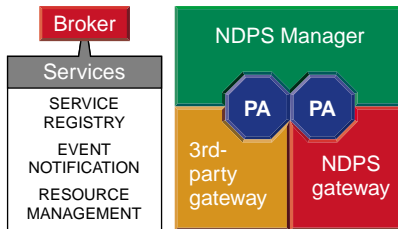


# Understanding the Port Handler

The Novell® Distributed Print Services™ (NDPS™) Port Handler is a component of the Novell gateway that allows NDPS to communicate through hardware ports and legacy methods:

- A server's serial and parallel ports (local printers)
- Queue-based printing
- Remote printers (RP mode in IPX environments, LPR in TCP/IP environments)
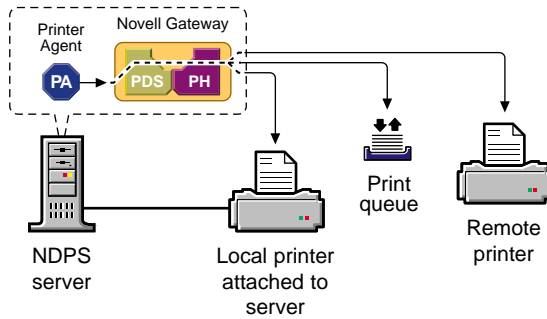
The port handler is an abstraction of the physical connection between the Print Device Subsystem (PDS) and the physical printer. It ensures that the PDS can communicate with the printer regardless of what type of interface is being used.

For information about other major NDPS components, see the following:
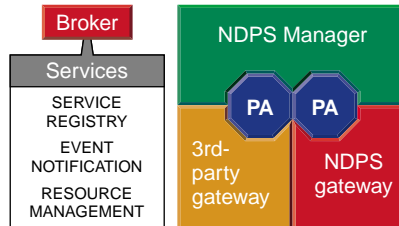
# Understanding the Broker

The Broker provides three network support services not previously available in NetWare®: the Service Registry Service (SRS), Event Notification Service (ENS), and Resource Management Service (RMS).

While these services are invisible to end users, network administrators should be aware of them. Novell® Distributed Print Services™ (NDPS™) uses these services in the following ways:

- **Service Registry Service.** The Service Registry allows public access printers to advertise themselves so that administrators and users can find

them. This service maintains information about device type, device name, device address, and device-specific information such as the manufacturer and model number. See "Understanding the Service Registry Service" on page 34.

- ◆ **Event Notification Service.** This service allows printers to send customizable notifications to users and operators about printer events and print job status. The Notification Service supports a variety of delivery methods including NetWare pop-up, log file, e-mail (GroupWise® ), and programmatic. See "Understanding the Event Notification Service" on page 36.

- ◆ **Resource Management Service.** This service allows resources to be installed in a central location and then downloaded to clients, printers, or any other entity on the network that needs them. The Resource Management Service supports adding, listing, and replacing resources including printer drivers, printer definition (PDF) files, banners, and fonts. See "Understanding the Resource Management Service" on page 38.

For information about other major NDPS components, see the following:
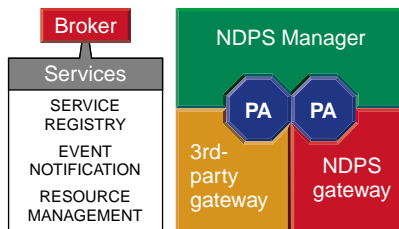
## Understanding the Service Registry Service

The Service Registry allows public access printers to advertise themselves so that administrators and users can find them. This service maintains information about device type, device name, device address, and device-specific information such as the printer manufacturer and model number.

**Service Registry**

**Broker**

**Public Access Printer**
| type |
| name |
| address |
| manufacturer |
| model number |
| etc. |

Administrator     User
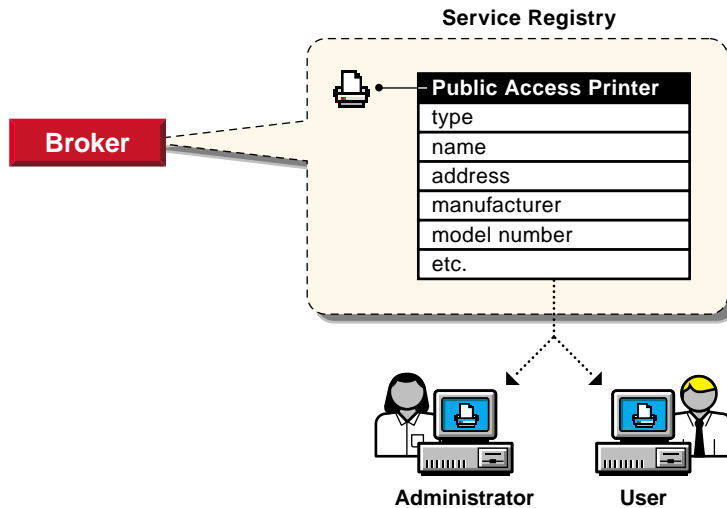
Before Novell® Distributed Print Services™ (NDPS™ ), each printer had to periodically advertise its availability through the Service Advertising Protocol (SAP), which was effective but created a lot of traffic on the wire.

The Service Registry Service helps minimize the network traffic problem created by many printers advertising through the SAP. (For information on turning off the SAP, see the documentation for your printer.) When you attach a public access printer to the network, it registers with the SRS. When an application or user wants to use a printer, it can contact an SRS and retrieve a list of all registered printers on the network.

**NOTE:** For IPX™ , the SRS uses SAP type 8202; for IP environments, it uses Multicast.

Through the SRS, plug-and-print public access printers, as well as those created manually, are immediately made available to users.

If there are multiple Service Registries running on the network, they synchronize automatically. This synchronization allows users to choose public access printers anywhere on the network.

In addition to printer information, the SRS also maintains lists of other services available, such as Event Notification Services and Resource Management Services. For more information, see and . Also see .

For information about other major NDPS components, see the following:
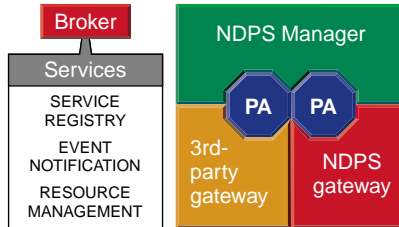
## Understanding the Event Notification Service

Novell® Distributed Print Services™ (NDPS™ ) printers can be configured to provide event notification regarding print jobs and printer status. In NetWare® Administrator, administrators can configure event notification for interested parties, that is, non-job-owners that you wish to be notified of a defined printer or server event that occurs during the processing and printing of a job. (See "Configuring Interested-Party Notification" on page 134.) At the workstation, individual users can use the Novell Printer Manager to configure event notification pertaining to their own jobs only. (See "Configuring Job-Owner Notification" on page 133.)
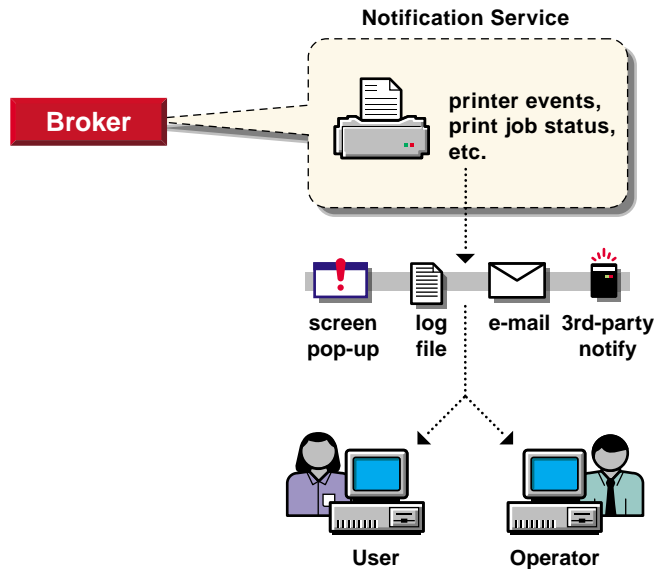
The Event Notification service supports both consumers of events (users) and suppliers of events (printers). Users can register with the ENS by identifying the types of events they want to be notified about, while the printer can register the kinds of events it is capable of reporting. For example, the administrator for a specific printer (by default a Manager of that printer) can designate an Operator to be notified if the printer runs out of paper or if the toner is low. Similarly, users can be notified when their jobs have finished printing.

## Delivery Methods

The availability of the following delivery options is dependent on which of them you have enabled. (See "Enabling Event Notification Delivery Methods" on page 184 for more information.)

- **Pop-up notification.** Messages will pop up on the screen for individuals designated to receive them. (Pop-up notification is always enabled when the ENS is enabled.)

- **GroupWise® notification.** Messages will be sent to the recipient through GroupWise, the Novell industry-leading scheduling and messaging system.

- **MHS notification.** Messages will be sent to the recipient through MHS.

- **SMTP notification.** Messages will be sent to the recipient through SMTP (Simple Mail Transfer Protocol) in IP-based systems.

- **Log file notification.** Messages are written to a file at a designated location on a NetWare server that the recipient has rights to.

- **Programmatic notification.** Two programmatic notification delivery methods are shipped with NDPS: SPX™ and RPC.

The open architecture of NDPS allows third parties to develop additional delivery methods as well.

**NOTE:** NDPS is enabled to work with SNMP. In addition, some third-party gateways are SNMP-enabled independently of the NDPS software.

For more information about other brokered services, see the following:

For information about other major NDPS components, see the following:

# Understanding the Resource Management Service

This service allows resources to be installed in a central location and then downloaded to clients, printers, or any other entity on the network that needs that resource. It provides a single place where a variety of file types are stored for immediate access by Novell® Distributed Print Services™ (NDPS™). The Resource Management Service supports adding, listing, and replacing resources including printer drivers, printer definition files (PDFs), banners, and fonts.

**Resource Management Service**

**Broker**

Allows adding, listing, or replacing of . . .    drivers   banners   definition files
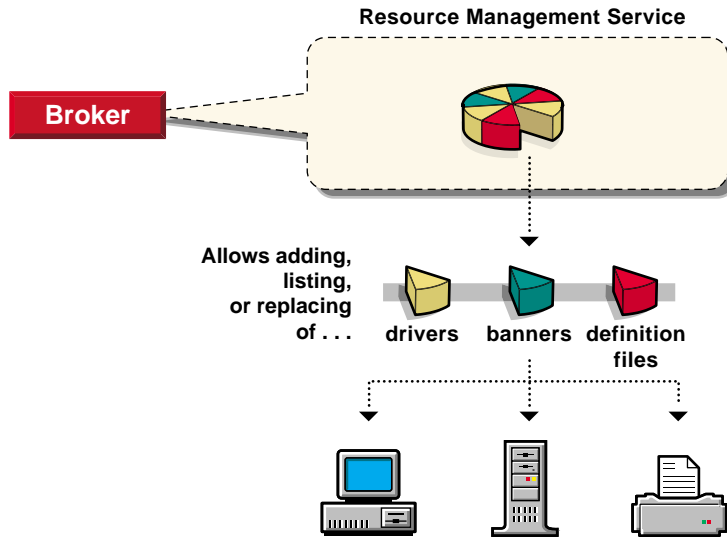
## Resources

The Resource Management Service allows you to add, list, and replace the following resources:

- Banners (see "Adding Banner Pages" on page 178)

- Windows* 95*, Windows NT*, and Windows 3.*x* printer drivers (see "Adding or Updating Printer Drivers" on page 182)

- Novell Printer Definition (NPD) files (see "Updating Printer Definition (NPD) Files" on page 183)

## Benefits

Some of the benefits offered by the RMS include

- Improved resource sharing

- More manageable resource distribution and updating

- Automatic printer driver download from a central repository

- Plug-and-print printer availability

- Availability of network resources to applications through a common interface

For more information about other brokered services, see the following:

- "Understanding the Service Registry Service" on page 34
- "Understanding the Event Notification Service" on page 36

For information about other major NDPS components, see the following:

- "Understanding Printer Agents" on page 26
- "Understanding the NDPS Manager" on page 28
- "Understanding Printer Gateways" on page 29
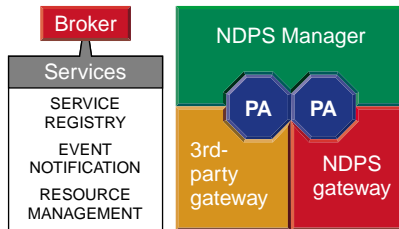
# 2 Planning

There is no single ideal strategy for implementing a new Novell® Distributed Print Services® (NDPS®) printing system or for upgrading your current queue-based system to take advantage of the many printer management and ease-of-use features provided by NDPS. However, the information provided in this section will help you understand the planning issues you should consider and the migration scenarios available as you make a successful transition to NDPS.

Because NDPS provides full support for IP-based as well as IPX™-based printing, it offers you a wide variety of system configuration options to fit your organization's specific needs. Novell's legacy, queue-based print system is also fully supported in NetWare® 5™, which allows your users to continue printing as they always have until you complete the transition to NDPS.

If you have not already done so, we encourage you to read "Understanding" on page 15 before you proceed further to ensure that you understand the terms and concepts discussed in this section.

## Establishing a Planning Base

The key to a successful move to Novell® Distributed Print Services™ (NDPS™) lies in understanding both what you are starting with and what you want when you have completed your move. As part of this understanding process, you should also anticipate the critical issues and decisions you will need to deal with as you implement the transition.

Establishing your planning base consists of the following tasks:

## Assessing Your Current Printing Environment

Beginning with NetWare® 5™, NDPS is the default and preferred print system. Meanwhile, NetWare 5 continues to offer the Novell legacy, queue-based print system as a viable option. Because both printing systems are supported, your users can continue printing as they always have until you complete the transition to NDPS.

For information about the differences between queue-based print services and NDPS, see "Comparing NDPS with Queue-Based Print Services" on page 22.

Your first planning task should be to determine what kind of printing system you currently have. You can then begin narrowing down your options for how to proceed. In nearly all cases, your system will consist of one or more of the following:

- ◆ "NetWare 4.x Legacy (Queue-Based) Printing System" on page 42
- ◆ "NetWare 3.x Printing System" on page 42
- ◆ "NetWare for UNIX or NFS Printing System" on page 43
- ◆ "Non-NetWare System" on page 43

### NetWare 4.x Legacy (Queue-Based) Printing System

If your current printing solution is based on the NetWare 4.*x* legacy, queue-based system, you will find information on upgrading to NDPS in "Migrating from Queue-Based Printing to NDPS" on page 57.

### NetWare 3.x Printing System

If you currently have a NetWare 3.1*x* server bindery and file system and you are using a relatively small number of printers, you should consider implementing your NDPS system from scratch and then deleting all of your legacy printing objects. However if your system is large and you do not want to create your NDPS printing system from scratch, you should use the Novell Upgrade Wizard that ships with NetWare 5 to migrate your NetWare 3.*x* printing objects across-the-wire (via the network) to your NDS® tree. You can then begin the process of implementing an NDPS printing system on your network using the process described in "Migrating from Queue-Based Printing to NDPS" on page 57.

### NetWare for UNIX or NFS Printing System

Several scenarios can be used to incorporate NDPS into environments that use NFS Print Services:

- "Printing in NetWare IP (NWIP)" on page 65
- "NetWare-to-UNIX Printing" on page 66
- "UNIX-to-NetWare Printing" on page 68

Migrating any of these configurations to NDPS will result in simpler and more reliable printing, in addition to the benefits inherent in using NDPS.

### Non-NetWare System

If you are implementing a new Novell network from scratch, or if you are changing over from a different networking system altogether (such as Windows* NT*, 3COM*, or LAN Manager*), you should implement NDPS as your printing solution. If any of your current printers or print clients require queues, the backward compatibility of NDPS allows you to integrate those printers and clients into your system. In all other cases, we recommend that you use an all-NDPS printing setup.

## Identifying Critical Planning Issues

The transition to your new printing system will go much more smoothly if you have identified the major issues involved before you begin the process. The following items provide a starting point for accomplishing this. We suggest that you develop your own checklist of issues, using the following as a starting point.

- "Which Protocol(s) Will Be Used (IP and/or IPX)?" on page 43
- "When Will Clients Be Upgraded?" on page 44
- "How Much Network Security Will Be Needed?" on page 44
- "How Will Brokered Services Be Distributed?" on page 45

### Which Protocol(s) Will Be Used (IP and/or IPX)?

A prominent feature of NetWare 5 is support for IP-based communication and system technologies. Selecting the protocol family (IP, IPX™, or both) to be used by a network has a direct impact on the way you must configure your printers for NDPS. NetWare 5 provides a rich variety of print configurations

so that one or more print systems and one or more protocol families may be employed to best accomplish the goals of a system.

In NetWare 5, NetWare Core Protocol™ (NCP™) communication can travel on top of IPX or on top of IP in a configuration referred to as Pure IP (the IP NCPs are no longer IPX packets encapsulated inside IP). In NetWare 5, all applications that use NCP and do not interface directly with IPX or SPX™ can operate as Pure IP applications.

NetWare 5 also supports existing applications that directly access IPX-based protocols (make IPX/SPX™ or SAP calls) through its Compatibility Mode (CMD). Compatibility Mode is implemented as a set of system components that allow IPX client or server applications to locate and communicate with their IPX counterparts without IPX packets being visible on the wire. Compatibility Mode components translate SAP advertise and query requests into their SLP equivalents, allowing IPX applications to dynamically advertise and/or discover without generating IPX traffic on the wire.

All NDPS components are IP-aware and IPX-aware, so they do not rely on Compatibility Mode to implement IP-based communication.

### When Will Clients Be Upgraded?

If you have a fairly large number of workstation clients, you may find it inconvenient to try to upgrade them to NDPS all at once. Because NDPS allows you to implement all of the server management components while allowing your workstation users to continue to print to queues just as they always have, you can upgrade these clients at a pace that suits your needs while you take advantage of the management benefits NDPS provides immediately. See "Making the Transition Gradually" on page 48 for more information.

### How Much Network Security Will Be Needed?

NDPS is tightly integrated with NDS™ to maximize both the security and ease-of-management that NDS provides. The level of security you desire for each of your printers can be as flexible as you want it to be, ranging from total public access to tightly controlled access. Printer security for controlled access printers is ensured through the assignment of the Manager, Operator, and User access control roles. For more information, see "Optimizing Security through NDPS Access Control" on page 117.

### How Will Brokered Services Be Distributed?

While the distribution of your Brokers is not really a critical issue initially, you will probably want to give some thought to this issue as you do your preliminary planning. You will not need to create a Broker on all of your servers, but you will want your Brokers sufficiently well distributed so that your brokered services (Service Registry Service, Event Notification Service, and Resource Management Service) will be readily available on the system when needed. The Broker(s) created automatically during the NetWare 5 installation process will be sufficient to implement your new NDPS system successfully, but as you gain experience with your new system, you may want to add or delete Brokers to optimize the efficiency of your system or to store your brokered resources (maintained in the Resource Management database) where you want them.

For information about the default distribution of Brokers during installation, see

For guidelines on when and where to enable various brokered services, see

## Designing Your New System

As a final planning step, before you begin the implementation process, you should create a written record of all the network resources and components that will be incorporated into your new printing system (printers, servers, workstation clients, routers, etc.). Then, you should draw a diagram of how these components will fit together in your modified NDS tree.

These steps to designing are described below:

❑ Make a record of your printing resources.

Write a list that you can refer to as you make a diagram of your NDS tree. This record helps you to include all of the printing resources you need for your network when you start to create the NDS objects.

For example, you might record that you have two printers for one location on your network. One will be used for everyone in the office, and the other is used only by the production team. This information can guide you in creating your diagram.

❑ Create a diagram of the new NDS tree.

We recommend that you create a diagram of the printing layout you want to implement in your new system. The diagram will help you simplify and reorganize your setup.

The diagram you create can take a variety of forms. Drawing a tree diagram is the most common. You can also create a list that includes all the objects that will be in the tree. Or you might prefer to create an organization chart with responsibilities and resources listed by each name.

The diagram should be centered around the printers and the NDPS Manager. (Keep in mind that only one NDPS Manager can be loaded on a server.) Although there are other items that may be included in the diagram, such as the NDPS Broker, printer Users, Managers, and Operators, or printer configuration information, the printers and the NDPS Manager are all that is necessary at this stage. Place the printers in the appropriate areas. Place an NDPS Manager on the server that you want to handle the Printer Agents that correspond with those printers.

# Determining Your Implementation Strategy

Now that you have done some initial information-gathering, identified the major issues you will face, and created a diagram of the new NDS™ layout you want to implement, you can now consider your strategy for implementing your new or upgraded Novell® Distributed Print Services™ (NDPS™) system.

If you have not already done so, be sure to read "Understanding the Architecture of NDPS" on page 25 before you proceed.

The following topics are discussed in this section.

# General Transition Guidelines

The following guidelines generically apply to any transition scenario and should expedite your decision process.

- ◆ Third-party gateways are currently the best option for printers they support. Until NDPS-embedded printers become widely available, third-party gateways enable the richest access to networked print devices. Thus, when migrating a printer to NDPS or when installing a new printer in an NDPS environment, you should first determine the availability of a third-party gateway for that printer. If a gateway is available and it supports the system's environment, it should be your first choice. (Make sure the third-party gateway supports the communication protocols you plan to use in your network.) See "Printing through Third-Party Gateways" on page 51 for more information.

- ◆ NDPS provides simple and reliable configurations for Pure IP environments. If a third-party gateway capable of Pure IP is available for the printer being configured, it should be used. Otherwise, use the Novell gateway and configure it to communicate with the printer using the LPR protocol. Before doing so, however, make sure the printer is configured for LPR/LPD.

- ◆ Migrate the server side first, then migrate your end-users gradually. A sensible approach to deploying NDPS into a system is to first replace the server components of your legacy printing system with the NDPS server components. Since the NDPS Manager (NDPSM.NLM) and the Print Server (PSERVER.NLM) can run simultaneously on a server, this transition can be accomplished one queue/printer at a time. Users can then be gradually switched to print directly to NDPS printers instead of queues.

  This transitional configuration would look this way:

  | Novell client | Queue | NDPS Printer Agent | Printer |
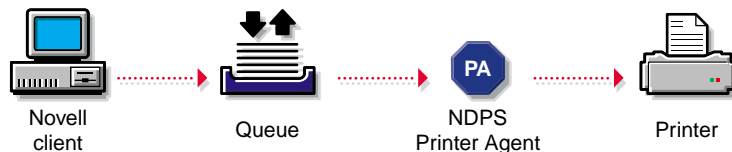
  See "Maintaining Your Queues During the Transition" on page 49 for more details on this printing configuration.

Eventually, only a few queues serviced by NDPS Printer Agents will remain to support your DOS and Windows DOS-box printing needs, while most printing will be through the following basic NDPS configuration and its variations, which will be explained in .



Novell client → NDPS Printer Agent → Printer

## Making the Transition Gradually

If you are using a queue-based printing system, you can continue to use your existing system without modification (see ). Because of the advantages provided by NDPS, however, we recommend that you begin the transition as soon as it becomes convenient.

In general, we suggest you make the move gradually, and begin by implementing the NDPS server components and management features available through the graphical NetWare® Administrator utility. This strategy allows you to set up your new printers and optimize the distribution of your brokered resources while your end users continue printing through the same queues they always have. Then, when you are satisfied that your NDPS printing components are set up and configured the way you want them, you can begin upgrading your end users to the new system gradually.

| Advantages to Running NDPS on the Server | Additional Advantages of Running NDPS on Clients as Well |
| --- | --- |
| Easier (and in many cases, the only way) to support Pure IP | Automatic driver download when a user logs on to the network (assuming that you have implemented this Remote Printer Management function) |
| Custom printer management tools available through NetWare Administrator | Remote workstation printer management |

| Advantages to Running NDPS on the Server | Additional Advantages of Running NDPS on Clients as Well |
| --- | --- |
| Simpler management and configuration | Local printer installation and management integrated into native operating system facilities |
| Advanced error reporting and troubleshooting tools for administrators | Public access printing |
| | Queues no longer needed |
| | Potentially less network traffic |
| | Improved error reporting and troubleshooting tools for users |
| | Advanced job-related event notification |

## Maintaining Your Queues During the Transition

NDPS Printer Agents, either embedded into printers or running as part of an NDPS Manager, can be configured to retrieve jobs from queues in addition to accepting jobs from NDPS users.



Novell client　　　Queue　　　NDPS Printer Agent　　　Printer
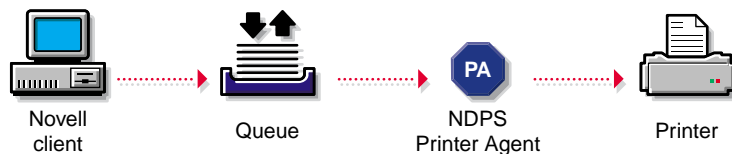
Maintaining your queues allows you to gradually migrate users to NDPS because users' workstations can continue to print to existing queues and be moved to NDPS as time permits. Workstations can even be configured to print to both queues and NDPS printers.

In addition to allowing for a gradual transition to NDPS, this configuration is also the only support currently available for DOS and Windows* DOS-box printing and for handling printing requests from other systems such as UNIX* or Macintosh*. It also allows NetWare 4.*x* clients to submit jobs to NetWare 5™ queues, providing these clients with access to NDPS-managed printers.

See for more information.

After you have created NDPS Printer objects to represent the printers that are still servicing queues, you can delete your legacy Print Server and Printer objects (but not your Queue objects) if you wish, reducing the number of objects in your NDS tree you need to manage.

In most cases, you will want to upgrade your administrators' workstations to NDPS first because NDPS allows administrators to quickly benefit from its advanced capabilities such as automatic printer driver download, extended job management, and event notification.

Administrators can accomplish much of the migration remotely by removing the CAPTURE statements from users' login scripts and installing NDPS printers on their workstations using the NDPS Remote Printer Management functionality. For more information, see .

| Advantages to Maintaining Your Queues While Transitioning to NDPS | Disadvantages to Maintaining Your Queues While Transitioning to NDPS |
| --- | --- |
| Allows gradual migration to NDPS | Users printing through queues don't have access to the NDPS advanced features |
| Allows administrators quick access to NDPS management tools | Two levels of indirection for queue users |
| Supports clients not directly supported by NDPS (UNIX, Macintosh, OS/2*, DOS) | Requires management of both NDPS printers and legacy queues |
| Supports NetWare 4™ clients | |

## Understanding Your Implementation Options

Possible scenarios for printing with NetWare 5 range from maintaining a legacy queue-based system (available only for IPX-based systems), to integrating NDPS into a heterogeneous print system, to implementing a pure NDPS printing system in a Pure IP environment. A wide range of heterogeneous configurations exist between all IPX and Pure IP systems, and between all-queue-based and all-NDPS systems. However, becoming one hundred percent Pure IP and utilizing the most advanced printing features of NetWare 5 implies full deployment of NDPS.

The following discussions offer specific detailed information and suggestions regarding the three primary options available through NetWare 5.

Keep in mind that there is no requirement to modify current NetWare 4 printing configurations for NetWare 5 immediately, and any modifications you make may be implemented gradually (see "Making the Transition Gradually" on page 48).

Your available implementation options are described in the following sections:

- ◆ "Option 1: Using Legacy Printers and NDPS Gateways" on page 51
- ◆ "Option 2: Using Printers with Embedded NDPS Technology" on page 54
- ◆ "Option 3: Keeping Existing Configurations" on page 54

# Option 1: Using Legacy Printers and NDPS Gateways

Gateways allow Novell® Distributed Print Services™ (NDPS™) clients to send jobs to printers that are not NDPS-aware (that is, printers that are not equipped with embedded NDPS Printer Agents). You select and configure a printer gateway when you create a new Printer Agent.

Gateways translate NDPS queries or commands to printer-specific language that the physical printer can use. This is possible because gateways are configured to know the specific type (make and model) of printer being used.

You can implement NDPS through two types of gateways: third-party gateways and the generic Novell gateway. Each type of implementation is described here.

## Printing through Third-Party Gateways

The best currently available method to communicate with a network printer using NDPS is through a third-party gateway designed specifically for that printer or printer family.
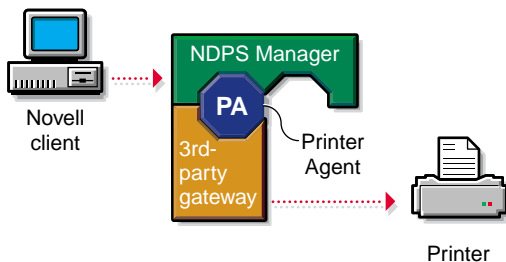
This scenario requires two components running on a NetWare server: (1) the NDPS Manager and (2) the third-party gateway. The NDPS Manager is an integral part of NDPS and implements a platform on which to run Printer Agents. The third-party gateway is provided by the printer manufacturer for a specific printer or class of printers.

Printer Agents (unless embedded in the printer itself) are created to run on the NDPS Manager to front-end printers which do not contain NDPS capabilities and make them appear to users and administrators as full NDPS printers. The NDPS Manager uses NDPS to communicate with users and administrators on one end, but requires a gateway to communicate with the printer on the other.

Some printer manufacturers have developed proprietary mechanisms for dynamically discovering their printers and for providing comprehensive access to their printers' capabilities. Gateways developed by these printer manufacturers can be snapped in to the NDPS Manager to give NDPS administrators and users enhanced access to the printers.

Different levels of NDPS functionality are available depending on the actual implementation of a specific gateway and the capabilities of the protocols used by the gateway.

| Advantages of Printing Through a Third-Party Gateway | Disadvantages of Printing Through a Third-Party Gateway |
| --- | --- |
| May support Pure IP | Currently not all existing printers have third-party gateways |
| May provide pseudo plug-and-print capabilities | Some manual configuration may be required. |
| Feed back and control as good as the protocols used by the gateway | |
| Simple administration | |

| Advantages of Printing Through a Third-Party Gateway | Disadvantages of Printing Through a Third-Party Gateway |
| --- | --- |
| Best support for legacy printers | |

## Printing through the Novell Gateway

For legacy printers that are not supported by third-party gateways, NetWare 5 includes a generic Novell gateway that allows the NDPS Manager to communicate with legacy devices using the LPR/LPD protocol on IP, the RP protocol on IPX, NPRINTER, and LPT and COM ports.
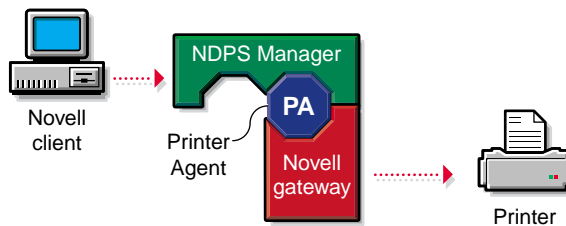


Using the Novell gateway, jobs can also be written to a queue as a way to route them to a different print system or to network printers set up in QServer mode.

| Advantages of Printing Through the Novell Gateway | Disadvantages of Printing Through the Novell Gateway |
| --- | --- |
| Support for Pure IP via LPR as well as support for IPX | Some manual configuration required during the creation of the Printer Agent |
| Feedback and control as good as the protocol employed | Typically less printer information available than with third-party gateways |
| Good support for legacy printers | |

# Option 2: Using Printers with Embedded NDPS Technology

As printers with embedded Novell® Distributed Print Services™ (NDPS™) technology become common, this will become the optimal configuration and achieve the most powerful NDPS capabilities.



Novell client

NDPS-embedded printer
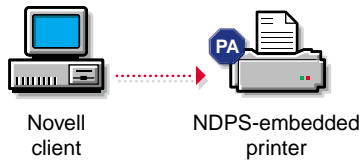
With this configuration, administrators and end-users can directly interact with print devices. This configuration requires printers to have an embedded NDPS Printer Agent. A Printer Agent is the NDPS component that receives and processes NDPS printer and job requests and provides a standard interface to all NDPS users and administrators regardless of the type of printer it represents. As with other printing solutions, in order for users to print, these printers must be installed on the users' workstations. Administrators can remotely install these printers for users by using NDPS Remote Printer Management functionality. Many printer manufacturers are working to embed NDPS into their next generation of printers.

| Advantages | Disadvantages |
| --- | --- |
| True plug-and-print capability | At present, limited availability of fully NDPS enabled printers |
| Peer-to-peer printing | |
| Exceptional feedback and control | |
| Simplest administration | |

# Option 3: Keeping Existing Configurations

This configuration is the familiar print system available in NetWare® 4.*x*. NetWare 5™ continues support for legacy printing. No configuration changes to your existing print system are necessary when upgrading to NetWare 5,

which allows you to make the transition to Novell Distributed Print Services™ (NDPS™) gradually.



Novell client          Queue          Existing print configurations
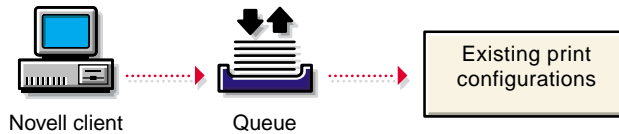
For more information, see "Maintaining Your Queues During the Transition" on page 49. For information on using NDPS along with UNIX* systems, see "Migrating from NFS to NDPS" on page 65.

| Advantages of Keeping Your Existing Printing Configuration | Disadvantages of Keeping Your Existing Printing Configuration |
| --- | --- |
| Requires no changes to NetWare 4.x printing configuration | Not Pure IP<br><br>(NFS add-on product required for Pure IP) |
| Familiar settings and operations | In most cases not even Compatibility Mode (CMD) IP is available (see "Using Compatibility Mode to Maintain Existing IPX-Based Configurations on IP" on page 55)<br><br>Two or more levels of indirection<br><br>None of the advanced manager and user features of NDPS |

## Using Compatibility Mode to Maintain Existing IPX-Based Configurations on IP

It is possible to keep existing printing configurations while converting the bulk of a network to IP. You can do this by using the NetWare 5 Migration Agent to help implement Compatibility Mode, as shown in the following chart:

Migration Agent → QServer-mode printer

Novell client (NetWare 4 or 5) → Queue

Print Server → Migration Agent → RP-mode printer
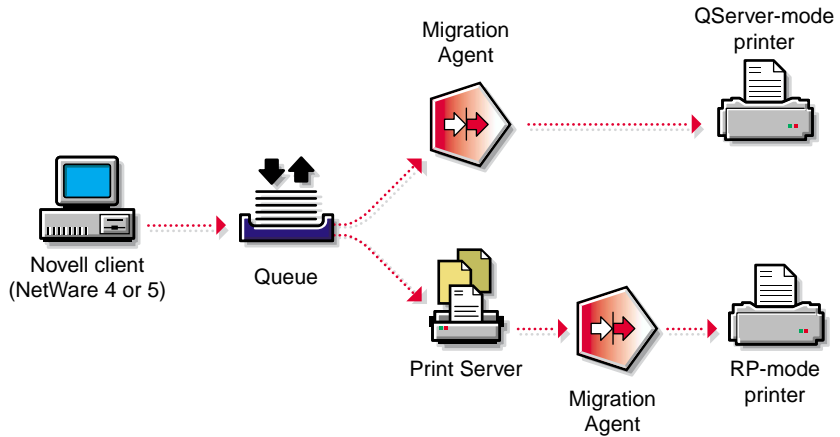
Through the Migration Agent, IPX segments can be easily isolated in an IP network, or if preferred, IP segments can be easily isolated in an IPX™ network. The Migration Agent allows IPX applications running in IPX segments to advertise/discover and communicate with IPX applications running on NetWare 5 clients or servers in IP segments while keeping IPX traffic hidden in those IP segments.

All IPX applications running on NetWare 5 clients or servers can benefit from the Compatibility Mode's encapsulation and translation capabilities. IPX-based printers cannot directly benefit from this encapsulation/translation, however, because they don't execute on top of a NetWare 5 server or client, and their communication cannot be intercepted before it goes on the wire. Such devices must reside in an isolated IPX segment and rely on a Migration Agent to cleanly redirect their communication in and out of IP segments.

| Advantages of Using Compatibility Mode | Disadvantages of Using Compatibility Mode |
|---|---|
| Supports current QServer- and RP-mode printers over an IP network, if those are the only protocols supported by the printers or if the administrator chooses not to reconfigure all such printers to use an IP-based protocol such as LPR | It is not Pure IP even in the IP segment |
| Isolates IPX communication | Requires management of Migration Agent |

| Advantages of Using Compatibility Mode | Disadvantages of Using Compatibility Mode |
| --- | --- |
| | Two or three levels of indirection |
| | Realizes none of the NDPS advanced management and user features |

# Migration Scenarios

The following scenarios will help you better understand the process for making the transition to a Novell® Distributed Print Services™ (NDPS™) environment that will best meet your printing needs.

# Migrating from Queue-Based Printing to NDPS

Most queue-based printing in NetWare® networks is currently realized through one of the following configurations:
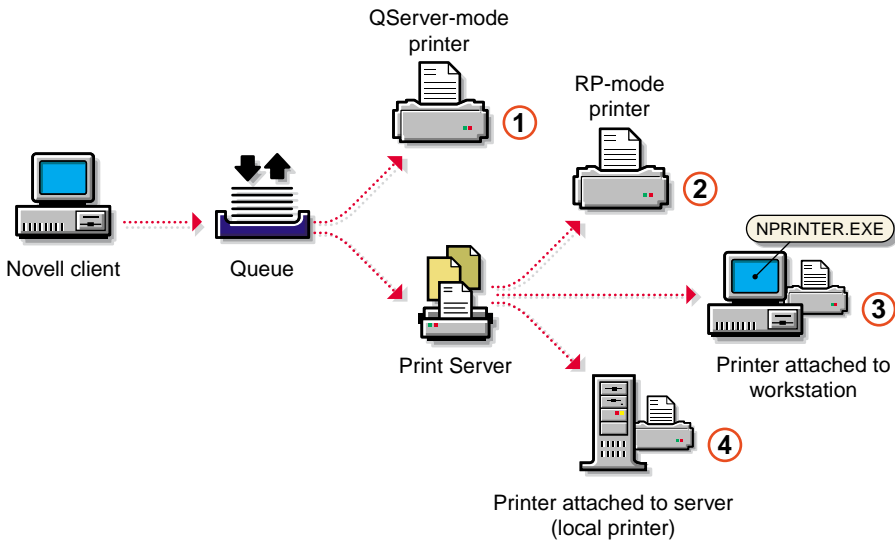
When migrating to Novell Distributed Print Services™ (NDPS™) from any of these configurations, you should first consider using a third-party gateway. The protocols, connection methods used, and potential need to configure the printer depend on the particular gateway used. If a third-party gateway is used, the resulting configuration would look as follows:
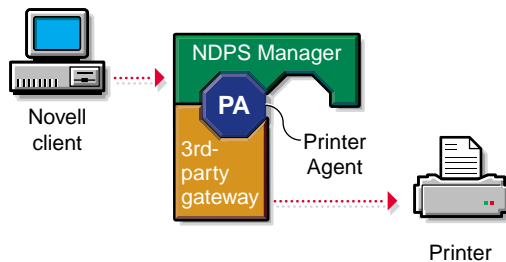


For printers for which there isn't a third-party gateway available, the Novell gateway provides a straightforward migration path. The NDPS configurations corresponding to the queue-based printing configurations illustrated above, as well as an additional configuration for Pure IP support, are shown in the following illustration:

The diagram shows:
- Novell client → NDPS Manager with Printer Agent (PA) and Novell gateway, branching to:
  - Queue → QServer-mode printer (1) — See "Important" note below
  - RP-mode printer (2)
  - NPRINTER.EXE — Printer attached to workstation (3)
  - Printer attached to server (local printer) (4)
  - LPR/LPD printer (5)
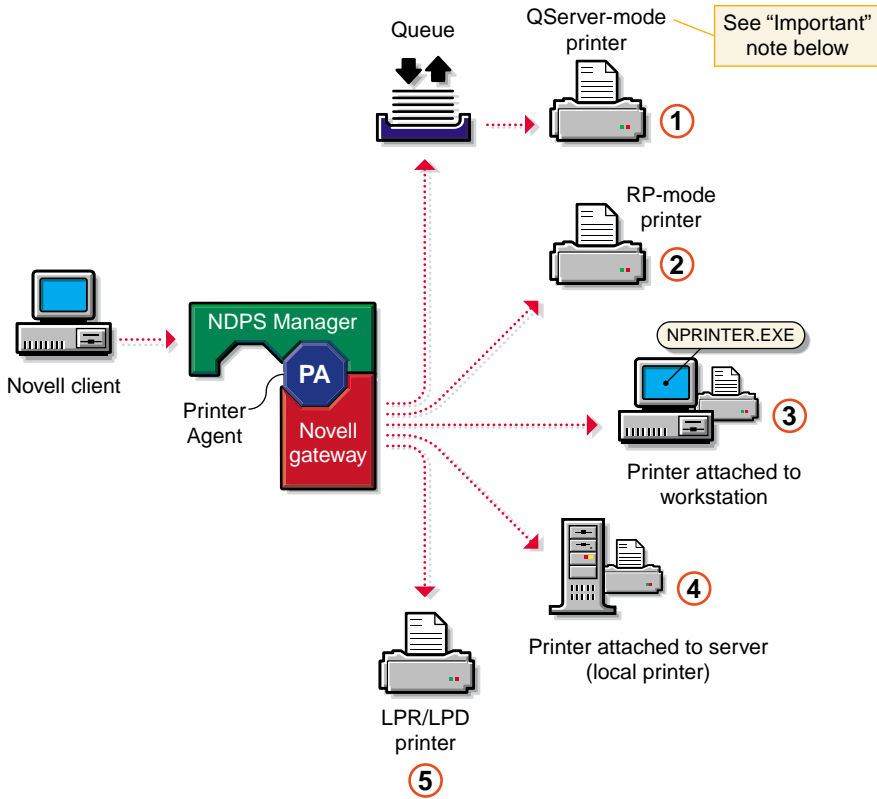
The NDPS configuration (1) above is not recommended because a back-end queue is still required, increasing network traffic and delaying job completion. In addition, while transitioning to NDPS, there would be two queues in the print path as shown in the following illustration:



Novell client → Queue → NDPS Manager with Printer Agent (PA) and Novell gateway → Queue → QServer-mode printer
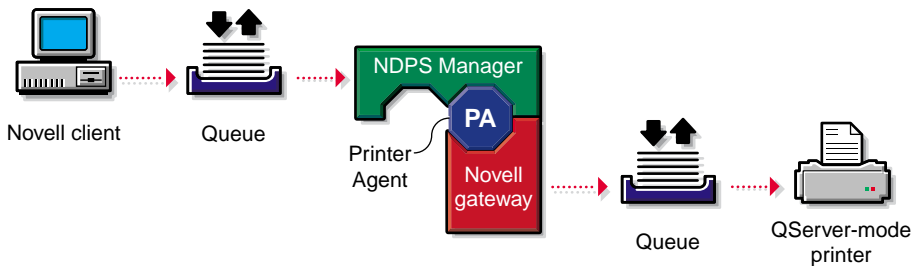
If you are migrating a QServer-mode printer, we recommend that you reconfigure it for LPR as in configuration (5) or RP as in configuration (2) if possible. Choose configuration (5) if the network supports IP and the printer supports LPR/LPD. Choose configuration (2) if the network supports IPX and the printer supports RP. Configurations (3) and (4) are available if the printer does not support LPR or RP, but you still wish to benefit from many NDPS features without the need for a queue. Notice that configurations (2) through (5) require you to configure the print device to enable a new protocol.

Notice that if the NPRINTER.EXE in configuration (3) is running on a NetWare 5 client, it is possible to realize IP-only printing to a remote printer, though not Pure IP. However, if IP is desired, configuration (5) is preferable and is Pure IP.

# Migrating from IPX-Based NDPS to IP-based NDPS



Novell® Distributed Print Services™ (NDPS™) 2.0, which is included in NetWare® 5™, is written to support IP natively. All communication between NDPS clients and NDPS back-end services will automatically switch to use the protocol or protocols available at the client and server. Thus, much of the effort to switch to an IP network will consist of configuring the clients and servers to use IP only. (This is normally done during the installation process.) However, there are some protocols used by NDPS gateways to communicate with printers that have inherent IPX™ dependencies. This section provides guidelines for switching these configurations to use IP-based protocols. None of the changes described will require the clients' installation and configuration to change.

The following scenarios are described in this section:

- ◆ "Migrating an IPX-Based Third-Party Gateway to IP" on page 61

- ◆ "Migrating a Printer in RP Mode to IP" on page 61

- ◆ "Migrating a Printer in QServer Mode to IP" on page 63

## Migrating an IPX-Based Third-Party Gateway to IP
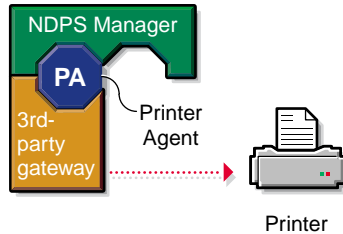


Several third-party gateways that will be available by mid-1998 will support both IPX-based and IP-based communication to printers. The process to switch a third-party gateway to use IP is likely to differ from gateway to gateway and should be explained in each gateway's documentation. It might be as simple as using the gateway's user interface at the server console to change the protocol used by the gateway.

If a specific third party gateway doesn't support IP, you might need to use the Novell gateway until the gateway's developers add support for IP. The following sections provide more information.

## Migrating a Printer in RP Mode to IP
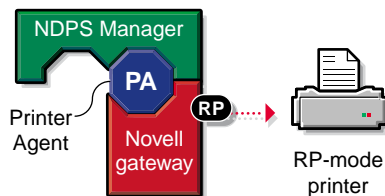


The Remote Printer protocol (RP) is inherently IPX-based. Configurations using printers in RP- mode can use one of the following configurations to conform to an IP setting:

LPR/LPD-mode printer ②

Migration Agent

RP-mode printer ③

NDPS Manager

Printer Agent

PA  PA

LPR

3rd-party gateway

Novell gateway

RP

LPT/COM

IP

Printer ①

Printer attached to server (local printer) ⑤

NPRINTER.EXE

Printer attached to IP CMD client ④
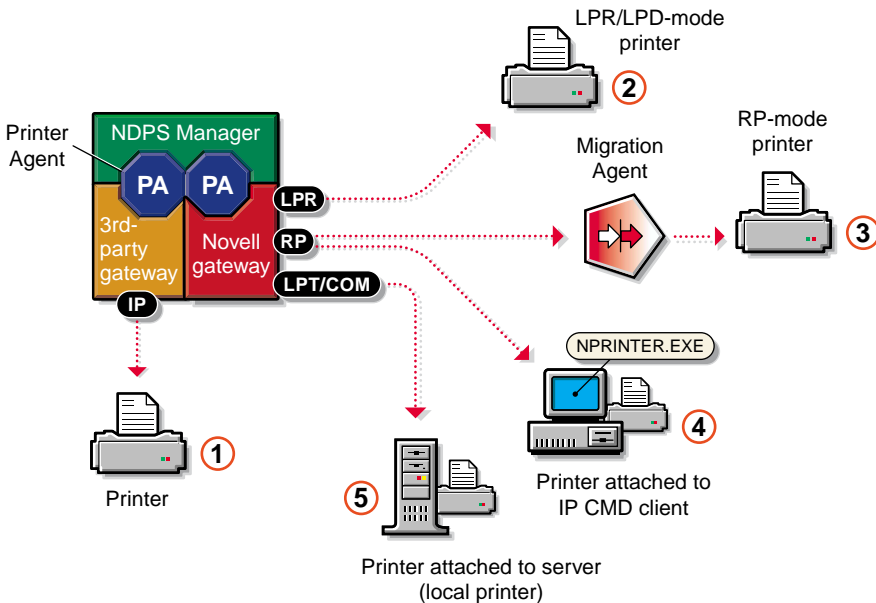
As stated before, the best way today to communicate to a printer with NDPS is through a third-party gateway. If you plan to reconfigure a printer to support IP, you should check whether a third-party gateway for that printer has become available.

Option (2) is simpler and offers better performance than option (3), but it requires the printer to support LPR/LPD mode and have IP configured. Options (4) and (5) are also simple, but they might not be a viable option in some settings because they require the printer to be directly attached to a workstation or server. Of the three options, only (5) maintains a Pure IP environment.

Option (3) requires an isolated IPX segment to exist in the network. Communication with this segment can be filtered and/or translated by a Migration Agent, thus maintaining the IP segments free of IPX communication (see "Using Compatibility Mode to Maintain Existing IPX-Based Configurations on IP" on page 55 for information on the Migration Agent). The advantages of option (3) are that it doesn't require any changes to the current printing configuration and doesn't add much overhead to networks that already manage isolated IPX segments.

## Migrating a Printer in QServer Mode to IP
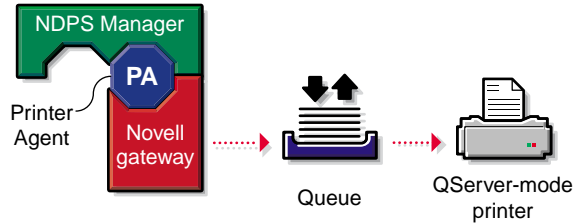


The best alternatives for this scenario to support IP are to (1) use a third-party gateway (see "Migrating a Printer in RP Mode to IP" on page 61) or (2) reconfigure the Novell gateway to communicate with the printer through a different protocol altogether. If neither of these options are feasible, the following configuration is available to isolate the IPX traffic generated by printers in QServer mode:
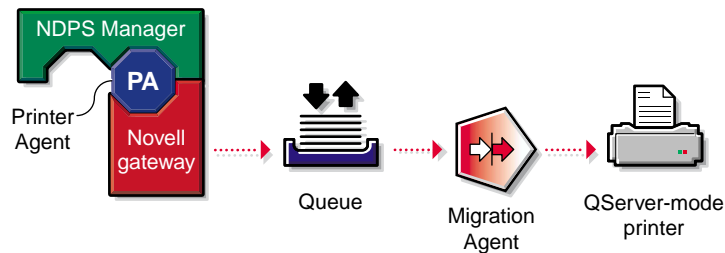


See "Using Compatibility Mode to Maintain Existing IPX-Based Configurations on IP" on page 55 for information on this configuration.

The advantages of this option are that it doesn't require any changes to the current printing configuration and doesn't add much overhead to networks that already manage isolated IPX segments.

# Migrating from NDPS 1.0 to NDPS 2.0

Migrating from Novell® Distributed Print Services™ (NDPS™) 1.0 to NDPS 2.0 requires the deployment of the new server and client components to fully replace their 1.0 counterparts. However, the two systems are designed to inter-operate smoothly during the transition:

- NDPS 1.0 clients can communicate with and print to NDPS 2.0 Printer Agents as long as the client is running NDPS 1.0 utilities (the version of NetWare® Administrator and Novell Printer Manager that shipped with NDPS 1.0).

- NDPS 2.0 clients can communicate with NDPS 1.0 Printer Agents as long as the client is running NDPS 2.0 utilities (the version of NetWare Administrator and Novell Printer Manager that shipped with NetWare 5™).

- NDPS 1.0 server components can communicate with NDPS 2.0 server components.

- When an NDPS 1.0 client is upgraded to NDPS 2.0 client (the client that ships with NetWare 5), existing 1.0 installed printers are automatically updated to the NDPS 2.0 format.

- NDPS 1.0 controlled and public access printers will continue to work as currently configured after NDPS 2.0 is installed.

- The NDPS 1.0 NDS™ Schema is compatible with that of NDPS 2.0. Any necessary changes to NDS are accomplished at install time or when new utilities perform tasks that require the new Schema.

- The server installation of NDPS 2.0 adds the Windows* NT* printer drivers.

The following are some of the most relevant benefits of NDPS 2.0 over NDPS 1.0:

- Native support for IP

- Native support for Windows NT workstations, so that NT workstations no longer have to print to NDPS through queues

- Integration of end-user print tools into the Add Printer wizard for Windows 95* and Windows NT

- Improved remote management of workstation printing configurations

- Improved reliability

# Migrating from NFS to NDPS

Several scenarios can be used to incorporate Novell® Distributed Print Services™ (NDPS™) into environments that use NFS Print Services:

In most cases, migrating one of these configurations to NDPS will result in simpler and more reliable printing, in addition to the benefits inherent in using NDPS. This section discusses how NDPS can be used to replace or work with NFS Print Services.

## Printing in NetWare IP (NWIP)

This configuration is popular among NetWare® installations that chose not to wait for NetWare 5™ to switch their networks over to IP. Through the use of NetWare IP (NWIP), all IPX™ traffic between clients and back-end services is properly encapsulated in IP packets. The NFS Print Services NetWare-to-UNIX* Print Gateway is then used to route jobs from a print server to a printer using LPR, thus ensuring that all traffic on the wire is IP-based. This configuration looks as follows:



| NWIP client | NWIP queue | NWIP print server | NetWare-to-Unix printer gateway | LPR/LPD-mode printer |
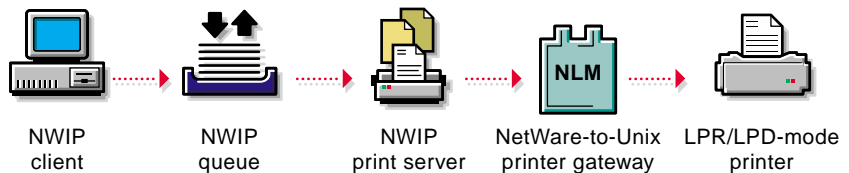
Systems using this configuration can readily benefit from NDPS by replacing the Print Server and NetWare-to-UNIX Printer Gateway with the NDPS Manager, resulting in the following configuration:

NWIP client    NWIP queue    NDPS Manager    Printer Agent    PA    Novell gateway    LPR/LPD-mode printer
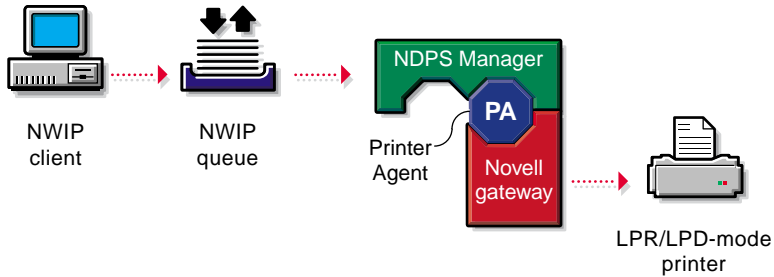
The Novell gateway uses LPR to communicate with the printer. Notice that the printer doesn't require any configuration because it is already set to support LPR/LPD. Eventually the clients can also be switched to NDPS, yielding the following configuration:

Novell client    NDPS Manager    Printer Agent    PA    Novell gateway    LPR/LPD-mode printer
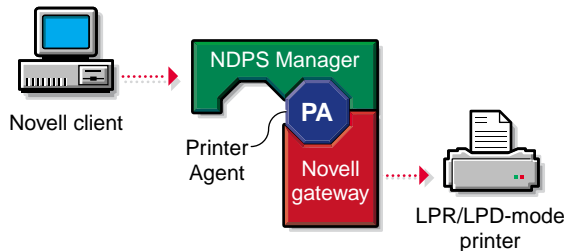
There are various benefits to the NDPS setup:

* It is easier to manage because there is a tighter integration between the NDPS Manager and the Novell gateway than between the Print Server and the NetWare-to-UNIX Print Gateway.

* It enables all the NDPS administrative advantages discussed in earlier sections.

* It provides a sound migration path to the advanced printing and Pure IP offered by NetWare 5.

## NetWare-to-UNIX Printing

This configuration is very similar to the one described in "Printing in NetWare IP (NWIP)" on page 65, except that the goal is not to implement an IP environment, but to route jobs from NetWare out to a UNIX system. This configuration is as follows:
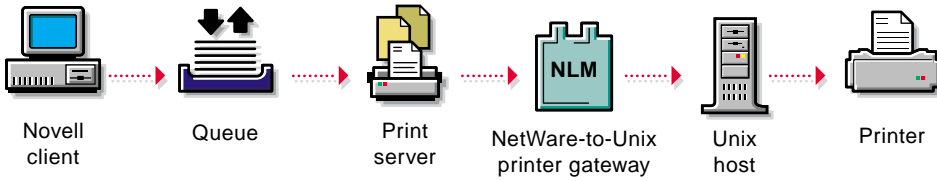
Again, by replacing the Print Server and NetWare-to-UNIX Printer Gateway with the NDPS Manager, the following configuration is possible:
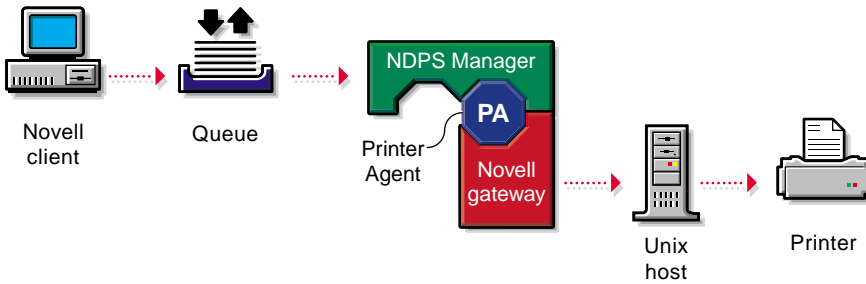


The Novell gateway uses LPR to communicate with the UNIX host. Eventually the clients can also be switched to NDPS, yielding the following configuration:
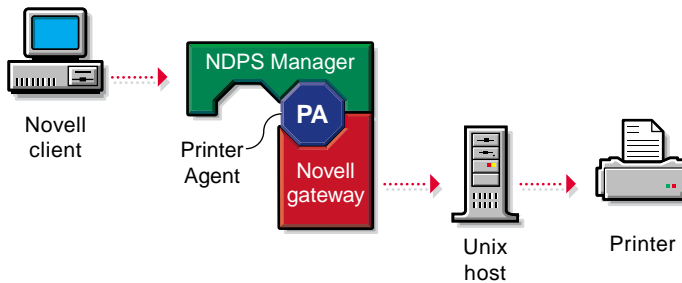
# UNIX-to-NetWare Printing

This configuration uses the NFS Print Services to route print jobs from a UNIX system into NetWare. The following is a common use of the UNIX-to-NetWare Printer Gateway:



| UNIX system | UNIX-to-NetWare printer gateway | Queue | Print server | Printer |
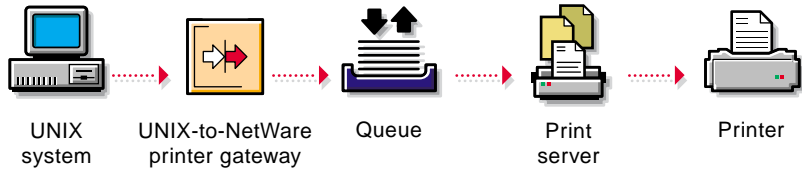
As discussed in "Maintaining Your Queues During the Transition" on page 49, a Printer Agent can be set to service queues, enabling one of the following setups:
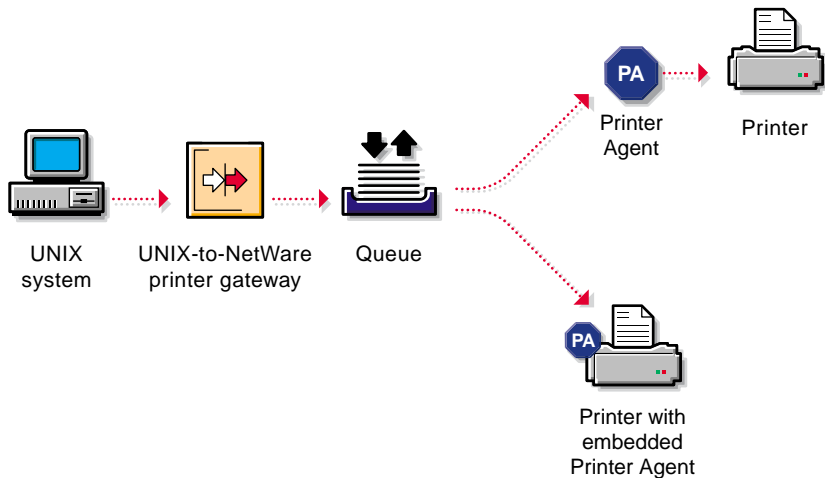


This configuration allows administrators to route jobs out of UNIX systems into NDPS using the same mechanism they use today, while giving them extended capabilities to manage the printers that service those jobs.

# **3** Setting Up

Creating your new Novell® Distributed Print Services® (NDPS®) system will not automatically disable your current printing setup. Your users can continue to print just as they always have until you decide to dismantle the old printing setup and replace it with the new NDPS setup. This can be done gradually or all at once.

Before you begin setting up your new NDPS printing system, we recommend that you read "Planning" on page 41.

## Getting Started

The following are the basic steps you must go through to create a new Novell® Distributed Print Services™ (NDPS™) printing system from the ground up. These steps assume that you have already installed NetWare® 5™ on your server and a Broker is running. (A Broker will already have been created during the installation process. For more information, see "Setting Up NDPS on Your Servers" on page 71.)

1. **Create an NDPS Manager in NetWare Administrator.**

   The NDPS Manager is used to create and manage server-based Printer Agents (similar to the way PSERVER is used on servers to manage printing resources in legacy printing). You must create an NDPS Manager on each server you will be controlling NDPS printers from.

   See "Creating NDPS Manager" on page 74 for more information.

2. **Create one or more NDPS Printer Agents.**

   NDPS printers must be represented by a logical entity known as a Printer Agent. No Printer Agent can represent more than one printer, and no printer can be represented by more than one Printer Agent.

Unless your printer has an embedded Printer Agent, you will need to create one for each printer.

The Printer Agent lies at the heart of NDPS, combining the functions previously performed by a printer, print queue, print server, and spooler into one intelligent and simplified entity.

See "Understanding Printer Agents" on page 26 and "Creating NDPS Printers" on page 77 for more information.

Any printer, regardless of its physical type or connection mode, can be configured as either a public access printer or a controlled access printer (see "Understanding NDPS Printers" on page 24).

See these sections for information on creating the respective printers:

- **Create a public access printer (by creating a Printer Agent).**

    See "Creating Public Access Printers" on page 82.

- **Create a controlled access printer (NDS® Printer Object).**

    See "Creating Controlled Access Printers" on page 78.

After you have created a controlled access printer, you can then do the following:

- **Configure access control (security).**

    See "Optimizing Security through NDPS Access Control" on page 117 for more information.

- **Define one or more printer configurations.**

    See "Optimizing Printer Configurations" on page 125 for more information.

3. **Install the latest version of Novell Client™ on each workstation that will be using NDPS.**

The correct version of the Novell Client accompanies NetWare 5 and is required in order for NDPS features to be available on your client workstations. Other clients can print to NDPS printers through the backward compatibility feature, but only NDPS clients can take full advantage of the advanced features offered by NDPS.

See "Preparing Client Workstations to Use NDPS" on page 114 for more information.

4. **Install printers on individual workstations.**

You can do this in either of the following ways:

- ◆ Designate printers to be automatically installed on users' workstations through the NDPS Remote Printer Management feature available through NetWare Administrator. See "Designating Printers to be Automatically Installed" on page 148 for more information.

- ◆ Install printers manually on each workstation using the Novell Printer Manager workstation utility, or the Windows* 95* or Windows NT* Add Printer function in the Printers folder. See "Installing NDPS Printers Manually on Workstations" on page 149 for more information.

# Setting Up NDPS on Your Servers

During the initial installation and setup process, there are several issues you should be familiar with:

- ◆ "Rights Required for Configuring NDPS Installation" on page 71
- ◆ "When and Where Brokers Are Created" on page 71
- ◆ "Product Customization" on page 72
- ◆ "Updating the Autoexec.ncf File" on page 73

## Rights Required for Configuring NDPS Installation

The person installing NetWare® 5™ and Novell® Distributed Print Services™ (NDPS™) must have Supervisor rights at the root of the tree because the schema will be modified. In order to install the resource database (in the sys:ndps/resdir directory), the administrator must also have file system rights (rights to the volume) where it will be installed.

After the schema has been extended, a user installing another Broker must have at least Read, Write, Modify, and Create rights for the container in which the Broker will be created.

## When and Where Brokers Are Created

The first time NDPS is installed in an NDS™ tree, a Broker object is created automatically in the container where the Server object resides.

When NDPS is subsequently installed on other servers in an NDS tree, certain conditions affect where and whether additional Brokers are created:

1. In a Typical install, the NDPS installation checks the current server and every active Service Registry Service (SRS) to find a Broker that meets the following requirements:

   - It is a NetWare 5 Broker (NDPS 2.0).

   - It is running on the current server or is configured in the autoexec.ncf file to run on that server.

   - It is running within three hops of the current server and the installing user has Supervisor rights to it.
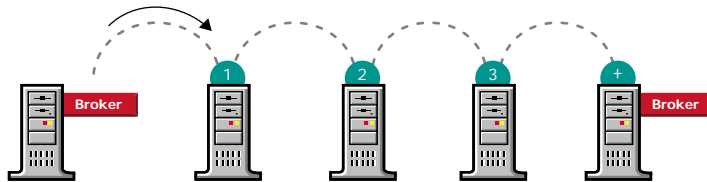


2. If a Broker is found that meets these requirements, a new Broker is not automatically created.

   If a Broker was not found on the server where NDPS is being installed, the user performing the installation may override the default and force one to be created. If a Broker is found on the server, the installation process will use that Broker and will not allow the user to override the Don't Create Broker choice.

3. If no existing Broker meets these requirements, a new Broker is created.

   The Custom install screen contains a default Broker NDS fully-qualified name (FQN) for the context of the server. The installing user may change this Broker name and context by editing the default name. By default, a Broker will be created with all services enabled. When a Broker is created, it is added to the autoexec.ncf file and will start automatically when the server is rebooted.

## Product Customization

Following the main server installation, a Product Summary screen appears where you can select whether you want to customize any of the server or add-on products that were installed.

NDPS is installed by default on each NetWare 5 server you install. An NDPS resource database (in the sys:ndps/resdir directory) used by the NDPS Resource Management Service (RMS) is copied automatically to that server.

The RMS is a central repository for network resources and services. It contains printer drivers, banners, printer definition (NPD) files, and possibly fonts. See "Understanding the Resource Management Service" on page 38 for more information.

If you select to customize NDPS, you will be asked whether you want to create a new Broker on this server and whether you want the different brokered services enabled. In general, you will want these services available for each Broker that you create, including the resource database for the Resource Management Service. If disk space is an issue on a specific server, and you do not intend to create a Broker object on that server, be sure the option to Copy Resource Files is not checked. This will save approximately 60 MB of disk space on that server.

## Changing the Location of a Broker

NDPS allows you to customize your printing setup for maximum efficiency. When NDPS determines that a new Broker should be created during the normal NDPS installation process, it will automatically create a new Broker object in the server's container. However, you may occasionally want to change the location of one or more Brokers. For example, you may want a Broker to be in a different NDS container. If you want to change the location of a Broker after it has been created during installation, you can use NetWare Administrator to move the Broker object into the desired container, provided you have Supervisor or equivalent rights to the new container.

You may also want to create new Brokers in certain situations. For example, you may want to create a Broker on a local server for each site on a wide-area network (WAN).

## Updating the Autoexec.ncf File

The **load broker** command is only inserted automatically once in the autoexec.ncf file (during the initial NDPS installation). If subsequent changes are made to the Broker's name or location, the Install program cannot determine which Broker you want loaded.

This feature was purposely implemented to prevent the Install program from overwriting a command that you may have inserted to load a specific Broker (perhaps a Broker that you created in NetWare Administrator).

In general, it is useful to remember that Install is not a configuration utility. Install will get you up and running the first time, but any subsequent changes to the Broker configuration must be done manually.

For more information about the Broker, see "Optimizing NDPS Brokered Services" on page 136.

# Creating NDPS Manager

A Novell® Distributed Print Services™ (NDPS™) Manager provides a platform for Printer Agents that reside on the server. An NDPS Manager must be created as an object in the NDS™ tree before you can create server-based Printer Agents.



**NDPSM.NLM
is accessed
through . . .**

**OR**

**. . . the server
console**

**. . . a workstation
running NetWare
Administrator**

The NDPS Manager object stores information used by the NetWare® Loadable Module™ (NLM™), NDPSM.NLM. You can manually load this NLM™ at the server console, or it will be automatically loaded when you create a Printer Agent with NetWare Administrator.

A single NDPS Manager can control multiple Printer Agents. (There is no hard limit.)

A specific NDPS Manager can be loaded only on one server. If it controls a local printer, it must be loaded on the server the local printer is attached to.

A user creating an NDPS Manager must have at least Read, Write, Modify, and Create rights for the container in which the object will be created.

While you can perform some configuration and management tasks directly through the NDPS Manager console interface, NetWare Administrator is the main tool for performing these tasks.

To create an NDPS Manager object, complete the following:

1 In NetWare Administrator, select the container where you want the NDPS Manager object to reside.

2 From the Object menu, select Create.

The New Object dialog appears.

**3** Select NDPS Manager.

The Create NDPS Manager Object dialog appears.

**4** Type a name of your choice in the NDPS Manager Name field.

**5** Browse for the Resident Server where you want this Manager assigned.

This can be any server in the current NDS tree in which you have installed NDPS. This will be the only server you will be able to load this NDPS Manager on. The NDPS Manager will store its database on a volume of this server.

**NOTE:** Any printer you designate as a local printer when you are configuring Printer Agents assigned to this NDPS Manager must be directly attached to this server.

If you move the NDPS Manager to a different server, its database will be moved also. As a result, local printers assigned to this NDPS Manager will no longer work.

**6** Browse for the Database Volume where you want the NDPS Manager database assigned.

This must be a volume on the Resident Server you selected. This database will include configuration data for all of the Printer Agents you assign to this NDPS Manager. Normally, volume Sys can be used with no problems. If this Manager will be controlling a large number of printers, you should allow 3 to 5 MB of disk space for this function.

**NOTE:** The default for print job spooling is the volume you select. You can change the configuration later through the Printer Control page for each Printer Agent. Be sure to allow sufficient disk space to accommodate your printing needs.

**7** (Optional) Mark the Define Additional Properties box.

If you do not want to add additional information or perform additional configuration tasks for this NDPS Manager, skip this step.

**8** Click Create.

If you marked the Define Additional Properties box, the NDPS Manager Details dialog appears. See .

If you did not mark the Define Additional Properties box, the new NDPS Manager will appear in the main browser window. Go to for instructions on creating your NDPS printers.

**NOTE:** To autoload the NDPS Manager when you bring up the server, add the following line to your server's autoexec.ncf file:

```
load ndpsm NDPS Manager name and context
```
For example:
```
load ndpsm .sales_manager.corp.acme
```

# Optional Configuration Steps for NDPS Manager

The following configuration steps can be performed after the Novell®
Distributed Print Services™ (NDPS™) Manager is created.

**1** If you selected Define Additional Properties, from the Define Additional
Properties dialog, you can add whatever information you wish to the
Description and Location fields.

You can also do this by double-clicking the NDPS Manager icon in the
browser.

**2** Click the Access Control button to configure access to this NDPS
Manager.

The NDPS Manager Access Control dialog appears. For a discussion of
Access Control roles, see "Optimizing Security through NDPS Access
Control" on page 117.

**2a** Select the individuals who will manage this object.

**2b** Click Add to view a list of users who can be added.

**3** Click the Printer Agent List button to get a list of existing Printer Agents
or to create a new Printer Agent.

If you have just installed NDPS, there will probably not be any Printer
Agents listed here. However, if you are using the Public Access Printing
feature of the HPGATE gateway utility, Printer Agents will be created
automatically for that manufacturer's network-attached printers.

(For a discussion of Printer Agents, see "Understanding Printer Agents"
on page 26.)

Use the online help available at this dialog for additional information.

Go to "Creating NDPS Printers" on page 77 for information on what to do
next.

# Creating NDPS Printers

Novell® Distributed Print Services™ (NDPS™) printers can be either *public access* or *controlled access.* For an explanation of each type, see "Understanding NDPS Printers" on page 24. In most cases, we recommend that you make all of your NDPS printers controlled access printers as soon as possible in order to take full advantage of the management and security benefits offered by NDS™.

Before you can create an NDPS printer, you must first have created an NDPS Manager on your server.

After creating an NDPS Manager, you can create NDPS printers in any of the following ways:

- **By using NetWare® Administrator.** If you are creating a controlled access printer, we recommend that you use NetWare Administrator to create your new printers. See the following discussions:

    - "Creating Controlled Access Printers" on page 78

    - "Converting Public Access Printers to Controlled Access Printers" on page 80

    You can also create public access printers with NetWare Administrator. For more information see "Creating Public Access Printers" on page 82.

- **By using gateways provided by third-party vendors.** Some third-party gateways have server-based utilities that can be configured to search for new printers attached to the network and to automatically create Printer Agents to represent them. For more information about the gateways that ship with NetWare 5™, see the following discussions:

    - If you are unsure of whether you can use a third-party gateway, see "Selecting the Correct Gateway to Use" on page 85.

    - For HP* printers, see "Using Third-Party Gateways" on page 227.

- **By using NDPSM.NLM at the server console.** If you prefer to use the server console to create your new public access printers using the Novell gateway, see "Creating NDPS Printers at the Server Console" on page 82.

```
ABC_Publishing
├── NetWare4
└── Creative Services
    └── Controlled Access Printer
        ● Advanced services
    
    Public Access Printer
        ● No advanced services

NDPS Manager
```
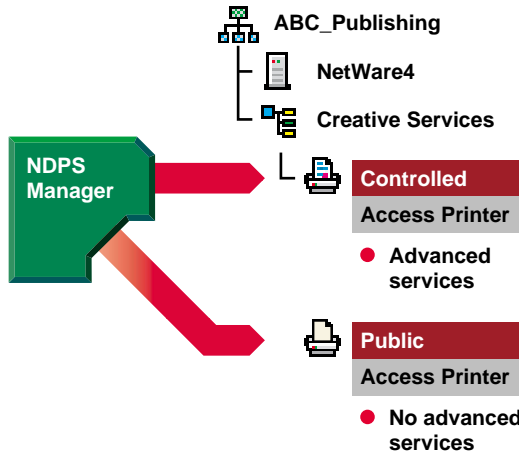
# Creating Controlled Access Printers

Novell® Distributed Print Services™ (NDPS™) printers added to the NDS™ tree by NetWare® Administrator are referred to as controlled access printers. As NDS objects, access to them is controlled and they are no longer available directly as public access printers. They are only available to the workstation user through the NDS object list instead of through the list of public access printers.

## Prerequisites

To create a controlled access printer on your network, you must meet the following prerequisites:

❑ Have at least Read, Write, Modify, and Create rights for the destination container where its associated Printer object will reside

❑ Be designated as a Manager of the NDPS Manager that will control this Printer Agent

❑ Have a Broker running

❑ Have created an NDPS Manager object

## Procedure

1 In NetWare Administrator, select the container where you want the NDPS Printer object to reside.

2 From the Object menu, select Create.

The New Object dialog appears.

**3** Select NDPS Printer.

The Create NDPS Printer dialog appears.

**4** Type a name of your choice in the NDPS Printer Name field.

**5** At the Printer Agent Source field, select the source of the Printer Agent and press Create.

The following options are available:

- ◆ **Create a New Printer Agent.** If you select this option, you will be asked to select either the Novell Gateway or a third-party gateway and to configure the new Printer Agent.

- ◆ **Existing NDS Printer Object.** Use a printer already configured as a controlled access printer (NDPS Printer Object). If you select this option, a list of current NDPS Printer Objects in this container will be displayed from which you can select the one you want to use.

- ◆ **Public Access Printer.** Use an existing Printer Agent representing a public access printer. If you select this option, a list of available public access printers will be displayed.

**6** Confirm the Printer Agent name (default is the name of the new printer you are creating) and browse to select the NDPS Manager you want to assign it to.

**7** Select the gateway you want to use in the Gateway field and press OK.

For more information about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

**8** Complete the tasks associated with this gateway.

Refer to one of the following for specific information on completing the tasks associated with your printer:

- ◆ "Configuring Remote Printers" on page 87
- ◆ "Configuring Queue-Based Printers" on page 95
- ◆ "Configuring Local Printers" on page 100

**9** Select the printer driver for each client operating system.

These drivers will be automatically downloaded to users' workstations when they install this printer in the future. Select a driver for each operating system.

If you choose a Windows* 3.*x* driver but not a Windows 95* or Windows NT* driver, a 16-bit driver will be selected. Normally this will not create problems.

**NOTE:** Since the list of printer drivers shipped with this product is limited, you can add drivers to the Resource Management Service database. (See "Adding or Updating Printer Drivers" on page 182 for more information.)

If the driver you need is not in the drivers list, rather than adding it to the RMS, you can choose [None] from the top of each list. Users will then be asked to provide a disk with the appropriate driver the first time they install this printer on their workstations.

**10** Click Continue.

The main browser window appears with your new controlled access printer listed.

Workstation users can now select the printer and print to it.

You can select it from the browser to complete the following tasks:

- ◆ "Optimizing Security through NDPS Access Control" on page 117
- ◆ "Optimizing Event Notification" on page 131

For more information, see the following:

- ◆ "Understanding NDPS Printers" on page 24
- ◆ "Converting Public Access Printers to Controlled Access Printers" on page 80
- ◆ "Installing Printers on Workstations" on page 147

# Converting Public Access Printers to Controlled Access Printers

To take full advantage of the security and management features provided by NDS, you might want to convert public access printers to controlled access printers.

For example, if you used a third-party gateway to get a printer up and running immediately (plug-and-print), the gateway automatically created a public access printer. Later, you might want to convert that printer to a controlled access printer. The following procedure explains how to do this.

## Prerequisites

To create a controlled access printer on your network, you must meet the following prerequisites:

❑ Have at least Read, Write, Modify, and Create rights for the destination container where its associated Printer object will reside

❑ Be designated as a Manager of the NDPS Manager that will control this Printer Agent

❑ Have a Broker running

❑ Have created an NDPS Manager object

❑ Have created a public access printer created (see "Creating Public Access Printers" on page 82)

## Procedure

1 From the browser's Object menu for the organization or organizational unit, select Create.

   The New Object dialog appears.

2 Select NDPS Printer.

   The Create NDPS Printer dialog appears.

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

4 At the Printer Agent Source field, select Public Access Printer.

   The Select Public Access Printers list appears.

5 Click Create.

   A warning message appears saying that all clients will need to reinstall this printer after it is converted.

6 Click OK to confirm your intention.

   The Select Printer Agent dialog appears.

7 Highlight the public access printer you want to convert to a controlled access printer and click OK.

   The Create NDPS Printer dialog reappears with the Printer Name and Printer Agent fields filled in.

8 Select Create.

The main browser window appears with your new controlled access printer listed.

You can select it from the browser to complete the following tasks:

- ◆ "Optimizing Security through NDPS Access Control" on page 117
- ◆ "Optimizing Event Notification" on page 131

Workstation users can now select the printer and print to it.

# Creating Public Access Printers

Public access printers are printers that anyone can print to. Unlike controlled access printers, public access printers are not associated with an NDS™ Printer object, and therefore cannot take advantage of security and notification features provided through NDS. However, public access printers can be installed by users on their workstations just as controlled access printers can.

Public access printers can be created in the following ways:

- ◆ **By using NDPSM.NLM at the server console.** See "Creating NDPS Printers at the Server Console" on page 82.

- ◆ **By using gateways provided by third-party vendors.** Some of these gateways can be configured to search for new printers attached to the network and automatically create Printer Agents to represent them.

  To learn more about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

- ◆ **By using the NDPS Manager object in NetWare Administrator.** See "Creating Public Access Printers in NetWare Administrator" on page 106.

Public access printers can be converted to controlled access printers at any time. For more information, see "Converting Public Access Printers to Controlled Access Printers" on page 80.

# Creating NDPS Printers at the Server Console

You can use the Novell® Gateway to create Novell Distributed Print Services™ (NDPS™) public access printers at the server console by using the following procedure.

**1** Load NDPSM.NLM.

A display screen appears, listing all NDPS Manager objects in the current context. You can also browse in other contexts for NDPS Manager objects that are installed on this server.

**Figure 1    Screen Listing NDPS Manager Objects in Current Context**

```
┌─────────────────────────────────────────────────────────────────┐
│                        Current context                          │
├─────────────────────────────────────────────────────────────────┤
│ NDPS_DOC                                                        │
└─────────────────────────────────────────────────────────────────┘

┌─────────────────────────────────────────────────────────────────┐
│                   Contents of current context                   │
├─────────────────────────────────────────────────────────────────┤
│ .                                                               │
│ ..                                                              │
│ paTEST                                                          │
│                                                                 │
│                                                                 │
│                                                                 │
│                                                                 │
└─────────────────────────────────────────────────────────────────┘
```

**NOTE:** You cannot browse for NDPS Manager objects created on other servers. When the NDPS Manager object is created, it is associated only with the specific server it was created on and can only be loaded on that server.

**HINT:** You can also load a specific NDPS Manager object from the console command line by typing `load ndpsm` *fully distinguished name*.

**2** Select an existing NDPS Manager.

Selecting an NDPS Manager displays the Printer Agent list containing all the Printer Agents referenced by this NDPS Manager.

**3** Press Insert.

An edit box opens.

**4** Enter the name of the new Printer Agent, then press Enter.

A Printer Agent name can be from 1 to 30 characters.

The Printer Configuration screen appears. From this screen you can configure how print jobs are scheduled, which volume to use to store print jobs, how much space to allocate to print jobs, how much space to allocate to retained print jobs, and how long to permit a job hold to last.

**Figure 2    Printer Configuration Screen**

```
┌──────────────────────────────────────────────────────────────────┐
│                      Printer Configuration                         │
├──────────────────────────────────────────────────────────────────┤
│                                                                    │
│ Scheduler:               first in, first out                       │
│ Configuration Utilities: (See List)                                │
│                                                                    │
│ Job Storage Volume:      OSO_SYS                                   │
│                                                                    │
│ Total Job Space Limit:      (none) Kb        Used:        0 Kb     │
│ Retained Job Space Limit:   (none) Kb        Used:        0 Kb     │
│                                                                    │
│ Job Wait Time:                  15 Minutes                         │
│                                                                    │
│                                                                    │
└──────────────────────────────────────────────────────────────────┘
```

**5** Select the Configuration Utilities option.

The Gateway Type window appears.

**6** Select Novell Printer Gateway.

The Novell Printer Gateway is used for local and remote printers. Third-party gateways are generally used for printers attached directly to the network using proprietary hardware and/or software.

The Select a Printer list appears.

**7** Select the appropriate printer from the list.

The Port Handler Types screen appears. The Port Handler utility defines the port and port type for the current Printer Agent.

**8** Select Novell Port Handler.

The Connection Type window appears.

**9** Select the correct connection type.

There are five Connection Type options:

- ◆ **Local Printer.** Local printers are attached directly to the server where the NDPS Manager is loaded. There are two basic types of output ports: parallel (LPT1 through LPT3) and serial (COM1 through COM4). See "Configuring a Local Printer at the Server Console" on page 101.

- ◆ **Manual.** This option allows you to manually build the Port Handler string as if you were at the server console command prompt. While in most cases you will be able to configure the Port Handler using the Local Printer, Queue-Based Printer, and Remote Printer options, the Manual option allows you to use features that the Port Handler Configuration utility might not support, such as printing to a NetWare 3.*x* queue. See "Creating NDPS Printers by Configuring a Port Handler String Manually" on page 107.

- ◆ **Queue-Based Printer.** This option configures the Port Handler to redirect print jobs to a NetWare queue. This provides NDPS users with access to printers and print systems that require jobs to be placed in queues. See "Using the Queue-Based Printer Option at the Server Console" on page 99.

- ◆ **Remote Printer RP/SPX.** This option allows you to create a Printer Agent to represent a printer running in RP mode. This can include printers attached to a workstation running NPRINTER.EXE or a file server running NPRINTER.NLM. It can also include printers directly attached to the network configured in RP mode. See "Using the Remote Printer RP/SPX Option at the Server Console" on page 91.

- ◆ **Remote Printer LPR/TCPIP.** This option allows you to create a Printer Agent to represent a printer configured with LPR mode for TCP/IP environments. See "Using the Remote Printer LPR/TCPIP Option at the Server Console" on page 94.

# Selecting the Correct Gateway to Use

Gateways allow Novell® Distributed Print Services™ (NDPS™ ) clients to send jobs to printers that are not NDPS-aware (that is, printers that are not equipped with embedded NDPS Printer Agents). You select and configure a printer gateway when you create a new Printer Agent.

Gateways translate NDPS queries or commands to printer-specific language that the physical printer can use. This is possible because gateways are configured to know the specific type (make and model) of printer being used.

The following diagram illustrates a typical gateway configuration.

Third-party gateway

Printer Agent — **PA**

Gateway — **GW**

NDPS client

NDPS server

Existing printer

Third-party gateways are developed by printer manufacturers to support printers directly attached to the network. An example is the HP* Gateway that ships with this product. These gateways, because they are developed to interact with specific proprietary printers, can provide a wider array of information and offer options that are not available for the generic Novell gateway. Some third-party gateways provide utilities that can be configured to automatically create Printer Agents when one of their printers is attached to the network.

For an introduction to the gateway provided by Hewlett-Packard*, see "Using Third-Party Gateways" on page 227.

The Novell gateway supports local and remote printers, including those using NPRINTER or queue-based technology as well as those configured with RP mode enabled in IPX™ environments or LPR mode enabled in TCP/IP environments. The Novell gateway is designed to be used with printers for which a proprietary, third-party gateway is not yet available.

**NOTE:** RP printers are those that support Novell's legacy Remote Printer protocol. It is supported by many network-attached printers. LPR is a UNIX*-based printing protocol used by network-attached printers in TCP/IP environments to service jobs submitted to print queues.

The Novell gateway is implemented through a Print Device Subsystem (PDS) and a Port Handler. For more information, see "Understanding the Print Device Subsystem" on page 31 and "Understanding the Port Handler" on page 32.

For detailed information about using the generic Novell gateway, see the following discussions:

- "Configuring Remote Printers" on page 87
- "Configuring Queue-Based Printers" on page 95
- "Configuring Local Printers" on page 100

# Setting Up NDPS Printers to Service Legacy Queues

In many cases, you will want to continue using print queues while you make the transition to Novell® Distributed Print Services™ (NDPS™ ). This strategy is discussed in detail in "Making the Transition Gradually" on page 48. For information on how to set up your NDPS printers to service legacy queues, see "Supporting Queue-Based Client Workstations" on page 164.

# Configuring Remote Printers

The Novell® Distributed Print Services™ (NDPS™ ) gateway allows you to configure all of your current remote printers so that they will work just as they always have, whether they are attached to a workstation or a remote file server, or are directly attached to the network running in RP mode (or LPR mode in a TCP/IP environment). A remote printer controlled by an NDPS Printer Agent will emulate a legacy print server (PServer Emulation), and will no longer require PSERVER.NLM.

We recommend that you reconfigure your direct-connect printers currently configured for Queue Server mode to run in RP mode so that they can take advantage of the advanced features NDPS provides.

For detailed information, see the following:

- ◆ "Configuring Remote Printers Using NPRINTER" on page 87
- ◆ "Configuring Remote Printers Running in RP Mode" on page 89
- ◆ "Configuring Remote Printers Running in LPR Mode" on page 92

# Configuring Remote Printers Using NPRINTER

Use the following procedure to configure a new Novell® Distributed Print Services™ (NDPS™ ) printer attached to a workstation client or remote server that is running NPRINTER.EXE or NPRINTER.NLM.

**1** In NetWare® Administrator, select the container where you want the NDPS Printer object to reside.

**2** From the Object menu, select Create.

The New Object dialog appears.

**3** Select NDPS Printer.

The Create NDPS Printer dialog appears.

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

This name should distinguish it from other printers on your system.

**5** At the Printer Agent Source field, select Create a New Printer Agent and click Create.

**6** Confirm the Printer Agent name (default is the name of the new printer you are creating) and browse to select the NDPS Manager you want to assign it to.

**7** At the Gateway Types window, select the Novell Printer Gateway.

The Configure Novell PDS dialog appears.

For more information about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

**8** Configure the PDS by selecting the Printer Type and Port Type, then click OK.

The Configure Novell Port Handler configuration wizard appears.

**9** Configure the Connection Type as Remote and specify the Port Type as LPT, COM, or Other, then click Next.

**10** At the PServer Emulation field, modify or use the default SAP Name, specify a Printer Number, if needed, and specify any address restrictions you want to impose for this printer. Then click Next.

Refer to the online help for detailed information on these fields.

**11** Configure the Controller Type and Interrupts, if needed, then click Finish.

Refer to the online help for detailed information on these fields.

The Select Printer Drivers dialog appears.

**12** Select the printer driver for each client operating system.

These drivers will be automatically downloaded to users' workstations when they install this printer in the future. Select a driver for each operating system.

If you choose a Windows* 3.*x* driver but not a Windows 95* or Windows NT* driver, a 16-bit driver will be selected. Normally this will not create problems.

**NOTE:** Since the list of printer drivers shipped with this product is limited, you can add drivers to the Resource Management Service database. (See "Adding or Updating Printer Drivers" on page 182 for more information.)

If the driver you need is not in the drivers list, rather than adding it to the RMS, you can choose [None] from the top of each list. Users will then be asked to provide a disk with the appropriate driver the first time they install this printer on their workstations.

**13** Click OK.

The main browser window appears with your new controlled access printer listed.

You can select it from the browser to complete the following tasks:

- ◆ "Optimizing Security through NDPS Access Control" on page 117
- ◆ "Optimizing Event Notification" on page 131

**14** At the workstation or remote server to which this printer is attached, run NPRINTER and select the SAP name specified in Step 10 on page 88.

Workstation users can now select the printer and print to it.

# Configuring Remote Printers Running in RP Mode

These instructions are for configuring a printer attached directly to the network and running in RP mode, unless that printer is an HP* printer.

**HINT:** If you are using a direct-connect printer configured for Queue-Server mode, we recommend that you reconfigure that printer to RP mode and then configure it as a Novell® Distributed Print Services™ (NDPS™) printer using RP. This allows you to gain the management benefits of NDPS while eliminating a queue object from your system.

**1** From the browser's Object menu for the organization or organizational unit, select Create.

The New Object dialog appears

**2** Select NDPS Printer.

The Create NDPS Printer dialog appears.

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

**4** At the Printer Agent Source field, select Create a New Printer Agent and click Create.

**5** Confirm the Printer Agent name (default is the name of the new printer you are creating) and browse to select the NDPS Manager you want to assign it to.

**6** At the Gateway Types window, select the gateway you want to use.

The Configure Novell PDS dialog appears.

For more information about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

**7** Configure the Novell PDS by selecting the Printer Type and Port Type, then click OK.

The Configure Novell Port Handler configuration wizard appears.

**8** Configure the Connection Type as Remote and specify the Port Type as LPT, COM, or Other, then click Next.

Refer to the online help for detailed information on these fields.

**9** At the PServer Emulation field, modify or use the default SAP Name, specify a Printer Number, if needed, and specify any address restrictions you want to impose for this printer. Then click Next.

Refer to the online help for detailed information on these fields.

**10** Configure the Controller Type and Interrupts, as needed, then click Finish.

Refer to the online help for detailed information on these fields.

The Select Printer Drivers dialog appears.

**11** Select the printer driver for each client operating system.

These drivers will be automatically downloaded to users' workstations when they install this printer in the future. Select a driver for each operating system.

If you choose a Windows* 3.*x* driver but not a Windows 95* or Windows NT* driver, a 16-bit driver will be selected. Normally this will not create problems.

**NOTE:** Since the list of printer drivers shipped with this product is limited, you can add drivers to the Resource Management Service database. (See "Adding or Updating Printer Drivers" on page 182 for more information.)

If the driver you need is not in the drivers list, rather than adding it to the RMS, you can choose [None] from the top of each list. Users will then be asked to provide a disk with the appropriate driver the first time they install this printer on their workstations.

**12** Click Continue.

The main browser window appears with your new controlled access printer listed.

You can select it from the browser to complete the following tasks:

- ◆ "Optimizing Security through NDPS Access Control" on page 117
- ◆ "Optimizing Event Notification" on page 131

## Using the Remote Printer RP/SPX Option at the Server Console

At the server console, you can use the RP/SPX™ option if you are creating a Printer Agent to represent one of the following:

- ◆ A printer attached to a workstation or a remote file server
- ◆ A printer directly attached to the network running in NPRINTER mode for which no gateway is available

A Printer Agent configured in this mode will emulate a legacy print server (PServer Emulation), and will no longer require PSERVER.NLM.

**1** Perform steps 1-8 described in "Creating NDPS Printers at the Server Console" on page 82.

**2** Select Remote Printer RP/SPX from the Connection Type menu.

The Port Handler Configuration: Remote Mode screen appears.

**3** Select the Remote Port connection type.

Choose the type of connection the printer has with the remote machine.

For information about the options, see the following:

- ◆ **Parallel port (LPT).** See Table 2 on page 102.
- ◆ **Serial (COM).** See "Serial Port Parameters" on page 104.
- ◆ **Other.** Send print jobs to the display screen rather than to a port.

**4** Enter the SAP Name.

This is the print server name the Printer Agent will use when emulating PSERVER.NLM. This name should match the print server name the printer is looking for.

The Port Handler may be configured to use the same SAP name for multiple Printer Agents. This allows you to replace an existing print server controlling multiple printers with one Port Handler.

**5** (Optional) Enter a Printer Number.

If you configure more than one printer with the same SAP Name, the printer number must match the printer number configured on the printer (by the manufacturer's configuration utilities).

Each printer controlled by a Port Handler must have a unique number.

**6** (Optional) Enter the Network Address.

If you want users from a certain network to be the only users of your printer, enter the address of that network here; otherwise, leave it blank.

The network address is the number that uniquely identifies a network cable segment; it is usually referred to as the IPX™ external network number.This is a hexadecimal number consisting of one to eight digits (1 to FFFFFFFE). The number is arbitrary, and it is assigned when the IPX protocol is bound to a network board in the server.

**7** (Optional) Enter the Node Address.

If you want a user on a specific node (workstation) to be the only user of your printer, enter the address of that node here; otherwise, leave it blank.

This is a hexadecimal number that uniquely identifies a network board. It is assigned to the server during installation.

If you specify a Network Address but leave the Node field blank, then all nodes on the specified network have access to your printer. If you leave both fields blank, then every node on the network has access to the printer.

**8** Select Accept and Exit.

The Printer Agent with its associated Print Device Subsystem and Port Handler string are then loaded. The Port Handler configuration utility is exited and control is returned to the NDPS Manager.

# Configuring Remote Printers Running in LPR Mode

Use the following procedure to configure a remote printer running in LPR mode in TCP/IP environments, unless that printer is an HP* printer.

**NOTE:** LPR will only work if TCP/IP is configured correctly. See the documentation on configuring TCP/IP on a NetWare server.

**1** From the browser's Object menu for the organization or organizational unit, select Create.

The New Object dialog appears

**2** Select NDPS Printer.

The Create NDPS Printer dialog appears.

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

**4** At the Printer Agent Source field, select Create a New Printer Agent and click Create.

**5** Confirm the Printer Agent name (default is the name of the new printer you are creating) and browse to select the NDPS Manager you want to assign it to.

**6** At the Gateway Types window, select the Novell gateway.

The Configure Novell PDS dialog appears.

For more information about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

**7** Configure the Novell PDS by selecting the Printer Type and Port Type, then click OK.

The Configure Novell Port Handler configuration wizard appears.

**8** Configure the Connection Type as Remote LPR/TCPIP and specify the Port Type as LPT, COM, or Other, then click Next.

Refer to the online help for detailed information on these fields.

**9** Select the printer driver for each client operating system.

These drivers will be automatically downloaded to users' workstations when they install this printer in the future. Select a driver for each operating system.

If you choose a Windows* 3.*x* driver but not a Windows 95* or Windows NT* driver, a 16-bit driver will be selected. Normally this will not create problems.

**NOTE:** Since the list of printer drivers shipped with this product is limited, you can add drivers to the Resource Management Service database. (See "Adding or Updating Printer Drivers" on page 182 for more information.)

If the driver you need is not in the drivers list, rather than adding it to the RMS, you can choose [None] from the top of each list. Users will then be asked to provide a

disk with the appropriate driver the first time they install this printer on their workstations.

**10** Click Continue.

The main browser window appears with your new controlled access printer listed.

You can select it from the browser to complete the following tasks

- ◆ "Optimizing Security through NDPS Access Control" on page 117
- ◆ "Optimizing Event Notification" on page 131

## Using the Remote Printer LPR/TCPIP Option at the Server Console

At the server console, you can create a Printer Agent to represent one of the following:

- ◆ A printer attached to a workstation or a remote file server
- ◆ A printer directly attached to the network running in LPR mode in a TCP/IP environment and for which no gateway is available

A Printer Agent configured in this mode will emulate a legacy print server (PServer Emulation), and will no longer require PSERVER.NLM.

**NOTE:** LPR will only work if TCP/IP is configured correctly. See the documentation on configuring TCP/IP on a NetWare server.

**1** Perform Steps 1-8 described in "Creating NDPS Printers at the Server Console" on page 82.

**2** Select Remote Printer LPR/TCPIP from the Connection Type menu.

The Port Handler Configuration: Remote LPR/TCPIP Mode screen appears.

**3** Provide the information requested.

**4** Select Accept and Exit.

The Printer Agent with its associated Print Device Subsystem and Port Handler string are then loaded. The Port Handler configuration utility is exited and control is returned to the NDPS Manager.

# Configuring Queue-Based Printers

Users can submit jobs through Novell® Distributed Print Services™ (NDPS™) to printers and print systems that still require queues, such as the following:

◆ Printers controlled by PSERVER.NLM (either locally attached or attached directly to the network) running on servers that have not been upgraded to NDPS

◆ Printers attached directly to the network that are configured for queue-server mode

◆ Mainframe systems using NetWare® HostPrint® and certain proprietary systems

The following procedure allows you to configure the Printer Agent to redirect print jobs to a NetWare queue.

**NOTE:** While the following procedure allows you to connect to queue-based printers controlled by NetWare servers in the current NDS™ tree, you might need to create one or more bindery reference queues to provide access to printers controlled by a NetWare 3™ file server and printers controlled by a NetWare 4™ or NetWare 5™ server in a different NDS tree. For information about this procedure, see "Using Bindery Reference Queues" on page 97.

**1** In NetWare Administrator, select the container where you want the NDPS Printer object to reside.

**2** From the Object menu, select Create.

The New Object dialog appears.

**3** Select NDPS Printer.

The Create NDPS Printer dialog appears.

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

**5** At the Printer Agent Source field, select Create a New Printer Agent, then click Create.

The Create Printer Agent dialog appears.

**6** Confirm the Printer Agent name (default is the name of the new printer you are creating) and browse to select the NDPS Manager you want to assign it to.

**7** At the Gateway Types window, select the Novell Printer Gateway.

The Configure Novell PDS dialog appears.

For more information about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

**8** Configure the Novell PDS by selecting the Printer Type and Port Handler Type, then click OK.

The Configure Novell Port Handler configuration wizard appears.

**9** At the Connection Type field, click Forward Jobs to a Queue, and then click Next.

(The Port Type options are grayed when you select the Queue connection type.)

A screen with the Queue Name and Queue User Name fields appears.

**10** Provide the Queue Name and Queue User Name.

Browse for the target print queue. If no queues are listed, none exist in the current context. Browse the tree to find a queue in a different context. The queue you select must exist in the current tree, or else you will need to create a bindery reference queue in your own container to allow access to the actual queue. See "Using Bindery Reference Queues" on page 97.

The user you specify might need to log in to the server on which this queue resides. This user must have full rights to manage this queue.

**11** Click Finish.

The Select Printer Drivers dialog appears.

**12** Select the printer driver for each client operating system.

These drivers will be automatically downloaded to users' workstations when they install this printer in the future. Select a driver for each operating system.

If you choose a Windows* 3.*x* driver but not a Windows 95* or Windows NT* driver, a 16-bit driver will be selected. Normally this will not create problems.

**NOTE:** Since the list of printer drivers shipped with this product is limited, you can add drivers to the Resource Management Service database. (See "Adding or Updating Printer Drivers" on page 182 for more information.)

If the driver you need is not in the drivers list, rather than adding it to the RMS, you can choose [None] from the top of each list. Users will then be asked to provide a disk with the appropriate driver the first time they install this printer on their workstations.

**13** Click Continue.

The main browser window appears with your new controlled access printer listed.

You can select it from the browser to complete the following tasks:

- "Optimizing Security through NDPS Access Control" on page 117
- "Optimizing Event Notification" on page 131

# Using Bindery Reference Queues

While we strongly urge you to upgrade all of your printers to NDPS as soon as possible, you may still want to provide your users with access to queue-based printing resources for a variety of reasons. While connecting to queue-based printers controlled by NetWare 4 or NetWare 5 servers in the current NDS tree can be accomplished directly when you configure a Printer Agent, you may need to create one or more bindery reference queues to provide access to the following:

- Printers controlled by a NetWare 3 file server
- Printers controlled by a NetWare 4 or NetWare 5 server in a different NDS tree

A bindery reference queue serves as a pointer to a real NetWare queue on both types of servers. After you have created a bindery reference queue to point to a real bindery queue on a target server, you can then configure a Printer Agent to send jobs to that queue just as you would if the queue actually resided on a NetWare 4 or NetWare 5 server in the same tree. The following discussion explains how to accomplish this procedure using NetWare Administrator.

**NOTE:** If a bindery reference queue already exists, you can use it with NDPS with no modification. A new reference queue object does not need to be created in NDS.

### Prerequisites

To create a bindery reference queue, the following prerequisites must exist.

❑ The print queue you want to reference must already exist on the server you want to point to.

❑ A bindery object of the same name as the one you are using must exist on that server and must have rights to the print queue you are referencing.

### Procedure

The following procedure lets you reference a bindery queue and make it available to NDPS printers.

**1** In NetWare Administrator, select the container where you want the reference queue to reside.

**2** From the Object menu, select Create.

The New Object dialog appears.

**3** Select Print Queue.

The Create Print Queue dialog appears.

**4** At the Create Print Queue dialog, select Reference a Bindery Queue.

Notice that the dialog changes when you select this option.

**5** (Optional) If you want to assign a bindery reference queue name different from the queue's name on the legacy 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.

**6** Click the browser button to select a bindery server and queue.

The Network Server and Queue dialog appears.

**7** Click List Only Attached Servers to specify 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.

**8** Double-click the server you want to use.

A list of queues available on that server appears in the Queues list.

If you are not attached, you must authenticate to that server.

**NOTE:** For you to complete this procedure, a bindery object of the same name as the one you are using must exist on that server and must have rights to the print queue you are referencing.

If no queue names appear, no queues have been defined on that server.

**9** Select the queue you want to create a reference for, and click OK.

The Create Print Queue dialog appears again.

**10** Click Create.

The bindery reference queue now appears in your NDS tree.

**11** Return to of the procedure for configuring a queue-based printer as a controlled access printer.

Now that this queue is created, you can configure a Printer Agent to service jobs from a queue or to submit jobs to a queue.

## Using the Queue-Based Printer Option at the Server Console

At the server console, you can configure a printer to service a legacy queue by using the following procedure.

**1** Perform steps 1-8 described in "Creating NDPS Printers at the Server Console" on page 82.

**2** Select Queue-Based Printer from the Connection Type menu.

The Port Handler Configuration: Queue-Based Printing Mode screen appears.

**Figure 3    Port Handler Configuration: Queue-Based Printing Mode Screen**

```
┌────────────────────────────────────────────────────────┐
│     Port Handler Configuration:     QMS Mode           │
├────────────────────────────────────────────────────────┤
│                                                        │
│  Distinguished Queue Name:                             │
│                                                        │
│  User Name:                                            │
│                                                        │
│                 Accept and Exit                        │
│                                                        │
└────────────────────────────────────────────────────────┘
```

**3** Enter a queue name.

This is the name of the print queue where you want the Printer Agent to place jobs.

Highlight Distinguished Queue Name and press Enter; then type in an existing queue name. If you press Enter or Insert again, you can browse the network tree to search for a queue.

**4** Enter a User Name.

Highlight User Name and press Enter or Insert; then type the name of the user who will manage the queue just specified. To browse the network tree for a valid user, press Enter or Insert.

**5** Select Accept and Exit.

The Printer Agent with its associated Print Device Subsystem and Port Handler string are then loaded. The Port Handler configuration utility is exited and control is returned to the NDPS Manager.

# Configuring Local Printers

Local printers are attached directly to your server. There are two basic types of output ports: parallel (LPT1 through LPT3) and serial (COM1 through COM4).

**IMPORTANT:** Novell® Distributed Print Services™ (NDPS™) does not support printers locally attached to servers running on non-native NetWare® platforms such as NetWare for OS/2* or NetWare for UNIX*.

Use the following procedure to configure a new NDPS printer attached to a server on which NDPS is installed.

1 In NetWare Administrator, select the container where you want the NDPS Printer object to reside.

2 From the Object menu, select Create.

   The New Object dialog appears.

3 Select NDPS Printer.

   The Create NDPS Printer dialog appears.

4 Type a name of your choice in the Printer Name field.

   This name should distinguish it from other printers on your system.

5 At the Printer Agent Source field, select Create a New Printer Agent and click Create.

   The Create Printer Agent dialog appears.

6 Confirm the Printer Agent name (default is the name of the new printer you are creating) and browse to select the NDPS Manager you want to assign it to.

7 At the Gateway Types window, select the Novell Printer Gateway.

   The Configure Novell PDS dialog appears.

   For more information about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

8 Configure the PDS by selecting the Printer Type and Port Type, then click OK.

   The Configure Novell Port Handler configuration wizard appears.

9 Configure the Connection Type as Local and specify the Port Type as LPT, COM, or Other, then click Next.

**10** Configure the Controller Type and Interrupts, if needed, then click Finish.

Refer to the online help for detailed information on these fields.

The Select Printer Drivers dialog appears.

**11** Select the printer driver for each client operating system.

These drivers will be automatically downloaded to users' workstations when they install this printer in the future. Select a driver for each operating system.

If you choose a Windows* 3.*x* driver but not a Windows 95* or Windows NT* driver, a 16-bit driver will be selected. Normally this will not create problems.

**NOTE:** Since the list of printer drivers shipped with this product is limited, you can add drivers to the Resource Management Service database. (See "Adding or Updating Printer Drivers" on page 182 for more information.)

If the driver you need is not in the drivers list, rather than adding it to the RMS, you can choose [None] from the top of each list. Users will then be asked to provide a disk with the appropriate driver the first time they install this printer on their workstations.

**12** Click Continue.

The main browser window appears with your new controlled access printer listed.

- ◆ "Optimizing Security through NDPS Access Control" on page 117
- ◆ "Optimizing Event Notification" on page 131

## Configuring a Local Printer at the Server Console

Local printers are attached directly to your server. There are two basic types of output ports: parallel (LPT1 through LPT3) and serial (COM1 through COM4).

**1** Perform steps 1-8 described in "Creating NDPS Printers at the Server Console" on page 82.

**2** Select Local Printer from the Connection Type menu.

The Port Type window appears.

**3** Select the type of port your printer will be attached to.

Selecting a port type opens the Port menu.

◆ **Parallel Port Handler Configuration (LPT#).** If you select a parallel port type (LPT), a window similar to the following will appear.

```
┌─────────────────────────────────────────────┐
│ Port Handler Configuration:  Local Mode      │
├─────────────────────────────────────────────┤
│                                              │
│ Controller Type:        Auto-Determine       │
│ Interrupt:              7                     │
│                                              │
│             Accept and Exit                  │
│                                              │
└─────────────────────────────────────────────┘
```

The values selected for the default configuration are those typically used on most computers. Verify that these are correct for your hardware. If not, you may modify them. Use the arrow keys to go to the option you want to change. The settings specified should match the actual hardware settings for the selected port.

Refer to for help in determining the correct configuration settings.

**Table 2    Parallel Port Parameters**

| Parameter | Description | Options |
|---|---|---|
| Controller Type | Specifies the type of hardware controlling the port. Auto-Determine automatically determines the method; Compatible sets the port as an IBM*-compatible controller (Type 1); and Enhanced Capabilities Port (ECP) is capable of faster, more efficient input and output modes.<br><br>**Warning:** If you select a value, the value must match the computer hardware or the printer will not print. | The controller type will be configured by the software if this argument is committed. Auto-Determine is the default if an option does not appear on the command line. This mode searches the port hardware for the configured controller type automatically.<br><br>We recommend that you do not specify this parameter. |

| Parameter | Description | Options |
|---|---|---|
| Interrupt | Specifies which interrupt the hardware is configured to use with the port. Polled mode means that no interrupt will be used. Interrupts are used to signal the processor of some event that needs attention. Most devices in the computer are configured to use a particular interrupt. Be sure to keep a record of the interrupts your system uses.<br><br>**Warning:** If you select an interrupt, the value must match your computer hardware or the printer will not print. If you are not sure of the hardware configuration, specify polled mode. | Valid interrupt options are from 3 through 15. The default for LPT1 is 7, the default for LPT2 and LPT3 is 5. Generally the same interrupt should not be assigned to more than one device.<br><br>Polled mode checks the port periodically without using interrupts and eliminates the potential for interrupt conflicts. |

◆ **Serial Port Handler Configuration (COM#).**

If you select a serial port type (COM), a window similar to the following will appear.

```
┌──────────────────────────────────────────────┐
│  Port Handler Configuration:   Local Mode     │
├──────────────────────────────────────────────┤
│                                                │
│   Interrupt:         4                         │
│   Baud Rate:         9600                       │
│   Data Bits:         8                          │
│   Stop Bits:         1                          │
│   Parity:            None                        │
│   Use XON/XOFF:      No                          │
│   Controller Type:   Auto-Determine             │
│                                                │
│             Accept and Exit                     │
│                                                │
└──────────────────────────────────────────────┘
```

The values selected for the default configuration are those typically used on most computers. Verify that these are correct for your hardware. If not, you may modify them. Use the arrow keys to go to

the option you want to change. The settings specified should match the actual hardware settings for the selected port.

Refer to for help in determining options.

Table 3        Serial Port Parameters

| Parameter | Description | Options |
|---|---|---|
| Interrupt | Specifies the type of hardware controlling the port. Auto-Determine automatically determines the method; Compatible sets the port as an IBM-compatible controller (Type 1); and Enhanced Capabilities Port (ECP) is capable of faster, more efficient input and output modes.<br><br>**Warning:** If you select a value, the value must match your computer hardware or the printer will not print. | Valid interrupt options are from 3 through 15.<br><br>Polled mode is the default. This mode checks the port periodically without using interrupts and eliminates the potential for interrupt conflicts. |
| Baud Rate | Baud rate measures the speed at which data is transferred over a serial interface. This correlates roughly to data bits per second.<br><br>The most common baud rate for printers is 9600 baud.<br><br>**Warning:** The value must match the setting on your printer or the printer will not print. | 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200<br><br>Most printers can be configured for several baud rates. Configure your printer for the highest baud rate it will support. Specify that value here. Consult your printer documentation for more information. |
| Data Bits | This field should contain the number of bits needed to represent every character in the character set you are downloading to your printer.<br><br>The standard ASCII character set has 128 characters of letters, numbers, and punctuation. It requires 7 bits for transmission.<br><br>An extended character set has 256 characters, with 128 characters from the standard character set and an additional 128 characters of line drawings and foreign characters. It requires a character length of 8 bits.<br><br>**Warning:** The value must match the setting on your printer or the printer will not print. | 8, 7, 6, and 5<br><br>The default is 8. The use of 5 data bits allows 1 or 1.5 stop bits. The use of 6, 7, or 8 data bits allows 1 or 2 stop bits. |

| Parameter | Description | Options |
|---|---|---|
| Stop Bits | Stop bits are inserted between each set of Data Bits, allowing your printer time to prepare for the next set of data. The value here represents the minimum number of spacing bits sent between each character in a serial transmission. This time is needed by the receiving circuitry to prepare to receive each new character.<br><br>**Warning:** The value must match the setting on your printer or the printer will not print. | 1, 1.5, and 2<br><br>Most printers today are fast enough that Stop Bits is set to 1. Slower printers like teletype devices require more than one stop bit.<br><br>The use of 1.5 stop bits requires a character length of 5 data bits. To select 1.5 stop bits, first set Data Bits to 5. |
| Parity | Parity checking is a method of checking for errors in data transmission. Serial printers are commonly configured for no parity, but you can reconfigure them if you wish. Parity checking might degrade speed by up to 10% but might be desirable in some environments such as printers connected by very long cables.<br><br>When parity checking is used, errors are reported at the printer. However, parity checking does not provide absolute assurance that no errors occur. If more than one bit changes, parity checking might not detect the error.<br><br>**Warning:** The value must match the setting on your printer or the printer will not print. | Even, Odd, and None<br><br>If you select None (the default), parity checking is not used.<br><br>If you select Even or Odd, parity checking is enabled and set to Even parity or Odd parity, respectively. |
| Use XON/XOFF | XON/XOFF is a flow control method used to prevent the sending system from transmitting data faster than the receiving system can accept the information. It is an alternative to hardware handshaking (the default), which uses the Clear to Send signal between the port and the printer.<br><br>**Warning:** The value must match the setting on your printer or the printer will not print. | When XON/XOFF is selected, the Port Handler expects the printer to send an XOFF character (Ctrl+S) whenever transmission should be suspended (usually indicating that the printer's memory buffer is full or the printer is offline), and an XON character (Ctrl+Q) when transmission can be resumed.<br><br>To avoid troubleshooting the printer or cable pin configuration, select XON/XOFF. |

| Parameter | Description | Options |
|---|---|---|
| Controller Type | Specifies the type of hardware controlling the port. Auto-Determine automatically determines the method; Compatible sets the port as an IBM-compatible controller (Type 1); and Enhanced Capabilities Port (ECP) is capable of faster, more efficient input and output modes.<br><br>**Warning:** If you select a value, the value must match your computer hardware or the printer will not print. | Compatible, ECP, FIFO<br><br>The controller type will be configured by the software if this argument is committed. Auto-Determine is the default if an option does not appear on the command line. This mode searches the port hardware for the configured controller type automatically.<br><br>We recommend that you do not specify this parameter. |

**4** Select the Accept and Exit option.

The Printer Agent with its associated Print Device Subsystem and Port Handler string are then loaded. The Port Handler configuration utility is exited and control is returned to the NDPS Manager.

# Creating Public Access Printers in NetWare Administrator

To create a public access printer using the Novell® Distributed Print Services™ (NDPS™) Manager object in NetWare® Administrator, do the following:

**1** Double-click the NDPS Manager object you will be using to control this Printer Agent.

**2** At the Identification page for the NDPS Manager object you want to use, click the Printer Agent List button.

The Printer Agent List dialog appears.

**3** Click New.

The Create Printer Agent dialog appears.

**4** Type a name of your choice in the NDPS Printer Name field.

**5** Select the Gateway Type you want to use.

For more information about using gateways, see "Selecting the Correct Gateway to Use" on page 85.

**6** Click OK.

**7** Complete the tasks required.

You will need to select the Printer Type that best matches your printer and the Port Type. These tasks vary depending on the gateway type you are using. Use the online help for specific information on each task.

**8** Select the printer driver for each client operating system.

These drivers will be automatically downloaded to users' workstations when they install this printer in the future. Select a driver for each operating system.

If you choose a Windows* 3.*x* driver but not a Windows 95* or Windows NT* driver, a 16-bit driver will be selected. Normally this will not create problems.

**NOTE:** Since the list of printer drivers shipped with this product is limited, you can add drivers to the Resource Management Service database. (See "Adding or Updating Printer Drivers" on page 182 for more information.)

If the driver you need is not in the drivers list, rather than adding it to the RMS, you can choose [None] from the top of each list. Users will then be asked to provide a disk with the appropriate driver the first time they install this printer on their workstations.

**9** Click Continue.

The new Printer Agent will now appear in the Printer Agent List window.

For information on converting this public access printer to a controlled access printer, see "Converting Public Access Printers to Controlled Access Printers" on page 80.

# Creating NDPS Printers by Configuring a Port Handler String Manually

You can manually build the Port Handler string directly at the server's command prompt or by selecting the Manual option from the Novell® Distributed Print Services™ (NDPS™) Manager configuration utility on the server.

To manually load a Port Handler, type the following at the console command line:

```
load ph pa=pa_name [port=]port port_specific_arguments]
```

**NOTE:** Load strings may not exceed 60 characters.

You can display a list of the port handler parameters by typing the following at the server console command line:

**load ph /?**

Table 4    **Specific Arguments for Port Handler**

| Parameter | Description | Options |
|---|---|---|
| PA | Printer Agent | Specify the Printer Agent you want that is controlled by the NDPS Manager currently running. |
| PORT | The port type<br><br>**Warning:** If you select a value, the value must match the computer hardware or the printer will not print. | You may select from the following port types:<br><br>LPT1, LPT2, LPT3 (Parallel port)<br><br>COM1, COM2, COM3, COM4 (Serial port)<br><br>QMS (forward to a queue)<br><br>RP (Remote Printer) |

For detailed instructions, see the following:

# Manually Loading a Parallel Port

The following table describes the command line arguments for a parallel port. Here is an example of how these arguments are used in syntax for a port string to emulate Remote printer 0 of type Other on a print server named MYSERVER:

**load ph pa=myprinter rp sap=myserver**

**Table 5       Port-Specific Arguments for a Parallel Port**

| Parameter | Description | Options |
|---|---|---|
| CONTROLLER | Specifies the type of hardware controlling the port. Auto-Determine automatically determines the method; Compatible sets the port as an IBM*-compatible controller (Type 1); and Enhanced Capabilities Port (ECP) is capable of faster, more efficient input and output modes.<br><br>**Warning:** If you select a value, the value must match the computer hardware or the printer will not print. | COMPATIBLE, ECP<br><br>The controller type will be configured by the software if this argument is committed. Auto-Determine is the default if an option does not appear on the command line. This mode searches the port hardware for the configured controller type automatically.<br><br>We recommend that you do not specify this parameter. |
| IRQ\|IRT | Specifies which interrupt the hardware is configured to use with the port. Polled mode means that no interrupt will be used. Interrupts are used to signal the processor of some event that needs attention. Most devices in the computer are configured to use a particular interrupt. Be sure to keep a record of the interrupts your system uses.<br><br>**Warning:** If you select an interrupt, the value must match your computer hardware or the printer will not print. If you are not sure of the hardware configuration, specify polled mode. | Valid interrupt options are from 3 through 15. The default for LPT1 is 7, the default for LPT2 and LPT3 is 5. Generally the same interrupt should not be assigned to more than one device.<br><br>Polled mode checks the port periodically without using interrupts and eliminates the potential for interrupt conflicts. |
| INMODE | Specifies the input mode for this port.<br><br>**Warning:** If you select a value, the controller hardware must be capable of the input mode you select or the printer will not print. | NONE, NIBBLE, BYTE, ECP, ECPWRLE, and Auto-Determine<br><br>The input mode will be determined by the software if this argument is omitted. Auto-Determine is the default if an option does not appear on the command line. This mode searches the port hardware for the configured input mode automatically.<br><br>We recommend that you do not specify this parameter. |

| Parameter | Description | Options |
|---|---|---|
| OUTMODE | Specifies the output mode for this port.<br><br>**Warning:** If you select a value, the controller hardware must be capable of the output mode you select or the printer will not print. | COMPATIBLE, FAST, ECP, and Auto-Determine<br><br>The output mode will be determined by the software if this argument is omitted. Auto-Determine is the default if an option does not appear on the command line. This mode searches the port hardware for the configured output mode automatically.<br><br>We recommend that you do not specify this parameter. |

# Manually Loading a Serial Port

The following chart describes the command line arguments for a serial port. Here is an example of how these arguments are used in syntax for COM1 with a Printer Agent named MYPRINTER:

```
load ph pa=myprinter COM1
```

| | Table 6 | Port-Specific Arguments for a Serial Port |
|---|---|---|

| Parameter | Description | Options |
|---|---|---|
| CONTROLLER | Specifies the type of hardware controlling the port. Auto-Determine automatically determines the method; Compatible sets the port as an IBM*-compatible controller (Type 1); and Enhanced Capabilities Port (ECP) is capable of faster, more efficient input and output modes.<br><br>**Warning:** If you select a value, the value must match your computer hardware or the printer will not print. | COMPATIBLE, ECP, FIFO<br><br>The controller type will be configured by the software if this argument is committed. Auto-Determine is the default if an option does not appear on the command line. This mode searches the port hardware for the configured controller type automatically.<br><br>We recommend that you do not specify this parameter. |

| Parameter | Description | Options |
|-----------|-------------|---------|
| IRQ\|IRT | Specifies which interrupt the hardware is configured to use with the port. Polled mode means that no interrupt will be used. Interrupts are used to signal the processor of some event that needs attention. Most devices in the computer are configured to use a particular interrupt. Be sure to keep a record of the interrupts your system uses.<br><br>**Warning:**  If you select an interrupt, the value must match your computer hardware or the printer will not print. If you are not sure of the hardware configuration, specify polled mode. | Valid interrupt options are from 3 through 15.<br><br>Polled mode is the default. This mode checks the port periodically without using interrupts and eliminates the potential for interrupt conflicts. |
| BAUD | Baud rate measures the speed at which data is transferred over a serial interface. This correlates roughly to data bits per second.<br><br>The most common baud rate for printers is 9600 baud.<br><br>**Warning:**  The value must match the setting on your printer or the printer will not print. | 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200<br><br>Most printers can be configured for several baud rates. Configure your printer for the highest baud rate it will support. Specify that value here. Consult your printer documentation for more information. |

| Parameter | Description | Options |
|-----------|-------------|---------|
| PARITY | Parity checking is a method of checking for errors in data transmission. Serial printers are commonly configured for no parity, but you can reconfigure them if you wish. Parity checking might degrade speed by up to 10%, but it might be desirable in some environments such as printers connected by very long cables.<br><br>When parity checking is used, errors are reported at the printer. However, parity checking does not provide absolute assurance that no errors occur. If more than one bit changes, parity checking might not detect the error.<br><br>**Warning:**  The value must match the setting on your printer or the printer will not print. | EVEN, ODD, and NONE<br><br>If you select None (the default), parity checking is not used.<br><br>If you select Even or Odd, parity checking is enabled and set to Even parity or Odd parity, respectively. |
| DATA | This parameter should contain the number of bits needed to represent every character in the character set you are downloading to your printer.<br><br>The standard ASCII character set has 128 characters of letters, numbers, and punctuation. It requires 7 bits for transmission.<br><br>An extended character set has 256 characters, with 128 characters from the standard character set and an additional 128 characters of line drawings and foreign characters. It requires a character length of 8 bits.<br><br>**Warning:**  The value must match the setting on your printer or the printer will not print. | 8, 7, 6, and 5<br><br>The default is 8. The use of 5 data bits allows 1 or 1.5 stop bits. The use of 6, 7, or 8 data bits allows 1 or 2 stop bits. |

| Parameter | Description | Options |
|---|---|---|
| STOP | Stop bits are inserted between each set of Data Bits, allowing your printer time to prepare for the next set of data. The value here represents the minimum number of spacing bits sent between each character in a serial transmission. This time is needed by the receiving circuitry to prepare to receive each new character.<br><br>**Warning:** The value must match the setting on your printer or the printer will not print. | 1, 1.5, and 2<br><br>Most printers today are fast enough that stop bits is set to 1. Slower printers like teletype devices require more than one stop bit.<br><br>The use of 1.5 stop bits requires a character length of 5 data bits. To select 1.5 stop bits, first set data bits to 5. |
| HANDSHAKE | The type of data communications protocol.<br><br>XON/XOFF is a flow control method used to prevent the sending system from transmitting data faster than the receiving system can accept the information. It is an alternative to hardware handshaking (the default), which uses the Clear to Send signal between the port and the printer.<br><br>**Warning:** The value must match the setting on your printer or the printer will not print. | SOFTWARE, XONXOFF, HARDWARE, CTS, or BOTH<br><br>When XON/XOFF is selected, the Port Handler expects the printer to send an XOFF character (Ctrl+S) whenever transmission should be suspended (usually indicating that the printer's memory buffer is full or the printer is off-line), and an XON character (Ctrl+Q) when transmission can be resumed.<br><br>To avoid troubleshooting the printer or cable pin configuration, select XONXOFF. |
| FIFORDEPTH<br><br>(Receiver depth)<br><br>(FIFO=First In First Out data buffers) | The depth, in bytes, of the receive FIFO at which an interrupt is generated. Larger values are faster when no errors occur. Smaller values are less prone to errors.<br><br>The 16550 UART has a 16 byte deep FIFO on the receiver. This provides buffering to improve efficiency and reduce data loss when interrupt handling might be delayed. | 1, 4, 8, or 14<br><br>Only used when CONTROLLER=FIFO.<br><br>A larger number tends to be more efficient, while a smaller number tends to be a better hedge against data loss. |

| Parameter | Description | Options |
|-----------|-------------|---------|
| FIFOTDEPTH (Transmitter depth) (FIFO=First In First Out data buffers) | The depth, in bytes, of the transmit FIFO that the port handler software tries to maintain when data is available to be transmitted. Larger values are faster when no errors occur. Smaller values are less prone to errors. The 16550 UART has a 16 byte deep FIFO on the transmitter. This provides buffering to improve efficiency and reduce data loss when interrupt handling might be delayed. | 1 through 15 Only used when CONTROLLER=FIFO. A larger number tends to be more efficient, while a smaller number tends to be a better hedge against data loss. |

# Preparing Client Workstations to Use NDPS

Before you can run Novell® Distributed Print Services™ (NDPS™) client utilities on your user workstations, each workstation must have the Novell Client™ that ships with NetWare® 5™ installed. The Novell Client supports Windows* 95*, Windows NT*, and Windows 3.*x* workstations.

The NDPS components of the Novell Client require approximately 800 KB of random access memory (RAM). If you select the Custom install option, make sure you have enabled NDPS.

Tasks you must perform in order to implement your NDPS print system include the following.

## Installing the Novell Client

For specific instructions on installing the Novell Client, see the Client documentation.

**NOTE:** Do not install a client using the DOS install program. To install a client that has NDPS support, you must run SETUP or WINSETUP in Windows 3.*x* or Windows 95 and not the DOS "install" program.

## Enabling NDPS on a Previously Installed Client

If you have previously installed the correct version of the Novell Client on one or more Windows 95 or Windows NT workstations, but you did not enable NDPS at that time, here is how to enable it for NDPS.

**NOTE:** On Windows 3.*x* workstations, you must reinstall the Client to enable NDPS.

**1** At the Windows 95 or Windows NT desktop, right-click the Network Neighborhood icon.

**2** Select Properties.

The Network properties screen appears.

**3** At the Configuration tab, click the Add button.

The Select Network Component Type screen appears.

**4** Select Service and click the Add button.

The Select Network Service screen appears.

**5** Select Manufacturer > Novell, and Network Service > Novell Distributed Print Services.

**6** Click the Have Disk button.

The Install from Disk dialog appears.

**7** With the Novell Client CD-ROM inserted, browse for the following path: *CD-ROM drive*:\products\win95\ibm_*lang*

If you have copied the contents of the Novell Client CD-ROM to your network, point to the path where the install.exe file for the Client is stored.

**8** Run the install.exe program from that location.

## Adding NDPS Printers

For a discussion of how to add printers automatically to your NDPS client workstations, see "Designating Printers to be Automatically Installed" on page 148.

You can install printers manually at individual workstations using the Novell Printer Manager utility, which is available for Windows 95, Windows NT, and Windows 3.*x*. See "Installing NDPS Printers Manually on Workstations" on page 149 for more information.

In Windows NT, all of the NDPS printer management functions are fully integrated with that platform's normal printer management features, including the Add Printer folder, so users do not need to access the Novell Printer Manager in order to gain full benefit of NDPS bi-directionality and ease of use.

## Removing CAPTURE Statements

Existing CAPTURE statements should be removed from your NDPS clients for NDPS to be fully enabled. These statements might exist in container or user login scripts, in batch files, or other locations. After you have tested your new system thoroughly, you can safely remove these statements.

## More Information

For more information about supporting your clients in an NDPS environment, see .

# 4 Optimizing

While the default settings in Novell® Distributed Print Services® (NDPS®) allow your users to print without further configuration being necessary, you will probably want to modify some of those settings so that you can manage your printing resources most effectively. NDPS allows you to do the following:

- Optimize security for all of your printing resources and system components

- Optimize printer configurations

- Optimize event notification

- Optimize print job spooling

- Optimize NDPS Brokers

- Optimize brokered resources and services

- Optimize NDPS fault tolerance

## Optimizing Security through NDPS Access Control

Novell® Distributed Print Services™ (NDPS™) is designed to take full advantage of NDS®. You receive all the benefits of NDS security and the easy management provided by the industry's most advanced and robust directory service. The Access Control feature for NDPS allows you to specify the access each User, Group, or container object will have to your NDPS printing resources.

Access control roles are mutually exclusive, even though the same individual might need to perform tasks reserved for different roles. For example, only printer Managers can add or delete printer Operators or printer Users. In a

similar way, Managers and Operators must also be designated as Users for a printer before they can submit print jobs to it.

In actual implementation, the NDPS defaults prevent most problems that might occur from these distinctions. For example, a printer Manager is automatically designated an Operator and User as well, while an Operator of a printer is automatically designated a User of that printer also. You cannot remove the User role from an Operator, and you cannot remove the Operator and User roles from a Manager.

The creator of an NDPS object is automatically granted privileges for all available roles for the type of object being created.

The following sections illustrate some of the security issues and features you might find useful as you plan your NDPS setup.

# Optimizing Security for NDPS Printers

Printer security is ensured through the assignment of the Manager, Operator, and User access control roles and by the strategic placement of your printers and printer configurations.

You may assign multiple Printer objects to represent a single Printer Agent. You can then make different access control assignments to each Printer object. (You can also give each Printer object a different configuration. See "Optimizing Printer Configurations" on page 125 for more information.) This can be an especially useful option if you want to allow users in different containers to use the same printer, because each group of users can be given different rights to the printer.

A physical printer cannot be a controlled access printer and a public access printer at the same time. However, if you delete all the Printer objects representing a Printer Agent, that printer will become a public access printer.

The following sections discuss security options for Novell® Distributed Print Services™ (NDPS™) printers in more detail.

# Printer Access Control Roles

Different User, Group, or container objects can have different access rights to the same printer. For example, if you want only certain users to be able to send jobs to a particular printer, you can specify which users should have access and what access roles each will have.

The following table describes the rights and privileges associated with each of the NDPS Printer access control roles.

**Table 7**　　**Printer Access Control Roles**

| Role | Description |
| --- | --- |
| Manager | NDPS tasks performed exclusively by the Printer Manager are those that require the creation, modification, or deletion of NDPS Printer objects, as well as other NDS™ administrative functions. Printer Managers are automatically designated as printer Operators and Users as well, so they can perform all tasks assigned to the Operator role. Typical Manager functions include the following: <br><br> ◆ Modifying and deleting Printer objects <br><br> ◆ Adding or deleting Operators and Users for a printer <br><br> ◆ Adding other Managers <br><br> ◆ Configuring interested-party notification <br><br> ◆ Creating, modifying, or deleting printer configurations |

| Role | Description |
|---|---|
| Operator | Printer management tasks performed by the Operator include the following: <br><br> • Performing all of the functions available through the Printer Control page <br><br> • Pausing, restarting, or reinitializing printers <br><br> • Reordering, moving, copying, and deleting jobs <br><br> • Setting printer defaults, including locked properties <br><br> • Configuring print job spooling <br><br> Operators cannot create, modify, or delete NDS objects or perform other NDS administrative functions. |
| User | NDPS tasks performed by Users include the following: <br><br> • Submitting print jobs <br><br> • Managing print jobs they own (Users cannot copy, move, reorder, or remove jobs they do not own) <br><br> To simplify administration, the container a printer resides in is automatically assigned as a User for that printer, so all users in that container and its subcontainers can use that printer without being added to the list. You can delete the container from the list if you want to limit access to certain users, groups, or roles. |

## Assigning Printer Access Control Roles through NDPS Printer Objects

Different User, Group, or container objects can have different access rights to the same printer. For example, if you want only certain users to be able to send jobs to a particular printer, you can specify which users should have access and what access roles each will be given.

**1** From the NetWare Administrator browser's Object menu, select the Printer object you want to work with.

**2** At the main NDPS Printer Details window, select Access Control.

The Printer Access Control dialog appears.

Three roles are available for printers: Managers, Operators, and Users. (For Broker and NDPS Manager objects, only the Manager role is available.)

**3** Select the role you want to assign or remove access control rights for.

A current list of objects assigned to this role appears.

**4** To add objects to this role, click Add. To delete objects, click Delete.

A browser appears from which you can select other objects.

**5** Select the objects you want to add or delete and click OK.

## Assigning Printer Access Control Roles through User Objects

In addition to configuring access control through NDPS printers, you can also configure access control through User objects.

The following procedure assumes that you are modifying the attributes for an existing User. You can also adapt this procedure if you are creating a new User object.

**1** From the NetWare Administrator browser's Object menu, select the User object you want to configure access control for.

The User Identification dialog appears.

**2** Scroll down the buttons on the right side of the dialog to the NDPS Printer Access Control button and select it.

The user's NDPS Printer Access Control dialog appears, with a list of available NDPS printers and icon representations of the three NDPS Access Control roles: User, Operator, and Manager.

**3** Select the printer for which you want to assign this user an access control role.

**4** Check the role(s) you want this user to be assigned for this printer.

If you check Manager, this user is automatically assigned Operator and User roles as well. Operator and User roles are assigned independently. Keep in mind that a User object must be assigned the access control role of User in order to submit print jobs to that printer.

**5** Click the Event Notification button if you want to configure event notification for this user.

See for more information.

**6** Click OK.

## Planning Your Printer Connections and Locations for Better Security

Depending on your organization's needs, the network administrator can attach printers directly to NetWare servers or to the network. Both types of setup can

provide security and administrative advantages. The ideal combination for each installation is different and will change as needs change. Be sure to consider the advantages of each approach when you set up your network.

Connecting the printer to the server places the two resources in close proximity to each other. If the server is in a secure location, this means that the printer is locked up with the server. This might be an advantage. For example, your company might use that printer to print confidential documents. Having the printer in a secure location protects these documents.Because most printers are already network-enabled, the most common type of network setup includes printers attached directly to the network. This allows the printer to be placed in a convenient location for all users, and places it away from the server for security reasons. Users who use the printer normally will not have access to the server console. Security is still maintained by requiring users to use a password to log in to the network before they can use the printer.

# Optimizing Security for NDPS Manager

Novell® Distributed Print Services™ (NDPS™) Manager security is ensured through the assignment of the Manager access control role.

## NDPS Manager Access Control Roles

The only access control role available for the NDPS Manager is that of Manager.

**Table 8     NDPS Manager Access Control Roles**

| Role | Description |
| --- | --- |
| Manager | NDPS tasks performed exclusively by the Manager are those that require the creation, modification, or deletion of NDS™ objects, or that involve other NDS administrative functions. Typical Manager functions include the following: <br><br> ◆ Creating Printer Agents and NDPS Manager objects <br><br> ◆ Adding or deleting Operators and Users for a printer <br><br> ◆ Adding other Managers <br><br> ◆ Configuring interested-party notification <br><br> ◆ Creating, modifying, or deleting printer configurations |

## Assigning the Manager Role for NDPS Managers

The following procedure explains how to make Manager assignments for your NDPS Manager objects.

1 From the NetWare Administrator browser's Object menu, select the NDPS Manager object you want to work with.

2 At the main NDPS Manager Details window, select Access Control.

The Printer Access Control dialog appears.

Three roles are available for printers: Managers, Operators, and Users. For NDPS Manager objects, only the Manager role is available.

3 Select the role you want to assign or remove access control rights for.

A current list of objects assigned to this role appears.

4 To add objects to this role, click Add. To delete objects, click Delete.

A browser appears from which you can select other objects.

5 Select the objects you want to add or delete and click OK.

# Optimizing Security for NDPS Brokers

Broker security is ensured through the assignment of the Manager access control role and by the optional assignment of a password to the Broker.

## Broker Access Control Roles

The only access control role you assign for the Novell® Distributed Print Services™ (NDPS™) Broker is that of Manager.

**Table 9    Broker Access Control Roles**

| Role | Description |
| --- | --- |
| Manager | NDPS tasks performed exclusively by the Broker Manager are those that require the creation, modification, or deletion of Broker objects, as well as those that involve other NDS™ administrative functions. Typical Manager functions include the following:<br><br>  &bull; Creating, modifying, and deleting Broker objects<br><br>  &bull; Adding other Managers<br><br>  &bull; Enabling or disabling brokered services<br><br>  &bull; Adding resources to the Resource Management Service<br><br>  &bull; Assigning or changing a Broker password |
| Public Access User | A public access user is a role assigned to all individuals on the network who are users of printers receiving services and resources provided by the Broker. This role is assigned by default and does not require specific administrative action by the Broker Manager. |

## Assigning Managers for NDPS Brokers

The following procedure explains how to make Manager assignments for your NDPS Broker objects.

**1** From the NetWare Administrator browser's Object menu, select the NDPS Broker object you want to work with.

**2** At the main NDPS Broker Details window, select Access Control.

The Broker Access Control dialog appears.

Only the Manager role is available for Brokers.

**3** Select the Manager role.

A current list of objects assigned to this role appears.

**4** To add objects to this role, click Add. To delete objects, click Delete.

A browser appears from which you can select other objects.

**5** Select the objects you want to add or delete and click OK.

## Assigning a Broker Password

You can assign or change the password for the NDPS Broker at the server console interface. To do so, press F4. An edit screen appears where you can

enter the new password. You must unload the Broker and then bring it back up after you change the password.

# Optimizing Printer Configurations

If you use configurations wisely, their use will help you manage your system more effectively. You can also create configurations that will help workstation users meet their specific printing needs efficiently and conveniently.

Configurations are properties assigned to a Novell® Distributed Print Services™ (NDPS™) Printer object that specify how the printer will handle print jobs. For example, configuration properties can specify the number of copies to print, event notification, what kind of media to use, job priority, banner instructions, and whether to hold or retain a job and for how long.

NDPS automatically assigns a Default Configuration to all NDPS Printer objects when they are created. However, administrators may modify that configuration or create new configurations for use by workstation users.

NDPS Printer objects can have multiple configurations. When a user installs a printer on his or her workstation, that user chooses one of those configurations. Each time a job with a particular configuration is submitted, the printer will handle the job according to the instructions contained in that configuration.

When a job is submitted, it inherits the properties of the installed printer's configuration. The configuration of the job can then be modified, if needed, by the job's owner or a printer Operator. When configurations are modified at the individual job level, additional configurable properties are available which are not included in the original configuration. For example, the job can be delayed, and advanced attributes can be viewed and modified.

For detailed information on using configurations, see the following discussions:

# Creating Configurations

Use the following procedure in NetWare® Administrator to create a new configuration based on the current Default Configuration.

**1** In NetWare Administrator, select the Novell® Distributed Print Services™ (NDPS™) Printer object for which you want to create a configuration.

The Printer Details page for that printer appears.

**2** Click the Configuration button.

The Configuration dialog appears. The Printer Configurations window in that dialog lists the Default Printer Configuration and any other configurations that have been created for this printer in NetWare Administrator.

**3** Click Create.

The Name Configuration dialog appears.

**4** Enter the name you want to assign to this configuration.

The Printer Configuration dialog appears, showing General, Job Holds, and Notification configuration tabs.

**5** Assign the configuration properties you want for print jobs.

For specific information about these tabs, refer to the online help or "Configuration Options" on page 127.

If you want to lock certain configuration properties so that workstation users cannot modify them, see "Setting Configuration Locks" on page 129.

**6** Click OK at the Printer Configuration dialog.

The Configuration view for the NDPS Printer Details page appears with the new configuration listed.

**7** Click OK at the NDPS Printer Details dialog.

Your new configuration will not be saved until you have done this.

For information about additional configuration optimization procedures, see the following:

- "Configuration Options" on page 127
- "Setting Configuration Locks" on page 129

# Configuration Options

The following list describes the configuration options available in Novell®
Distributed Print Services™ (NDPS™).

## General Properties

♦ **Copies.** The number of copies that will be printed for this configuration.

**Max Copies.** The maximum number of copies that a user can print using
this printer.

♦ **Priority.** The priority assigned to jobs using this configuration.

**Max Priority.** The maximum priority (Low, Medium, High) set by the
administrator for jobs using this printer. This setting determines when the
job will print in relation to other jobs with different priorities sent to this
printer.

♦ **Banner.** A list of banner pages users can select from. Banner pages will
be printed at the beginning of print jobs using the configuration. (If
multiple copies of a document are printed, the banner page will only be
printed at the beginning of the first copy.)

**NOTE:** If your client, printer, and server are not all configured for the same
language, you may experience problems with the output of your banner pages,
such as the job name being corrupted. If you are working in this type of mixed
environment, you should consider not using banner pages.

♦ **Medium.** The medium (form) on which jobs can be printed without
stopping the printer to mount a different medium (form). The default on
the printer is Any Medium, which allows jobs to be printed using the
currently mounted medium regardless of media specified in the job data.
If a medium is specified for this configuration, and a different medium
(anything other than Any Medium) is mounted on the printer, this
condition will cause the printer to pause for the given amount of time
(default is 15 minutes) or until the new media is mounted. If this Job Wait
Time expires, the job is placed on hold and returned to the spooling area.

Media are mounted by the administrator or Operator at the Printer
Control/Control pull-down menu of NetWare® Administrator.

## Job Hold Properties

♦ **Operator Hold.** Jobs do not print until the Operator releases them.

- **User Hold.** Jobs do not print until the user who submitted the job releases it.

- **Delay Printing Until.** Jobs do not begin printing until the time and date specified.

- **Pause Printer on Job Start.** Force the printer to pause at the beginning of jobs submitted using this configuration. The message entered is sent to the printer Operator. Only an Operator can release the pause. (By default, the printer will resume printing after a 15-minute pause if an Operator does not intervene. This setting can be changed at the server console by changing the Configuration setting Job Wait Time.)

- **Pause Printer on Job End.** Force the printer to pause after printing each job that is submitted using this configuration. The message entered is sent to the printer Operator. Only an Operator can release the pause. (By default, the printer will resume printing after a 15-minute pause if an Operator does not intervene. This setting can be changed at the server console by changing the Configuration setting Job Wait Time.)

- **Retain Job No Longer Than.** The maximum amount of time that jobs using this configuration can be retained after printing before being deleted (Minutes, Hours, Days, Years). By default, jobs are not retained.

- **Retain Job For.** The amount of time that a job using this configuration should be retained (regardless of when it is printed) until it is deleted (Minutes, Hours, Days, Years).

## Event Notification Properties

By specifying event notification for a printer configuration, you allow job owners to receive notification of printer or job events that occur during the processing and printing of a job. Notification configured in this way is sent by pop-up message box only.

Print job notification allows you to designate the event types for which notification messages should be generated (warnings, errors, or reports). For more information, see "Optimizing Event Notification" on page 131.

**NOTE:** In NetWare Administrator, administrators can use the Access Control feature to configure event notification for *interested parties*, that is, non-job-owners you wish to be notified of specific events. See "Configuring Interested-Party Notification" on page 134 for more information. At the workstation, individual users can use the Novell Printer Manager to configure event notification pertaining to their own jobs only. See "Configuring Job-Owner Notification" on page 133 for more information.

For information about specific configuration optimization procedures, see the following:

# Setting Configuration Locks

Properties of the Default Printer Configuration can be locked by the administrator to be nonconfigurable; that is, they cannot be modified or overridden by the user. Locked properties can be either of the following:

- **Maximum limits.** Certain properties, those that specify limits, are always locked: Maximum Copies, Maximum Priority, and Retain Job No Longer Than. Even if the Manager does not specify a limit for these properties, they are grayed out and inaccessible to users who are modifying their own configurations.

  These properties relate to a range in which the maximum value in that range is specified. For example, if the default configuration has a locked property limiting the maximum number of copies of a job that can be printed to five, any number of copies up to five is allowed, but a job calling for 10 copies will be rejected.

- **Individual locked properties.** Many properties are tied to a specific setting. For example, you can lock the priority of jobs to be printed using this configuration, or designate a specific banner page that must be used when jobs are submitted.

Once a default configuration property has been locked, it will be locked for all jobs submitted to that printer and for all new configurations created for that printer as well, whether that configuration has been created with NetWare® Administrator or by a workstation user when creating a new configuration for an installed printer.

Any job submitted to an old configuration must conform to the new locked property or the job will be rejected.

Use the following procedure to lock one or more properties for a printer.

**1** In NetWare Administrator, select the Novell Distributed Print Services™ (NDPS)™ Printer object you want to configure.

The main NDPS Printer Details window appears.

**2** Click the Control button.

A menu of printer control options appears.

**3** Select Set Defaults from the pulldown menu that appears.

The Printer Defaults configuration dialog appears.

**4** Set the configuration locks you want and then click OK.

The lock status of all properties that can be locked is shown by the icon. Click the lock icon next to the property.

For a detailed explanation of each configuration property, refer to the online help available at this dialog.

For information about additional configuration optimization procedures, see the following:

- "Creating Configurations" on page 126
- "Configuration Options" on page 127
- "Modifying Configurations" on page 130

## Modifying Configurations

To modify an existing configuration, complete the following procedure.

**1** At the main NDPS Printer Details window in NetWare® Administrator, click the Configuration button.

**2** In Printer Manager, select the printer you want to work with, then select the Printer/Configuration option.

The Configuration dialog appears. The Printer Configurations window of that dialog lists the Default Printer Configuration and any other configurations that have been created for this printer in NetWare Administrator.

**3** Highlight the configuration you want to modify and click Modify.

The Printer Defaults dialog appears, showing General, Job Holds, and Notification configuration tabs.

**4** Assign the configuration properties you want for print jobs.

For specific information about these tabs, refer to the online help or "Configuration Options" on page 127.

If you want to lock certain configuration properties so that workstation users cannot modify them, see "Setting Configuration Locks" on page 129.

**5** Click OK at the Printer Configuration dialog.

The Configuration view for the NDPS Printer Details page appears with the new configuration listed.

**6** Click OK at the NDPS Printer Details dialog.

Your changes will not be saved until you have done this.

For information about additional configuration optimization procedures, see the following:

- "Creating Configurations" on page 126
- "Configuration Options" on page 127
- "Setting Configuration Locks" on page 129

# Optimizing Event Notification

In NetWare® Administrator, administrators can configure event notification for interested parties, that is, users you wish to be notified of a defined printer or server event that occurs during the processing and printing of a job.

For example, the administrator for a specific printer (by default a Manager of that printer) can designate an Operator to be notified if the printer runs out of paper or if the toner is low.

## Notification Types

In NetWare Administrator, administrators can configure two types of event notification:

- **Job-owner notification.** In NetWare Administrator, you can configure event notification for job owners only through the printer's Configuration dialog. When notification is part of a configuration, the owner of a job submitted to a printer with that configuration will receive the notification specified. For more information, see "Configuring Job-Owner Notification" on page 133.

At the workstation, individual users can use the Novell® Printer Manager to configure event notification pertaining to their own jobs.

◆ **Interested-party notification.** In NetWare Administrator, you can use the Access Control Notification feature to configure notification to be sent to a printer's Managers, Operators, or other interested parties about specified events, normally those that require intervention of some kind.

Because this feature is tied to the Printer Access Control feature, it allows you to restrict the list of individuals who will be receiving this notification as narrowly as you wish. For more information, see "Configuring Interested-Party Notification" on page 134.

## Delivery Methods

The availability of the following delivery options are dependent on which of them you have enabled (see "Enabling Event Notification Delivery Methods" on page 184).

◆ **Pop-up notification.** Messages will pop up on the screen of individuals designated to receive them. Users designated for pop-up notification must have a default server defined in their User Environment specified in NetWare Administrator. They also must be currently authenticated to that server or they will not receive notification.

◆ **GroupWise® notification.** E-mail messages will be sent to the recipient through GroupWise, the Novell scheduling and messaging system. For detailed information, see "Enabling GroupWise Notification" on page 185.

◆ **MHS notification.** E-mail messages will be sent to the recipient through MHS (Message Handling Service).

◆ **SMTP notification.** Messages will be sent to the recipient through SMTP (Simple Mail Transfer Protocol) in IP-based systems.

◆ **Log file notification.** Messages are written to a file at a designated location on a NetWare server that the recipient has rights to. This is especially useful for keeping a record of printing events for auditing purposes (such as job completions, how often the toner ran out, etc.).

◆ **Programmatic notification methods.** Two programmatic notification delivery methods are shipped with NDPS: SPX™ and RPC.

◆ **Third-party notification methods.** The open architecture of Novell Distributed Print Services™ (NDPS™) allows third parties to develop additional delivery methods.

# Configuring Job-Owner Notification

Job-owner notification can be configured for specific print jobs or for printer configurations. This section provides procedures for each method.

## Notification for Specific Print Jobs

Configuring notification for a specific print job can be done as follows.

1 From the main Printer Control view of the printer's Details page, select Jobs/Job List.

   The Job List for that printer appears, showing all jobs currently scheduled for processing.

2 (Conditional) If you wish to see a list of jobs being retained and not currently scheduled for processing, click Show Retained Jobs.

3 Click Options, and select Configurations from the drop-down list.

   The Job Configurations tab window appears.

4 Click Notification.

   The Notification tab dialog appears.

5 Mark the notification methods and events you want.

   Use the online help available at that screen for detailed information about the available notification options.

## Notification for a Configuration

The following procedure explains how to configure job-owner notification by modifying an existing configuration. You can also configure job-owner notification when creating a new configuration.

1 In NetWare® Administrator, select the printer that you want to configure.

   The NDPS Printer Details window appears.

2 Click the Configuration button.

   The Configuration dialog appears. The Printer Configurations window lists the Default Printer Configuration and any other configurations that have been created for this printer in NetWare Administrator.

3 Highlight the configuration you want to modify and click Modify.

The Printer Defaults dialog appears, showing General, Job Holds, and Notification configuration tabs.

**4** Click the Notification tab.

The Notification dialog appears, displaying an icon for each notification method currently loaded.

**5** Click the icon representing the method you want to use.

**6** Mark the notification methods and events you want.

Use the online help available at that screen for detailed information on the available notification options.

**7** Click OK at the Printer Configuration dialog.

The Configuration view for the NDPS Printer Details page appears with the new configuration listed.

**8** Click OK at the NDPS Printer Details dialog.

Your changes will not be saved until you have done this. A user can now install this printer with this configuration option selected.

# Configuring Interested-Party Notification

The following procedure allows you to specify the users who will receive event notification for a Novell® Distributed Print Services™ (NDPS™) Printer object, the method of notification, and the types of events they will receive notification for.

**1** In NetWare® Administrator, select the Printer you want to configure.

The NDPS Printer Details window appears.

**2** Click the Access Control button.

The Printer Access Control dialog appears.

Three roles are available: Manager, Operator, and User.

**3** Select the role you want to configure Access Control notification for.

A current list of objects assigned to this role is then listed.

**4** Highlight the object you want to configure notification for and click Notification.

The Notification dialog appears, displaying an icon for each notification method currently loaded.

**5** Click the icon representing the method you want to use.

**6** Mark the notification methods and events you want.

Use the online help available at that screen for detailed information on the available notification options.

# Optimizing Print Job Spooling

Although Novell® Distributed Print Services™ (NDPS™) has eliminated the need to send print jobs through queues, jobs submitted to NDPS printers will often need to be stored somewhere when the printer is already processing other jobs or when the job is on hold or retain status. Job spooling allows you to specify where you want jobs to be stored while they await processing.

By default, the spooling area for a printer is located on the same volume as the database for the NDPS Manager supporting that printer. However, the Spooling Configuration option allows you to spool jobs to a different location through the following procedure.

Job spooling as used by NDPS offers greater simplicity and management convenience than queue-based printing. In NDPS, spooling requires only that a directory be designated where jobs can be stored while awaiting processing.

You can modify job spooling at any time, even when a job is already being processed.

The following procedure explains how to optimize job spooling.

**1** In NetWare® Administrator, select the Printer that you want to work with.

The NDPS Printer Details window appears.

**2** From the Printer Control view of the main printer Details page, select the Jobs/Spooling Configuration option.

The Spooling Configuration dialog appears.

**3** Provide the required spooling information.

You can configure the following:

   ◆ **Location.** Specify the path where print job data will be stored while waiting to be printed. By default, the spooling area for a printer will be located in the same volume as the database for the NDPS Manager supporting that printer.

- **Disk space.** Specify the maximum amount of disk space allowed for spooling. Be sure to set aside sufficient space for the maximum amount of data you expect to be awaiting printing at any one time. If the maximum is exceeded, the excess will be spooled to the job owner's workstation until space becomes available.

- **Scheduling algorithm.** Specify the scheduling algorithm to be used to determine the order in which jobs will be printed.

- **Print queues to be serviced.** Specify print queues to be serviced by this printer, if any.

    If your network includes clients like Macintosh* and OS/2* that require the use of print queues, the backward compatibility of NDPS allows these clients to submit jobs to the same queues they always have. Then the Printer Agent can retrieve jobs from these queues and print them.

# Optimizing NDPS Brokered Services

Novell® Distributed Print Services™ (NDPS™ ) allows you to optimize the distribution and implementation of the Broker and the services it provides in a number of ways, which are discussed in the following sections:

Through the Broker, NDPS provides three network support services not previously available in NetWare® . For information about each service, see the following discussions:
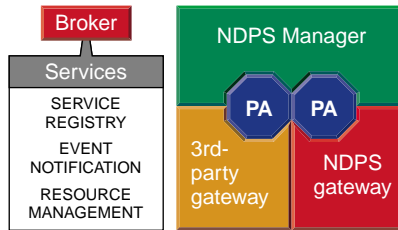
While these services are invisible to end users, administrators should be aware of them.

## Optimizing Distribution of Your Brokers

NDPS allows you to customize your printing setup for maximum efficiency. When NDPS determines that a new Broker should be created during the normal NDPS installation process, it will automatically create a new Broker object in the server's container. However, you may occasionally want to change the location of one or more Brokers. For example, you may want a Broker to be in a different NDS™ container. If you want to change the location of a Broker after it has been created during installation, you can use NetWare Administrator to move the Broker object into the desired container, provided you have Supervisor or equivalent rights to the new container.

You may also want to create new Brokers in some situations. For example, you may want to create a Broker on a local server for each site on a wide-area network (WAN). If your network is large and/or geographically spread out, and you add several additional servers, it is usually advisable to create additional Brokers so that services are not stored more than three router hops from the Printer Agent being serviced. This reduces network traffic and enhances overall printing performance.

In addition to creating Brokers, you can also reconfigure an existing Broker. Because Broker resources require disk storage space, CPU cycles, and memory, you might want to move some resources to a different location. You can also turn off one or more services if you don't use them in order to minimize the number of license connections they require.

**NOTE:** When NDPS is installed on a server, certain conditions affect whether a Broker will be created automatically on the tree. For more information, see "Setting Up NDPS on Your Servers" on page 71.

# Optimizing Distribution of Your Brokered Services

The following tables provide guidelines for determining the optimal implementation of your NDPS brokered services.

**NOTE:** Both the Event Notification Service and the Resource Management Service, when enabled on a server, require separate license connections.

**Table 10**  **When and Where to Enable the Service Registry Service**

| Issue | Recommendations or Considerations |
|---|---|
| Reliability of server (fault tolerance) | On multi-server networks, enable at least two Service Registries per network. |
| Network traffic (network layout) | Enable at least one Service Registry on each side of a wide-area link. |
| Memory | Allow at least 1MB of RAM for the Service Registry Service (SRS). |
| | Allow approximately 10KB of memory for each loaded service or resource (NDPS Manager, ENS, etc.) on a server. |

**Table 11**  **When and Where to Enable the Resource Management Service**

| Issue | Recommendations or Considerations |
|---|---|
| Number of trees | Enable at least one Resource Management Service per tree. |
| Reliability of server (fault tolerance) | On multi-server networks, enable at least two Resource Management Services per tree. Be sure to keep the databases synchronized after you have created them. |
| Disk space | Allow 50MB for each Resource Management Service to ensure adequate space for resources added in the future. Size may vary considerably depending on the number of languages, platforms, and drivers your system supports. |
| License connection | One license connection is required when enabled on a server. |

**Table 12**  **When and Where to Enable the Event Notification Service**

| Issue | Recommendations or Considerations |
|---|---|
| Number of trees | Enable at least one Event Notification Service per tree. |

| Issue | Recommendations or Considerations |
|-------|-----------------------------------|
| Reliability of server (fault tolerance) | On multi-server networks, enable at least two Event Notification Services per tree. |
| Availability of methods | Make sure that the methods you need are enabled for each ENS you have enabled. Novell provides NetWare pop-up, log file, e-mail (GroupWise®, MHS, and SMTP), and programmatic methods. Third parties can develop other types of notification methods. |
| Performance | Monitor sluggish response and enable additional notification services as needed. |
| License connection | One license connection is required when enabled on a server. |

# Creating a New NDPS Broker

You should create a Broker object on as many servers as necessary to eliminate an excessive number of hops (normally more than three) in order to reduce network traffic and optimize network printing performance.

Note that only one Broker can be loaded on a server.

## Prerequisites

- To install a new Broker, you must have at least Read, Write, Modify, and Create rights for the container in which the Broker will be created.

- If a Broker is already loaded on this server, you need to unload it at the server console before you can load the new one and enable its services.

- You will need to have an existing Resource Management Service database directory to point to when you specify the volume for the RMS during this process. The path you specify must point to a directory that currently exists and that already contains resources. (The RMS data storage area must not have a directory name that is longer than 8 characters or includes invalid characters.) If you point to an empty directory, you will receive an error message from the server when loading the Broker saying that the Broker cannot be enabled. (You can copy resources from another RMS to this directory if you wish.)

## Procedure

The following procedure lets you create a Novell® Distributed Print Services™ (NDPS™) Broker object.

**1** In NetWare® Administrator, select the container where you want the NDPS Broker object to reside.

**2** From the Object menu, select Create.

The New Object dialog appears.

**3** Click NDPS Broker.

The Create NDPS Broker Object dialog appears.

**4** Type a name of your choice in the NDPS Broker Name field.

The name must be unique and follow the naming conventions for NDS™.

**5** Mark the support services you want to have enabled on the new Broker.

Normally, you will want to enable all of the available services. For guidelines, refer to the tables in "Optimizing Distribution of Your Brokered Services" on page 138.

**6** Specify the volume and the path where you want the RMS to look for this Broker's resources.

   **6a** Select the volume from which the Resource Management Service will be accessed.

   The directory for the RMS must reside on this volume.

   **6b** Specify the directory path for the Resource Management Service you will be using (default is ndps\resdir).

**7** Mark the Define Additional Properties box if you want to enter information you can use later to help you search for and manage network services and resources.

**8** Click Create.

If you marked the Define Additional Properties box, the NDPS Broker Identification dialog appears.

**IMPORTANT:** If a Broker is already loaded on this server, you need to unload it before you can load the new one and enable its services. You will not be able to perform the following steps until this new Broker is running.

**9** Enter information in the Identification dialog.

The information you enter, such as Description and Location, can later help you search for and manage network resources.

**10** If you want to configure the Access Control list, click Access Control and add or remove users from the Managers list.

See "Assigning Printer Access Control Roles through NDPS Printer Objects" on page 120 for more information.

**11** If you want to change the status of your Service Registry (Disable/Enable), click Service Registry Service.

See "Enabling and Disabling Brokered Services" on page 143 for more information.

**12** If you want to load or unload Event Notification methods, click Event Notification.

See "Enabling Event Notification Delivery Methods" on page 184 for more information.

**13** If you want to modify the resource path you specified in Step 6 on page 140, or add resources to the resource database, click Resource Management.

For more information, see "Understanding the Resource Management Service" on page 38 and "Adding or Updating Brokered Resources" on page 177.

**NOTE:** The new Broker is automatically assigned Supervisor rights to the Remote Management Service you specified when the Broker was created. However, if you change the RMS for a Broker after it has been created, you may need to assign it rights to that area.
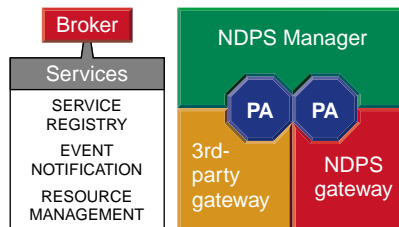


# Reconfiguring an NDPS Broker

A Novell® Distributed Print Services™ (NDPS™ ) Broker is usually created automatically during installation of NDPS. In most instances, the default configuration for the three support services it provides will result in satisfactory performance. However, in certain circumstances you might want to change that configuration. Here are a couple of examples:

◆ As you gain experience with your NDPS setup, you might want to reconfigure the default properties assigned to the Broker.

◆ If disk space on your volume is limited, you might want to move the managed resources database accessed by the Resource Management Service to a different volume on the same server or to a different server in the same NDS™ tree where more disk space is available. (The default location for the RMS resources is *server*\sys:ndps\resdir.)

## Prerequisites

◆ To reconfigure a Broker, you must have at least Read, Write, and Modify rights for the container in which the Broker resides.

◆ If you change the location of your Resource Management Service database, you will need to have rights to the new location.

◆ If you change the location of your Resource Management Service database, you will need to have an existing Resource Management Service database directory to point to when you specify the volume for the RMS during this process. The path you specify must point to a directory that currently exists and that already contains resources. (The RMS data storage area must not have a directory name that is longer than 8 characters or includes invalid characters.) If you point to an empty directory, you will receive an error message from the server when loading the Broker saying that the Broker cannot be enabled. (You can copy resources from another RMS to this directory if you wish.)

## Procedure

The following procedure explains how to reconfigure an existing Broker object or move your brokered resources to a different location.

1 In NetWare® Administrator, select the Broker object you want to reconfigure.

The Broker's Identification dialog appears.

2 If you want to change the location of your resources, do the following:

2a Click Resource Management.

2b Type in the Resource Path you want to use for storing these resources.

You may need to assign the Broker all rights (or Supervisor rights) to the new area.

3 If you want to modify the Access Control list, click Access Control and add or remove users from the Managers list.

See "Assigning Printer Access Control Roles through NDPS Printer Objects" on page 120 for more information.

**4** If you want to enable or disable your Service Registry, click Service Registry Service.

See "Enabling and Disabling Brokered Services" on page 143 for more information.

**5** If you want to load or unload Notification methods, click Event Notification.

See "Enabling Event Notification Delivery Methods" on page 184 for more information.
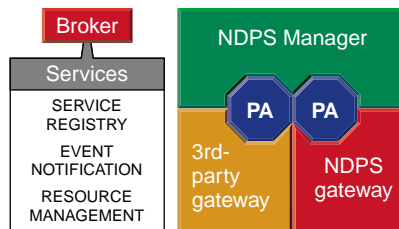


# Enabling and Disabling Brokered Services

When Novell® Distributed Print Services™ (NDPS™) is initially installed, the three network services provided by the NDPS Broker are automatically enabled on the Broker object. As your printing needs grow or change and you add additional Brokers to your network, you might want to disable certain services provided through a Broker on a specific server and allow them to be provided through a different Broker (to save disk space on the first server, for example), or you might want to enable services on a Broker that are currently disabled. This procedure explains how these tasks are performed.

**1** In NetWare® Administrator, select the Broker object you want to work with.

The Broker's Identification dialog appears.

**2** Click the button for the service you want to enable or disable.

The dialog for that service appears.

**3** At the *Service* Status line, select either Enable or Disable.

The service is now either enabled or disabled. If disabled, services will need to be provided by a different Broker.

Printer Agents using the services that were disabled will automatically search for another Broker on the network that will provide these services, so normally these printers should continue to be available for processing jobs.

However, if you want to specify a preferred Broker for a Printer Agent to use for these services, you must do this from each NDPS printer's Printer Control page in NetWare Administrator by selecting Features/Services.

**NOTE:** If a Broker is unloaded, and then is brought back up, Printer Agents that have designated that Broker as their preferred service provider will not be automatically reconnected to it. In order to reconnect to the preferred service provider, you must either unload each Printer Agent and bring it back up, or unload the NDPS Manager that controls the affected Printer Agents and bring it back up, thus bringing up all the Printer Agents with it.

**NOTE:** If the Resource Management Service cannot be enabled, check for one of the following problems:

a. The Broker object does not have rights to access the RMS data storage area (the default is ndps\resdir). Use NetWare Administrator to grant all (or Supervisor) rights to the Broker for that subdirectory.

b. The RMS data storage area has a directory name that is longer than 8 characters or includes invalid characters.
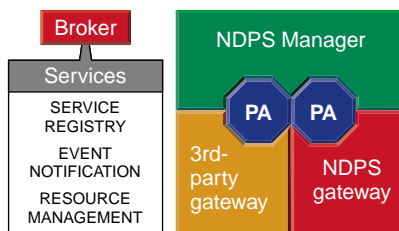


# Optimizing Fault Tolerance

The Novell® Distributed Print Services™ (NDPS™) Manager uses a database to store information about the printers it controls. This database can be backed up on the server on which it is running, or it can be backed up and replicated in NDS™.

Backing up the database on the server on which it is running will provide some protection in cases where the original database is corrupted or is accidently

deleted for some reason. However, if the server containing the database abends or becomes otherwise unavailable, the Printer Agents controlled by that NDPS Manager will also be unavailable, and users will not be able to print until the server is restarted or reconnected. Depending on the circumstances, this can result in a relatively minor inconvenience or a major work disruption for your users.

You can greatly enhance the fault tolerance of the NDPS Manager database by backing it up to NDS. through the automatic database backup configuration options available at the server console. This procedure ensures that the database image will be backed up to NDS whenever the NDPS Manager is unloaded or when the database is backed up (the default is once a day). Then, after failing to load the database through normal mechanisms, you can retrieve the database from NDS and load the NDPS Manager on any other server in the NDS tree.

**NOTE:** You cannot restore a database from NDS to the same server that it was backed up from. In order to restore a database from NDS to its original source server, you must first restore it to a different server, then back the database up to NDS from that server. You can then restore it to its original server.

## Configuring Fault Tolerance

The following procedure explains how to configure fault tolerance for the NDPS Manager:

**1** At the server console, go to the Available Options menu for the NDPS Manager.

**2** Select NDPS Manager Status and Control.

The NDPS Status and Control menu appears.

**3** Select Database Options.

The Database Options menu appears.

**4** Select Backup Database Options.

The Database Backup Options dialog appears.

**5** Select Yes at the Enable Auto Database Backup and Backup Database to NDS options.

The Enable Auto Database Backup option is used to turn the auto backup of the database on or off. The first auto backup will occur the first time the start hour is reached.

The Backup Database to NDS option is used to determine whether the database is backed up in NDS. Backing up the database in NDS gives the NDPS Manager more fault tolerance by allowing the database to be restored on another server.

You can also modify the default Backup Start Hour and Days Between Backup settings if you wish.

**6** Escape out to the Available Options menu.

## Restoring a Database from NDS

A database backed up to NDS can be restored to any server other than the one it was backed up from.

**1** At the server on which you want to restore the database, load NDPSM.NLM.

A display screen appears, listing all NDPS Manager objects in the current context. You can also browse in other contexts for NDPS Manager objects that are installed on this server.

**2** Select the name of the NDPS Manager whose database you want to restore.

A message will appear saying that the NDPS Manager you selected is not on this server and that its database must be moved.

A Move Database? choice box appears.

**3** Select Yes.

The Select Database Source menu appears. If the server with the original database is up and running, its name will appear in this menu. If the server is down, no server name will appear here. The only Source option available will be NDS (existing jobs will be lost).

**4** Select the source of the backup you want to restore.

In most cases, you will be selecting NDS as the source.

You will be prompted to select a volume.

**5** Select the volume where you want the database placed.

The restored database is then copied to the location you selected.

# 5 Managing

Novell® Distributed Print Services® (NDPS®) provides an extensive array of management features through NetWare® Administrator, the NDPS server console, and the Novell Printer Manager workstation utility.

Through NetWare Administrator, you can create and configure printers and designate them to be installed automatically for all user workstations. NDPS provides a printer driver database that includes drivers from many common printers. You can add drivers to this database as they become available so that they can be automatically downloaded when needed.

Your users can also install printers manually at their workstations with the graphical Novell Printer Manager utility. They can use this utility to manage those printers as well.

NDPS also allows you to manage print jobs for all of your users from NetWare Administrator, while the Novell Printer Manager allows job owners to manage their own jobs.

Managing your NDPS system resources and services can also be done through NetWare Administrator. For example, you may occasionally want to enable or disable your brokered services for NDPS and to add resources to the Resource Management Service database. You can also configure your NDPS Manager to help you better manage your Printer Agents. Information about all of these tasks is included in this section.

## Installing Printers on Workstations

You can install printers on Novell® Distributed Print Services™ (NDPS™) workstations in any of the following ways:

- By designating printers to be automatically installed on user workstations through the Remote Printer Management feature available in NetWare® Administrator. See "Using Remote Printer Management" on page 151 for more information.

- By allowing workstation users to install printers on their workstations by using the Novell Printer Manager. See "Installing NDPS Printers Manually on Workstations" on page 149 for more information.

- By allowing Windows* 95* and Windows NT* workstation users to install printers on their workstation by using the Windows Add Printers wizard in the Windows Printers folder.

**NOTE:** Certain drivers (mostly older drivers) will not work when the printer name/port name has a long name (32 characters or more).  The port name looks something like \\TREE_NAME\SERVER_NAME\*installed printer name*.

To resolve this problem for NDPS, a new flag has been added to the registry for Windows 95 and Windows NT that will allow for printer names to be less than 31 characters in length so that old applications can still print. The key is as follows:

HKEY_LOCAL_MACHINE\Software\NDPS\RPM\TruncatePrinterNames

0 = use long names

1 = truncate the printer names

## Designating Printers to be Automatically Installed

While NDPS allows users to download and install printers on their workstations, it also allows administrators to designate printers to be downloaded and installed automatically. These printers then appear on the user's installed printers list with no action required by the user.
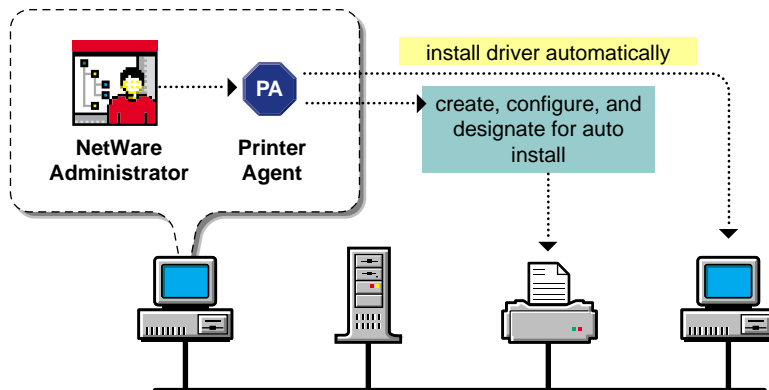
From NetWare Administrator an administrator can create and configure printer objects and designate printers to be automatically installed on user workstations.

You can designate a printer to be installed automatically by using the Remote Printer Management feature in NetWare Administrator. See "Using Remote Printer Management" on page 151 for more information.

**NOTE:** When an NDPS printer is installed on a Windows 3.*x* workstation, the descriptive NDPS name for the printer appears in the main Novell Printer Manager window, but does not appear in the native Windows Print Manager window. Instead, the Windows Print Manager identifies the printer with driver and port information rather than by its NDPS name. This may cause some confusion for your Windows 3.*x* users.

## Installing NDPS Printers Manually on Workstations

A printer must be installed on a user workstation before a user can print to it. The following procedure allows a user to install an NDPS printer on a user workstation with the Novell Printer Manager utility.

You may also designate printers to be installed automatically. See "Designating Printers to be Automatically Installed" on page 148 for more information.

For information about configuring printers that service queues, see "Supporting Queue-Based Client Workstations" on page 164.

**NOTE:** You can also use the Windows Add Printers wizard in the Windows Printers folder to install NDPS printers on Windows 95 and Windows NT workstations.

**1** Run the Novell Printer Manager from Windows.

Make sure you have a search drive mapped to *server*\sys:public, where *server* is the name of the server where the NDPS server components are installed.

◆ If you are running Windows 3.*x*, execute

    *search drive*:\public\nwpmw16.exe

◆ If you are running Windows 95 or Windows NT, execute

    *search drive*:\public\win32\nwpmw32.exe

**2** From Printer Manager's Printer pull-down menu, select New.

The Novell Printers dialog appears, displaying a list of installed printers (if any printers were previously installed on the workstation).

**3** Click Add.

A list of available printers appears.

You may browse for additional printers in other containers of the NDS® tree.

**NOTE:** The list of available printers shows the NDPS public access printers on the network and the NDPS controlled access printers in your current NDS context. To see controlled access printers in different NDS contexts that you have rights to, click the Browse button and select a different context.

**4** Select the printer you want and click Install.

The Novell Printers—Install dialog appears. You may modify the printer name that appears and select a pre-defined configuration.

**5** Click OK.

The default driver for that printer is then automatically downloaded.

If the driver you need is not found, see "Adding or Updating Printer Drivers" on page 182 for more information.

**NOTE:** If the default driver is not the one you want, you can change it through the Configuration tabs.

The Novell Printers dialog appears with the new printer appearing in the installed list.

**6** Click Close.

The printer appears in the main Printer Manager window and is available for print jobs.

**NOTE:** When an NDPS printer is installed on a Windows 3.*x* workstation, the descriptive NDPS name for the printer appears in the main Novell Printer Manager

window, but does not appear in the native Windows Print Manager window. Instead, the Windows Print Manager identifies the printer with driver and port information rather than by its NDPS name. This may cause some confusion for Windows 3.*x* users.

# Using Remote Printer Management

While Novell® Distributed Print Services™ (NDPS™) allows users to download and install printer drivers on their workstations, the Remote Printer Management feature also allows administrators to designate printers to be downloaded and installed automatically. These printers then appear in the Windows Printer Folder for the user's workstation. Administrators can also use this feature to remove printers, assign a printer to be the default printer, and update printer drivers from the NDPS Resource Management Service database (resdir).

**NOTE:** Remote Printer Management replaces the PSETUP utility that was shipped with the initial release of NDPS.

## How Remote Printer Management Works

After a printer has been designated for automatic installation on a user's workstation, this information is stored on the NDS™ container object where the administrator has configured it. When a user logs in after the machine is rebooted, the workstation's client software checks the container object where the User object resides for the Remote Printer Management configuration. The client software compares "time stamps" stored on the workstation and in NDS to determine whether any changes have occurred. If the time stamp is different, action is taken, and the printer list on the client is automatically updated to match the printer list maintained by NDS on the container.

- If the client finds a printer designated for installation that has not yet been installed, it is automatically installed.

- If a currently installed printer is added to the Printers to Remove list, that printer will be uninstalled automatically.

- If you designate a different printer to be the default in the Remote Printer Management list, the change will be automatically made on each client when it logs in.

- If the "Do not update workstations control is checked, you can update the Remote Printer Management configuration, but no changes will occur on the workstation.

◆ A log file named dprpmlog.txt is created in the *drive*:/windows directory of each workstation where Remote Printer Management has installed one or more printers. This log file is limited to 5 KB and can be turned off in the Windows Registry. (Type regedit, then select HK_KEY_LOCAL_MACHINE/SOFTWARE/NDPS/RPM and set the error log setting to 0 to disable it.) You can only do this after you have used the Remote Printer Management tool.

◆ When you install a printer using Remote Printer Management or the Novell Printer Manager, its installed name will be limited to no more than 31 characters (including the periods). The name will be broken off at a logical point from the beginning of the installed name. This will not affect the ability of the printer to service jobs.

The reason that names are limited to this length is that some applications cannot handle printer names of over 31 characters.

## Accessing Remote Printer Management

Remote Printer Management can be accessed in any of the following ways. Somewhat different functionality is available at each location.

◆ **From the Tools menu in NetWare® Administrator.** By selecting the NDPS Remote Printer Management option from this menu, you can manage printers in all containers to which you have Supervisor rights on the container object.

◆ **From the Details page for the Container object.** By pressing the NDPS Remote Printer Management button from this page, you can manage printers for this container only.

◆ **From the Details page for a specific printer.** By pressing the NDPS Remote Printer Management button from this page, you can remotely manage that printer.

◆ **From the Public Access Printers view under the Tools menu.** By highlighting a printer and selecting the Object/Details option, you can access the Printer Control page for that printer. Then, by pressing the NDPS Remote Printer Management button from this page, you can remotely manage that printer.

# Managing NDPS Workstation Printing

The following sections describe several of the important workstation management features of Novell® Distributed Print Services™ (NDPS™).

- "Designating a Default Printer" on page 153
- "Using the Novell Printer Manager Workstation Utility" on page 154
- "Managing Access to the Novell Printer Manager" on page 155
- "Filtering to Find Printers with Certain Characteristics or Features" on page 156
- "Managing Installed Printers at User Workstations" on page 158
- "Printer and Job Configuration Options" on page 161
- "Supporting Queue-Based Client Workstations" on page 164

# Designating a Default Printer

When you use the Remote Printer Management (RPM) feature to designate a printer for automatic installation on each user workstation, you can also designate that printer to be the default for users in the same context (container). This way, the user never has to install or configure that printer or designate it as the default. Instead, a configured default printer is installed automatically on each workstation.

The assignments made through the RPM are limited to the specific container. They do not flow down to subcontainers.

Even though you designate a printer as the default, users may specify a different default printer if they wish.

The following sections describe other important workstation management features of Novell® Distributed Print Services™ (NDPS™).

- "Using the Novell Printer Manager Workstation Utility" on page 154
- "Managing Access to the Novell Printer Manager" on page 155
- "Filtering to Find Printers with Certain Characteristics or Features" on page 156
- "Managing Installed Printers at User Workstations" on page 158
- "Printer and Job Configuration Options" on page 161

# Using the Novell Printer Manager Workstation Utility

The Novell® Printer Manager allows workstation users to manage all of their Novell Distributed Print Services™ (NDPS™) printing tasks including printer installation, customized printer configuration, and print job management.

Users may also use the Printers folder in Windows* 95* and Windows NT* to add NDPS printers and perform certain printer management tasks.

**NOTE:** If you do not want workstation users to have the ability to perform NDPS printer management tasks themselves, see "Managing Access to the Novell Printer Manager" on page 155.

Novell Printer Manager provides a graphical display of all of the NDPS printers that are currently installed on a workstation. Through an easy-to-use graphical interface, users can add and configure additional printers to their installed printers list.

When a user adds a printer to the workstation, the corresponding printer driver is automatically installed on that workstation. Administrators can specify printers to be added automatically to workstations through the Remote Printer Management feature of NDPS (see "Designating Printers to be Automatically Installed" on page 148).

**NOTE:** When you create a Printer Agent, if you select (None) when prompted to choose a printer driver, the workstation user will be prompted for one before the printer can be installed on that workstation.

Users can view real-time status and configuration information about their printers and print jobs and receive event notification for their print jobs. Feedback that they can receive includes information about the following:

- ◆ A printer's status
- ◆ A printer's characteristics and properties
- ◆ A printer's features
- ◆ Printer events that require operator intervention (such as low toner, empty paper tray, or jammed feed mechanism)
- ◆ A print job's status
- ◆ A print job's characteristics and properties

Users can also use the Novell Printer Manager to move, copy, reorder, and delete their own print jobs. See for more information.

The following sections describe other important workstation management features of NDPS.

# Managing Access to the Novell Printer Manager

Several options are available to help administrators manage user access to the Novell® Printer Manager. Depending on the particular environment you are working in, you may want to allow clients full access to the Printer Manager, or you may not want them to have any access at all.

The available options are described in the following sections.

## Restricting Access by Moving NWPM Files

During installation, the executable files for the Novell Printer Manager are placed in the sys:public directory (nwpm16.exe for Windows* 3.*x*) and sys:public\win32 (nwpm32.exe for Windows 95* and Windows NT*), so by default all users have access to them. If you do not want your users to manage their own printers through the Novell Printer Manager, the easiest way to prevent them from doing so is to move these files to a different folder and restrict rights to that folder.

## Managing Access with the Application Launcher

Application Launcher™, a component of Z.E.N.works™, lets you work with applications as objects in the NDS™ tree. This lets you distribute applications such as the Novell Printer Manager to users' Windows 3.*x*, 95, or NT workstations.

Using the Application object's numerous property pages, you can centrally manage a wide variety of application settings. For example, you can set up applications so they force run; install only; grant file rights; run according to a specified schedule; update Registry, .ini, configuration or application files; change icons and shortcuts; or terminate themselves. Not only can Application Launcher update secure Windows NT servers and workstations, it is also compatible with Windows roaming profiles so that users see the same distributed applications no matter where they log in. You can set up folders in which to store applications on the workstation. By associating Application objects with a user or container, you can control which users get applications. You can also put applications in the Application Launcher Window or in various parts of the Explorer, including the Start Menu, System Tray, and Desktop. Application Launcher is easy to use and set up, yet gives nearly complete control of distributed applications.

The following sections describe other important workstation management features of NDPS.

# Filtering to Find Printers with Certain Characteristics or Features

The filtering feature available in the Novell® Printer Manager provides a convenient method for locating Novell Distributed Print Services™ (NDPS™) printers with specific characteristics. This feature allows users to search among the following types of printers for the characteristics or capabilities they desire:

- NDPS controlled access printers in the selected context
- NDPS public access printers anywhere on the network

**Color 1**

**Color 2**

**Which printers support color?**

**1**

**2**

**List of color printers returned**

**Line Printer 1**        **Color 1**        **Color 2**
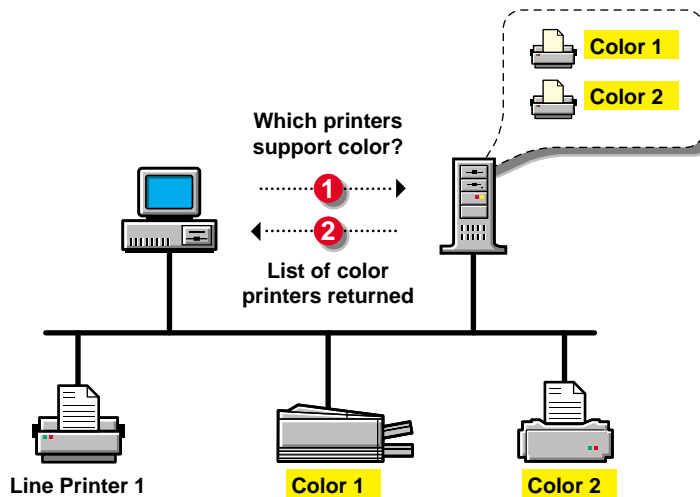
To use this feature, users should do the following:

**1** Run the Novell Printer Manager from Windows*.

Make sure you have a search drive mapped to *server*\sys:public, where *server* is the name of the server where the NDPS server components are installed.

◆ If you are running Windows 3.*x*, execute

   *search drive***:\public\nwpmw16.exe**

◆ If you are running Windows 95* or Windows NT*, execute

   *search drive***:\public\win32\nwpmw32.exe**

**2** From Printer Manager's Printer pull-down menu, select New.

The Novell Printers dialog appears, displaying a list of installed printers (if any printers were previously installed on the workstation).

**3** Click Add.

A list of available printers appears. You may browse for additional printers in other containers of the NDS™ tree.

**4** Click Filter.

The Novell Printers—Filter dialog appears. Types of characteristics you can choose from include Printer Type, Location, Description, Duplex Capability, Minimum Resolution, Color, and Minimum Speed.

**5** Select the features you want the printer to have and click OK.

A list of printers with the features you chose appears. If no printers with these features exist, the list box will remain blank.

**6** Select the printer you want and click Install.

The Novell Printers—Install dialog appears. You may modify the printer name that appears and select a pre-defined configuration.

**7** Click OK.

The default driver for that printer is then automatically downloaded.

If the driver you need is not found, see "Adding or Updating Printer Drivers" on page 182 for more information.

**NOTE:** If the default driver is not the one you want, you can change it through the Configuration tabs.

The Novell Printers dialog appears with the new printer appearing in the installed list.

**8** Click Close.

The printer appears in the main Printer Manager window and is available for print jobs.

The following sections describe other important workstation management features of NDPS.

- "Designating a Default Printer" on page 153
- "Using the Novell Printer Manager Workstation Utility" on page 154
- "Managing Access to the Novell Printer Manager" on page 155
- "Managing Installed Printers at User Workstations" on page 158
- "Printer and Job Configuration Options" on page 161
- "Supporting Queue-Based Client Workstations" on page 164

# Managing Installed Printers at User Workstations

Novell® Printer Manager allows users to manage installed printers from their Windows* 95*, Windows NT*, and Windows 3.*x* workstations.

The following sections describe how to perform several important printer management tasks from user workstations:

- "Customizing Configurations at a User Workstation" on page 159

## Customizing Configurations at a User Workstation

After a printer is installed, users can use the printer configurations that the administrator creates or they can customize them to meet their specific printing needs. They may modify any properties of an existing configuration that are not locked by an administrator.

For example, users can install a printer named Progress Report and modify its configuration so that it will automatically print three copies of the report with a banner page preceding the job.

In Novell Distributed Print Services™ (NDPS™), a printer can have multiple configurations. Configurations can be created in three ways:

◆ By the administrator creating multiple NDS™ Printer objects to represent the printer. This allows different user groups to have different access rights to the printer.

◆ By the administrator creating the configuration for a printer in the list of available printers that can be installed to your workstation.

◆ By the workstation user, who can modify the configuration for an installed printer. Users can also reinstall the printer multiple times using a unique printer name each time.

Users can use the printer configurations that the administrator creates or they can customize them to meet their specific printing needs. Users may modify any properties of an existing configuration that are not locked by the administrator. This procedure is described below.

**1** From the main Novell Printer Manager window, select the printer you want to modify.

**2** From the Printer pull-down menu, select Configuration.

The Installed Printer Configuration dialog for that printer appears.

**3** Select the tab(s) corresponding to the types of properties you wish to view or modify.

**4** Select the properties you want from these tab pages and click OK.

For a complete list of features you can modify in a printer's configuration, see .

## Viewing Printer Information at a User Workstation

To view information about a specific installed printer, users should follow this procedure:

1 From the Novell Printer Manager window, select the desired printer.

2 From the Printer pull-down menu, select Information.

The Printer Information dialog shows the current status and state details about the printer you chose.

- ◆ **Status.** Information including whether there is a problem with the printer. If so, the main problem is listed here.

- ◆ **State Details.** A complete description or list of the problems that exist.

Information about the following items also is shown in this dialog:

- ◆ **Printer Name.** The name given to the printer by the administrator when it was created.

- ◆ **Installed Name.** The name you entered when installing the printer.

- ◆ **Number of Jobs.** Jobs waiting to be printed.

- ◆ **Description.** Information that might have been provided by the administrator about this printer.

- ◆ **Location.** Information that might have been provided by the administrator about this printer.

- ◆ **Context.** The NDS context or other specifier.

- ◆ **Port.** Assigned by NDPS.

- ◆ **Default Printer.** Yes or No.

## Changing the Driver for an Installed Printer

Occasionally you may need to change the driver originally selected for a printer already installed on a workstation. For example, the manufacturer may have updated the driver, or you may want to substitute a PostScript* driver for a non-PostScript driver. For non-English-speaking workstation users, you may want to substitute drivers in the correct language for the default English drivers.

You can change the driver for an installed printer either through the Novell Printer Manager Configuration / Drivers tab page or through the Printers folder in Windows 95 or Windows NT by selecting the printer's Properties page and changing the driver there. If the driver you want to install is not currently in the NDPS Resource Management database, you will need to have it available on a diskette or copied onto your hard drive (if it requires more than one diskette) before you begin.

**NOTE:** NDPS ships with only English-language drivers. For information on adding additional drivers such as those in different languages, see "Adding or Updating Printer Drivers" on page 182.

## Removing an Installed Printer from a User Workstation

The Novell Printer Manager can be used to remove an installed printer from a workstation in the following way:

**1** At the main Novell Printer Manager window, select the printer you want to remove.

**2** Do one of the following:

   ◆ Select Remove from the Printer menu.

   ◆ Press the Delete key.

The following sections describe other important workstation management features of NDPS.

# Printer and Job Configuration Options

The following list describes the configuration options available to workstation users through the Novell® Printer Manager.

## General Properties

- **Copies.** The number of copies that will be printed for this configuration.

  **Max Copies.** The maximum number of copies specified by the administrator that you can print when using this printer.

- **Priority.** The priority that will be assigned to jobs using this configuration.

  **Max Priority.** The maximum priority (Low, Medium, High) set by the administrator for jobs using this printer. This setting determines when the job will print in relation to other jobs with different priorities sent to this printer.

- **Banner.** A list of banner pages users can select from. Banner pages will be printed at the beginning of print jobs using the configuration. (If multiple copies of a document are printed, the banner page will only be printed at the beginning of the first copy.)

- **Medium.** The medium (form) on which jobs can be printed without stopping the printer to mount a different medium (form). The default on the printer is Any Medium, which allows jobs to be printed using the currently mounted medium regardless of media specified in the job data. If a medium is specified for this configuration, and a different medium (anything other than Any Medium) is mounted on the printer, this condition will cause the printer to pause for the given amount of time (default is 15 minutes) or until the new media is mounted. If this Job Wait Time expires, the job is placed on hold and returned to the spooling area.

  Media are mounted by the administrator or Operator at the Printer Control/Control pull-down menu of NetWare® Administrator.

## Job Hold Properties

- **Operator Hold.** Jobs do not print until an Operator releases them.

- **User Hold.** Jobs do not print until the user who submitted the job releases it.

- **Delay Printing Until.** Jobs do not begin printing until the time and date specified. This option is available only after the job has been submitted.

- **Pause Printer on Job Start.** Force the printer to pause at the beginning of jobs submitted using this configuration. The message entered is sent to the printer Operator. Only an Operator can release the pause. (By default, the printer will resume printing after a 15-minute pause if an Operator

does not intervene. This setting can be changed at the server console by changing the Configuration setting, Job Wait Time.)

 * **Pause Printer on Job End.**  Force the printer to pause after printing each job that is submitted using this configuration. The message entered is sent to the printer Operator. Only an Operator can release the pause. (By default, the printer will resume printing after a 15-minute pause if an Operator does not intervene. This setting can be changed at the server console by changing the Configuration setting Job Wait Time.)

 * **Retain Job for No Longer Than.**  The maximum amount of time that jobs using this configuration can be retained after printing before being deleted (Minutes, Hours, Days, Years). By default, jobs are not retained.

 * **Retain Job For.**  The amount of time that a job using this configuration should be retained (regardless of when it is printed) until it is deleted (Minutes, Hours, Days, Years).

## Event Notification Properties

Event notification allows you to receive notification about printer events that occur during the processing and printing of a job.

The availability of the following delivery options are dependent on which of them the administrator has enabled.

 * **Pop-up notification.**  Messages pertaining to your own print jobs will pop up on your screen. To receive pop-up notification, you must have a default server defined in your User Environment (specified in NetWare Administrator by your network administrator). You also must be currently authenticated to that server.

 * **GroupWise™ notification.**  Messages will be sent to you through Novell GroupWise, the Novell industry-leading scheduling and messaging system.

 * **MHS notification.**  Messages will be sent to you through MHS (Message Handling Service).

 * **SMTP notification.**  Messages will be sent to the recipient through SMTP (Simple Mail Transfer Protocol) in IP-based systems.

 * **Log file notification.**  Messages are written to a file at a designated location on a NetWare server that you have rights to.

 * **Third-party notification methods.**  The open architecture of Novell Distributed Print Services™ (NDPS™ ) allows third parties to develop additional delivery methods.

## Printer Drivers

If the default printer driver that was downloaded with this printer when you installed it on your workstation is not the one you want, you can select a different driver from the list provided.

For more information, see "Changing the Driver for an Installed Printer" on page 160.

The following sections describe other important workstation management features of NDPS.

- "Designating a Default Printer" on page 153
- "Using the Novell Printer Manager Workstation Utility" on page 154
- "Managing Access to the Novell Printer Manager" on page 155
- "Filtering to Find Printers with Certain Characteristics or Features" on page 156
- "Managing Installed Printers at User Workstations" on page 158
- "Supporting Queue-Based Client Workstations" on page 164

# Supporting Queue-Based Client Workstations

If your network includes clients like Macintosh* and OS/2* that are not able to send jobs to Printer Agents directly, the backward compatibility of Novell® Distributed Print Services™ (NDPS™) allows these clients to submit jobs to the same queues they always have. Then the Printer Agent can retrieve jobs from these queues and print them. If you want a printer to service legacy queues, here's how to set it up.

1 In NetWare® Administrator, select the NDPS printer you want to work with.

The Printer Details page appears.

2 Select Jobs from the Printer Control view.

3 Click Spooling Configuration.

4 Under Service Jobs from NetWare Queues, click the Add button.

A browser window appears.

5 Select the queue(s) you want this printer to service and click OK.

6 Click OK again at the Spooling Configuration dialog.

The following sections describe other important workstation management features of NDPS.

# Managing Mobile NDPS Clients

On occasion, Novell® Distributed Print Services™ (NDPS™ ) users may need to travel to another location where NDPS is used. These mobile users may use the Novell Printer Manager to install and print to NDPS public access printers at these locations without needing to log in as long as they are attached to the network. However, they cannot install controlled access printers on their laptop workstations unless they have been given rights to these printers.

Each mobile laptop workstation must have a current version of the Novell Client™ installed to ensure that all of the components necessary to run NDPS are installed. In addition, the following files in Windows* 95*, Windows NT*, and Windows 3.*x* need to be copied to the laptop workstation before public access printers can be installed.

These files should be copied to a subdirectory (for example, c:\public) with the same name used on the server.

These subdirectories need to be in the workstation's search path.

## For Windows 95 and Windows NT

Copy the following files from *server*\sys:public to c:\public

bids45f.dll
cw3215.dll
dpcomn32.dll
dpcwin32.dll
nrddll32.dll
nwjmw32.exe

nwpmw32.exe

owl252f.dll

Copy the following files from *server*\sys:public\nls\*language* to
c:\public\nls\*language*

pmrwin32.dll

dprwin32.dll

jmrwin32.dll

nwadlg32.dll

nadmr32.dll

ndpsuw16.hlp

## For Windows 3.1*x*

Copy the following files from *server*\sys:public\ to c:\public

bids45.dll

nwcomn3x.dll

dpcwin16.dll

nrddll16.dll

nwjmw16.exe

nwpmw16.exe

Copy the following files from *server*\sys:public\nls\english to
c:\public\nls\english

pmrwin16.dll

dprwin16.dll

jmrwin16.dll

nwadlg3x.dll

nwadmr3x.dll

ndpsuw16.hlp

**NOTE:** Users copying files needed to run the Novell Printer Manager on their laptop
workstation will potentially have files that are out-of-sync at the location they will be
visiting if the version of NDPS is installed on the user's home server or is different from
the version installed on the server at the remote site.

The following sections describe other important workstation management
features of NDPS.

# Managing Printers from the Server Console

In addition to creating and configuring Printer Agents at the server console, you can also load, monitor, and manage them there.

Do the following if the NDPSM.NLM is not already loaded.

**1** Type the following at the console prompt:

**load ndpsm**

The contents of the current context are displayed.

**2** Select the Novell® Distributed Print Services ™ (NDPS™) Manager you want to load.

The NDPS Manager you selected is immediately authenticated to NDS™ and the Printer Agent List is displayed.

**3** To manage a specific Printer Agent, choose that Printer Agent from the list.

A Printer Agent status screen opens.

**Figure 4    Printer Agent Status Screen**

```
Printer Agent:          tst
  Status and Control:   Error Printing
  Status Details:       The Port Handler is not connected
  Information:          (See Form)
  Configuration:        (See Form)
  Current Medium:       Any Medium


Job Name:
  ID:
  Requested Medium:


  Kbytes Sent:                       of
  Copies Sent:                       of

  Percentage Sent:
```

Some fields on this screen can be configured. They are described in the following sections:

## Status and Control Options

The printer's status is displayed here. Selecting this field allows you to control the operation of the printer. You can perform the following actions:

◆ **Pause Output/Resume Output.**  Pausing output causes the printer to stop processing jobs, but allows new jobs to be submitted and held in the spooling area until output is resumed.

◆ **Pause Input/Resume Input.**  Pausing input stops jobs from being submitted to the spooling area, but existing jobs will continue to print.

◆ **Shut Down Printer/Start Printer.**  Shutting down the printer pauses output and input and unloads the gateway. Currently printing jobs are not

completed. They are returned to the spooling area until the printer is started up again.

## Information Options

The Information field provides additional information about the current Printer Agent. Selecting this field opens the Printer Information screen. The fields on the Printer Information screen provide such information as number of Active and Scheduled jobs, Notification and Resource Agents, Port Handler and Print Device System status, Printer Manufacturer and Model, and all the NDS Printer Objects associated with this Printer Agent. You can also see what print queues are being serviced from the NDS Printer Objects view.

## Configuration Options

The Configuration field provides information about job scheduling, storage locations, and space requirements. Selecting the Configuration field displays a Printer Configuration screen.

**Figure 5    Printer Configuration Screen**



```
                         Printer Configuration

Scheduler:                  first in, first out
Configuration Utilities:    (See List)

Job Storage Volume:         OSO_SYS

Total Job Space Limit:          (none) Kb        Used:          0 Kb
Retained Job Space Limit:       (none) Kb        Used:          0 Kb

Job Wait Time:                  15 Minutes
```

The Printer Configuration screen contains the following fields:

- **Scheduler.** Determines the order in which print jobs are serviced. Valid scheduling options are as follows:
  - First in, first out
  - Media changes minimized

◆ Print smallest job first

Third parties can add additional scheduler options.

- ◆ **Configuration Utilities.** Configures printers and Port Handlers. Use this option if you want to change Port Handler options for this Printer Agent.

- ◆ **Job Storage Volume.** Displays the server volume that stores waiting print jobs. Press Enter in this field to display the volume name, total space in kilobytes, and total free space in kilobytes. If more than one volume exists on the server, you may change volumes here.

- ◆ **Total Job Space Limit.** Controls the maximum amount of space allocated to store jobs waiting to be printed. A zero allows this space to grow dynamically. If you specify a limit, and that limit is reached, no more print jobs are accepted until there is room.

- ◆ **Retained Job Space Limit.** NDPS allows print jobs to be retained after they have been printed. This option controls the maximum amount of the total job space that can be used for retained print jobs. A zero allows this space to grow dynamically.

- ◆ **Job Wait Time.** Controls the maximum length of time that the Printer Agent will pause output while attempting to resolve a condition before moving on to the next job. (The default is 15 minutes.) For example, a job that was sent that requires a media change will cause the printer to pause for the given Job Wait Time, or until the new media is mounted. If time expires, the job is placed on hold and returned to the spooling area.

## Current Medium Options

The media (form) on which jobs can be printed without stopping the printer to mount a different medium(form). The default on the printer is Any Medium, which allows jobs to be printed using the currently mounted medium regardless of media specified in the job data. If a medium is specified for this configuration, and a different medium (anything other than Any Medium) is mounted on the printer, this condition will cause the printer to pause for the given amount of time (default is 15 minutes) or until the new media is mounted. If this Job Wait Time expires, the job is placed on hold and returned to the spooling area.

Media are mounted through the printer's Printer Control/Control pull-down menu at the Printer Details page in NetWare Administrator.

Selecting the Current Medium field displays the Supported Media window.

- To add a medium to this list, press Insert and select it from the Available Media window that appears.

- To delete a medium from the Supported Media list, highlight it and press Delete. This returns it to the list of available media.

# Managing Print Jobs

The following sections provide specific information about the Novell® Distributed Print Services™ (NDPS™) print job management features. All of the procedures listed below can be performed either through NetWare® Administrator or through the Novell Printer Manager. Users designated as Managers or Operators for a printer can perform these tasks for all jobs routed to that printer; individual job owners can only perform these tasks for their own print jobs.

- "Modifying Print Jobs" on page 171
- "Changing the Order of Print Jobs" on page 173
- "Copying or Moving Print Jobs" on page 174
- "Viewing Print Job Information" on page 175
- "Deleting Print Jobs" on page 176

# Modifying Print Jobs

You can modify a print job in two ways:

- **Modifying the printer's configuration**

  Before the job is submitted, you can modify the printer configuration on your workstation. Then every time you send a job to that printer, those modifications will be used. For information, see "Modifying Configurations" on page 130.

- **Modifying the specific job**

  When a job is submitted, it inherits the properties of the installed printer's configuration. The configuration of the job can then be modified, if needed, by the job's owner or the printer's Operator.

  When jobs are modified, additional configurable properties are available which are not included in the original printer configuration. For example,

the job can be delayed, and advanced attributes can be viewed and modified.

Administrators can modify any print job after it has been submitted if the job has not yet started printing. Users can modify only their own print jobs.

To modify a job, do the following.

**1** Select the printer the job was sent to.

**1a** (Conditional) If you are using NetWare® Administrator, select the printer the job was sent to from the browser window, then select Jobs/ Job List.

**1b** (Conditional) If you are using Novell® Printer Manager, highlight the printer the job was sent to from the main Novell Printer Manager window.

A list of all active print jobs appears.

If you wish to see a list of jobs already processed and being retained, click the Show Retained Jobs option.

**2** Select the job you want to modify.

**3** Go to the Job Configuration tabs.

**3a** (Conditional) If you are using NetWare Administrator, click Job Options and select Configurations from the pull-down list.

**3b** (Conditional) If you are using Novell Printer Manager, click Jobs and select Configuration from the pull-down menu.

The Job Configurations dialog appears.

These options allow you to configure a wide array of print job properties that will define how, where, and when a job will be printed.

**4** Select the tab(s) corresponding to the types of properties you want to modify.

**5** Select the properties you want from these tab pages and click OK.

For an explanation of the properties you can modify, see "Printer and Job Configuration Options" on page 161.

For specific information about other NDPS print job management features see the following:

◆ "Changing the Order of Print Jobs" on page 173

# Changing the Order of Print Jobs

Occasionally, you might need to print a job sooner than other jobs that have already been submitted to a printer and are awaiting servicing. Administrators can move jobs up or down the list. Users can only move jobs down the list.

Administrators can reorder any print job after it has been submitted if the job has not yet started printing. Users can reorder only their own print jobs.

The following procedure explains how this is done:

**1** Select the printer the job was sent to.

  **1a** (Conditional) If you are using NetWare® Administrator, select the printer the job was sent to from the browser window, then select Jobs/ Job List.

  **1b** (Conditional) If you are using Novell® Printer Manager, highlight the printer the job was sent to from the main Novell Printer Manager window.

  A list of all active print jobs appears.

**2** Go to the Reorder dialog.

  **2a** (Conditional) If you are using NetWare Administrator, select Job and click the Job Options tab. Then select Reorder.

  **2b** (Conditional) If you are using Novell Printer Manager, click Job and select Reorder from the pull-down menu.

  The Reorder dialog appears.

  Jobs can only be moved down the list, not up.

**3** Specify the position you want it to be in the list.

**4** If the list does not update automatically, press F5 or select Refresh from the View pull-down menu.

For specific information about other NDPS print job management features see the following:

# Copying or Moving Print Jobs

Novell® Distributed Print Services™ (NDPS™ ) allows operators and job owners to copy or move a print job to another printer. The target printer must be running on the same server (managed by the same NDPS Manager) as the printer on which the job currently resides. Also, the target printer must be compatible with the driver that formatted the job. For example, if a job was formatted with an HP5si driver, it should not be copied or moved to an HP* LaserJet* III.

Administrators can copy or move any print job after it has been submitted if the job has not yet started printing. Users can copy or move only for their own print jobs.

To copy or move a print job using NetWare Administrator, do the following.

**1** Select the printer the job was sent to.

   **1a** (Conditional) If you are using NetWare® Administrator, select the printer the job was sent to from the browser window, then select Jobs/ Job List.

   **1b** (Conditional) If you are using Novell Printer Manager, highlight the printer the job was sent to from the main Novell Printer Manager window.

   A list of all active print jobs appears. If you wish to see a list of jobs already processed and being retained, click the Show Retained Jobs option.

**2** Select the job you want to move or copy.

**3** From the Job Options tab (in NetWare Administrator) or the Job pull-down menu (in Novell Printer Manager), select Copy or Move.

   The Copy Job or Move Job dialog appears.

**4** Move or copy the job.

   Use the context-sensitive help available at that dialog for additional information.

**5** If the list does not update automatically, press F5 or select Refresh from the View pull-down menu.

For specific information about other NDPS print job management features see the following:

  ◆ "Modifying Print Jobs" on page 171

  ◆ "Changing the Order of Print Jobs" on page 173

  ◆ "Viewing Print Job Information" on page 175

  ◆ "Deleting Print Jobs" on page 176

# Viewing Print Job Information

You can view information about individual print jobs waiting to be processed by a specific printer by using the following procedure.

**1** Select the printer the job was sent to.

  **1a** (Conditional) If you are using NetWare® Administrator, select the printer the job was sent to from the browser window, then select Jobs > Job List.

  **1b** (Conditional) If you are using Novell® Printer Manager, highlight the printer the job was sent to from the main Novell Printer Manager window.

  A list of all active print jobs appears. If you wish to see a list of jobs already processed and being retained, click the Show Retained Jobs option.

**2** Highlight the print job you want to view information about and click the Information button.

  The Job Information window appears, showing the following information:

  ◆ **Status.** Information about the status of the print job.

  ◆ **State Details.** More detailed information about the print job status.

  ◆ **Job Owner.** The name of the user who submitted the print job.

  ◆ **Job Name.** The name of the print job. Normally, this will be the path and filename for the job.

  ◆ **Submission Date.** The date the print job was submitted by the owner.

◆ **Submission Time.** The time the print job was submitted by the owner.

◆ **Total Bytes in Job.** The size of the print job.

**3** To view or modify the properties of that job, click Job Options > Configuration > Advanced.

For specific information about other NDPS print job management features see the following:

◆ "Modifying Print Jobs" on page 171

◆ "Changing the Order of Print Jobs" on page 173

◆ "Copying or Moving Print Jobs" on page 174

◆ "Deleting Print Jobs" on page 176

# Deleting Print Jobs

Administrators can delete any print job after it has been submitted if the job has not yet started printing. Users can delete only their own print jobs.

Novell® Distributed Print Services™ (NDPS™) allows you to delete a print job from the jobs list by using the following procedure.

**1** Select the printer the job was sent to.

**1a** (Conditional) If you are using NetWare® Administrator, select the printer the job was sent to from the browser window, then select Jobs/Job List.

**1b** (Conditional) If you are using Novell Printer Manager, highlight the printer the job was sent to from the main Novell Printer Manager window.

A list of all active print jobs appears.

**2** Select the job you want to delete.

**3** From the Job Options tab (in NetWare Administrator) or the Job pull-down menu (in Novell Printer Manager), select Delete (in NetWare Administrator) or Cancel Printing (in Novell Printer Manager).

**4** If the list does not update automatically, press F5 or select Refresh from the View pull-down menu.

**NOTE:** If you are using an NDPS Port Handler configured to print to a print queue, and you attempt to delete a print job from PCONSOLE while it is being printed from NDPS

(in PCONSOLE, it says Adding), the Port Handler will unload. If this occurs, the only way to recover is to shut down and restart the Printer Agent. To prevent the possibility of this type of problem occurring, you should always delete print jobs submitted through NDPS with NDPS utilities rather than with PCONSOLE.

For specific information about other NDPS print job management features see the following:

- "Modifying Print Jobs" on page 171
- "Changing the Order of Print Jobs" on page 173
- "Copying or Moving Print Jobs" on page 174
- "Viewing Print Job Information" on page 175

# Adding or Updating Brokered Resources

The following procedure explains how to add banner pages, printer drivers, and printer definition (NPD) files to the resource database available through a Broker's Resource Management Service.

**NOTE:** Resources cannot be installed from multiple diskettes. If a printer driver or other resource is shipped on more than one diskette, copy the files to a directory on a hard disk or network drive and install it from there.

To add new resources through the Resource Management Service, do the following.

1 Make sure the Resource Management Service is enabled either in NetWare® Administrator or by going to your server console and viewing the Broker status screen.

2 In NetWare Administrator, select the Broker you want to work with.

The Broker Identification page appears.

3 Select the Resource Management view.

The Resource Service dialog appears.

4 Click the Add Resources button.

The Manage Resources dialog appears.

5 Select the icon for the type of resource you want to add.

A complete list of currently loaded resources of that type appears in the Current Resources window. Discussions of each type of resource that can

be added here (banners, NPD files, and printer drivers) appears at the end of this list. For more information, see the following:

**6** Click the Add button.

The Add *Resource Type* dialog appears. The listed resources that appear on this screen are currently installed.

**7** Press the Browse button to locate the resource you want to add to the list.

# Adding Banner Pages

Banner pages are pages that are printed at the beginning of a print job and that normally contain job identification information. In Novell® Distributed Print Services™ (NDPS™), banner pages can be configured for PostScript*, PCL*, and text formats.

NDPS provides you with a variety of options for creating and selecting banner page designs. You can choose from several ready-to-use banner page designs, or you may create a unique design that includes your company's logo, a drawing, or even a photograph.

When you add a new banner, it will be immediately available for printer configurations. If you want a banner page to be printed, you can select which banner design you want to use at the General tab of the Configuration page. The Configuration page lists only banners available in the format your printer supports (PostScript, PCL, text). For example, if you are using a PostScript printer, only banners in PostScript format will be available at the General configuration page.

Each banner page includes the following information in an information box at the bottom of the page: Job Name, Job Owner, Time Printed, Date Printed.

**NOTE:** If your client, printer, and server are not all configured for the same language, you may experience problems with the output of your banner pages, such as the job name being corrupted. If you are working in this type of mixed environment, you should consider not using banner pages.

Banners are added to the resource database through the Broker's Resource Management Service.

See the following topics for information about specific tasks associated with using banners.

- "Adding Banners to the Resource Management Service" on page 179
- "What Printer Types Support What Kind of Banner" on page 179
- "Creating Banner Files" on page 179

## Adding Banners to the Resource Management Service

To add the banners, do the following:

**1** Open the Broker object's main window in NetWare® Administrator.

**2** Select the Resource Service view.

**3** Click the Resources button.

**4** Select the icon for the type of resource you want to add.

**5** Click the Add button.

**6** Provide the required information and follow the prompts.

Refer to online help for detailed information.

## What Printer Types Support What Kind of Banner

A list of supported banners is supplied by both the Novell Gateway (through the PDS) and third-party gateways. The gateway first determines which file extension (.pcl, .ps, or .txt) is appropriate for the way the Printer object (or Printer Agent) was configured during creation. It then queries the associated Broker for a list of banner page files with that extension. For a list of formats supported by a specific NDPS printer, go to the main Printer Details page and click the Features button.

## Creating Banner Files

Administrators with knowledge of printer languages can create custom banners for use with NDPS. NDPS currently supports three types of custom banners:

- **PCL banner**  (.pcl extension). See "Creating a PCL Banner" on page 180.
- **PostScript banner**  (.ps extension). See "Creating a PostScript Banner" on page 181.

♦ **Generic Text banner**  (.txt extension). See "Creating a Generic Text File" on page 182.

All custom banners that are created should have one of these extensions. When creating custom banners, keep in mind that complex banners will increase the print time for jobs. Here are some tips for creating an efficient banner:

♦ Use internal/resident printer fonts instead of rasterized system fonts.

♦ When using graphics, use vector graphics when possible. Bitmaps take up a lot more space.

♦ Avoid half-toned images.

**Creating a PCL Banner**

A working knowledge of the Hewlett Packard* (HP*) PCL printer language is needed in order to create a custom PCL banner. The easiest way to create a PCL banner is to create the banner using an application like WordPerfect* or MS* Write. Be sure to leave the lower third of the custom banner page blank because NDPS will overlay the following information in a PCL banner page:

Job Name
Job Owner
Time Printed
Date Printed

**1** After formatting the banner page, print the banner document to a file using the appropriate PCL printer definition.

 The driver properties will have to be changed from printing to a port/ network to printing to a file on disk. All PCL banners must have the .pcl extension.

**2** Remove the form feed and reset commands in the file that was printed to disk.

You will need a binary editor to remove the form feed and any reset commands from the file. The form feed and reset commands will be in the overlay that NDPS provides. A form feed in PCL is a decimal 12 (hex 0C). There are several possible reset commands that need to be removed. Decimal 27, 69 (hex 1B,45), is the printer reset in PCL. The following Universal Exit Command (UEL) also needs to be removed:

```
Decimal 27,37,45,49,50,51,52,53,88
(Hex 1B,25,2D,31,32,33,34,35,58)
```

For more information on PCL, refer to the Printer Language technical reference manual available from Hewlett-Packard.

Once the form feed and reset are removed, you have a banner file that can be used with NDPS.

**3** Add the banner to the Resource Management Service.

See for more information.

## Creating a PostScript Banner

A working knowledge of the Adobe* PostScript printer definition language is needed in order to create a custom PostScript banner. The easiest way to create a PostScript banner is to create the banner using an application like WordPerfect or MS Write. Be sure to leave the lower third of the custom banner page blank because NDPS will overlay the following information in a .ps banner page:

Job Name
Job Owner
Time Printed
Date Printed

**1** After formatting the banner page, print the banner document to a file using the appropriate PostScript printer definition.

The driver properties will have to be changed from printing to a port/ network to printing to a file on disk. All PostScript banners must have the .ps extension.

**2** Using a text editor, remove the PostScript operator called "showpage" from the file that was printed to disk.

The driver will probably have a procedure that includes the "showpage" command. (The showpage command will be in the overlay that NDPS provides.) Sometimes "showpage" is embedded in another function within the driver and you will have to use care in removing it.

For more information on PostScript, refer to the PostScript Language Reference Manual available from Adobe Systems.

**3** Add the banner to the Resource Management Service.

See for more information.

A generic text banner must have a .txt extension. The banner can be formatted in any printer language. NDPS will not overlay any additional information on this banner page.

# Adding or Updating Printer Drivers

A printer driver is a software entity that directly supports a physical printer, enabling it to carry out the functions it is intended to perform.

Hardware vendors develop printer drivers, which are specific to each printer. Most printers require different printer drivers for each operating system they interact with. Novell® Distributed Print Services™ (NDPS™) allows you to view a complete list of printer drivers currently loaded in the Broker's Resource Management Service for Windows* 95*, Windows NT*, and Windows 3.*x*, and to add additional printer drivers.

**NOTE:** NDPS ships with only English-language drivers. To make drivers in other languages available for installation on workstations, you will first need to add those drivers to the RMS through the procedure described in this section.

**NOTE:** While the majority of printer drivers in common use today can be used with NDPS, some cannot. A few drivers do not work on a network at all, while others may not contain an index file or have an index file that is incorrectly formatted. If you attempt to add a printer driver to the Resource Management Service from a diskette through NetWare® Administrator and receive an error message stating that a printer driver cannot be found, you might need to contact the driver's vendor.

## Prerequisite

Printer drivers cannot be installed to the Resource Management Service from multiple floppy disks. If a printer driver is shipped on more than one disk, copy the files to a directory on a hard drive or network drive and install the driver from there.

## Procedure

**1** Make sure the Resource Management Service is enabled.

**2** In NetWare® Administrator, select the Broker object and double-click it.

The main Broker Details window appears.

**3** Select the Resource Management tab.

The Resource Service dialog appears.

**4** Click the Add Resources button.

The Manage Resources dialog appears.

**5** Select the icon for the type of printer driver you want to add.

A complete list of currently loaded printer drivers of that type appears in the Current Resources window.

**6** To add a driver to the list, click the Add button.

The Add Printer Driver dialog appears.

**7** Provide the required information and follow the prompts.

Refer to the online help for detailed information.

**NOTE:** The process described above may not work if the driver installation file (.inf extension) uses subdirectory paths in filename designations within the "copy files" sections of the .inf file. This format is not currently supported by NDPS. There are two possible work-arounds for this problem:

a. Look for an .inf file that does not use this format for filenames. Often one may exist in a subdirectory of the installation disk.

b. Edit the .inf file and remove path information from file names. Then ensure that all the files are in the same directory as the .inf file.

# Updating Printer Definition (NPD) Files

NPD files describe the capabilities of specific printers. Novell® provides these files to ensure that the features available in today's printers can be fully utilized by Novell Distributed Print Services™ (NDPS™).

Novell Printer Definition (NPD) files appear in the Printer Type list when you are creating a Printer Agent using the Novell Gateway's Print Device Subsystem (PDS).

Because many printers in current use do not yet have the full bidirectional communication capabilities NDPS supports, Novell provides printer definition (NPD) files which contain detailed information about the printers they correspond to in a format that NDPS can read and report. This information is then communicated to the NDPS Manager.

NPD files are generally extracted from NPR database files which NDPS references for information about the capabilities and features of the printers and families of printers these files support. By default, these NPR files are located in the *server*\sys:ndps\resdir\prndef\novell directory.

When you create a new Printer Agent and select a Printer Type, NDPS interprets your selection and references the appropriate NPR file (for example, hp01.npr or ps03.npr) and creates an NPD file in the server\sys:ndps\resdir\prndef\novell directory for that new Printer Agent. The filename for the NPD file created corresponds to the specific printer created (for example, hp4simx.npd).

Occasionally, an NPR file may be updated by Novell, in which case you will likely want to update the NPD files that were generated using the old NPR file. To do this, use the following procedure:

1 Copy in the new NPR file, replacing the old one.

2 Delete all the NPD files in the directory.

   They will be regenerated or updated when you complete the next step.

3 Unload and reload all NDPSM.NLMs that use the Resource Management Service whose database is located on this server.

# Enabling Event Notification Delivery Methods

The Novell® Distributed Print Services™ (NDPS™) Broker provides an Event Notification Service (ENS) that allows printers to send customizable notifications to users and operators about printer events and print job status. ENS supports a variety of delivery methods, including pop-up messages, log files, e-mail (GroupWise®, MHS, and SMTP) and programmatic. Third parties can also develop additional methods.

The Event Notification Service allows you to enable delivery methods such as e-mail and third-party methods not provided directly with NDPS. The executable files for these methods have an .enm extension (*filename*.enm) and must be added to the *server*\sys:system directory or another location in the server's search path.

For more information about Event Notification, see "Understanding the Event Notification Service" on page 36.

For specific information on enabling GroupWise notification, see "Enabling GroupWise Notification" on page 185.

1 Be sure the Event Notification Service is enabled by going to your server console and viewing the Broker status screen.

2 In NetWare® Administrator, select the Broker you want to work with.

The Broker Identification page appears.

**3** Select the Event Notification view.

The Broker's Notification dialog appears with a list of currently loaded methods.

**4** Click the Load or Unload button.

The Load Notification Method dialog appears.

**WARNING:** Do not unload the RPC and SPX™ Programmatic Notification methods. These are needed for communication between printers and the workstation Printer Manager utility to occur and driver download to take place.

**5** Specify the ENM file name for the Notification method you want to load.

This ENM must be in your *server*\sys:system directory or in another location in your server's search path in order to be loaded.

The Broker object will load this notification method automatically in the future.

See "Enabling GroupWise Notification" on page 185 for information on enabling that method.

# Enabling GroupWise Notification

To enable GroupWise® notification, you must first install the GroupWise API Gateway NetWare Loadable Module™ (NLM™) program. A self-extracting downloadable file is available on the Internet.

**NOTE:** The GroupWise API Gateway NLM is also available on the Novell Software Developer's Toolkit (SDK) CD-ROM.

See the following:

# Downloading and Installing the GroupWise API Gateway NLM

Before you can install the GroupWise® API Gateway, GroupWise 5.*x* must be installed and functioning, with domain(s) and post office(s) defined.

## Downloading and Extracting APINLM.EXE

The GroupWise API Gateway is contained in a self-extracting file named APINLM.EXE. You need to extract the needed files and copy them to a temporary directory on the server where the Gateway API will be loaded.

1 From your Internet browser, enter the following URL:

   http://support.novell.com/cgi-bin/search/download?/pub/updates/ gateways/gw41apin/apinlm.exe&sr

2 Select the global FTP site to connect with, and download this file to a temporary directory.

   **NOTE:** If the link is busy, try another link.

3 Go to a DOS prompt and type

   **path\apinlm.exe**

   This will extract the gateway files.

4 Create a temporary directory on the file server that will be loading the GroupWise API Gateway (for example, sys:\apigw.ins), then copy all extracted files to this location.

## Installing the Gateway

To install the GroupWise API Gateway, complete the following steps:

1 From the system console, type

   **load nwconfig**

2 Choose Product Options.

3 Choose Install a Product Not Listed.

4 Press F3 and specify the path on the local server that you want to install from.

   This path is the temporary network directory where the gateway files are located—for example, sys:\apigw.ins.

**5** Press Enter.

**6** Fill in the following fields:

- ◆ **Install From.** This field displays the location of the installation files. Use the default path.

- ◆ **Install NLM To.** Enter the path where you want the NLM program to reside. Use the default path sys:api4.

- ◆ **Install Shared NLMs To.** Enter the path where you want the GroupWise NLM library to reside. Use the default path sys:system.

- ◆ **Domain Path.** Type the path to the GroupWise domain where the gateway will be installed. Use the following syntax: *volume*:\*domain directory*.

- ◆ **Gateway Directory (under** *domain\wpgate\*)**.** This field indicates the directory where the gateway will reside. Use the default directory, api41.

- ◆ **Install...** Select this field, then press Enter to install the gateway.

**7** Press Esc until you return to the system console.

# Creating the GroupWise API Gateway

After you have installed the GroupWise® API Gateway, you must use the NetWare® 5™ NetWare Administrator utility for Windows* 95* to create the gateway object in GroupWise NDS™.

## Creating the Gateway Object

To create the gateway object using the NetWare Administrator utility, complete the following steps.

**1** Right-click the domain object and select Create.

**2** Select GroupWise Gateway.

**3** Fill in the Gateway Name field.

This is a name that identifies the gateway and that is unique within the domain—for example, APIGATEWAY.

**4** From the Gateway Home Directory menu, select API41.

**5** Choose the appropriate language in the Language field.

**6** Fill in the Time Zone field.

The gateway assumes the time zone of its domain; however, you can click the down-arrow to choose a different time zone if the gateway is installed on a computer in a different time zone.

**7** Fill in the Gateway Type field by selecting API from the drop-down list.

**8** To complete the creation of the gateway object, click Create.

## Defining Required Gateway Properties

The following items must be configured in order for the GroupWise API Gateway to function properly.

**1** In the NetWare Administrator utility, select the domain where you created the GroupWise API Gateway.

**2** Right-click the gateway and select Details from the pop-up menu.

**3** From the list of pages on the right-hand side of the Gateway Details dialog box, select Required Parameters.

**4** In the Root Directory Gateway field, enter the path to the root directory for gateway messages using the syntax: *server\volume:path*.

For example, myserver\sys:\gwdomain\wpgate\api41.

**NOTE:** By default, this path is a DOS-mapped drive path (for example, f:\headq\wpgate\api). However, this will not work, and you must edit the path to the syntax indicated above.

**5** In the Root Directory Directory Services Messages field, enter the path to the root directory for NDS messages, using the same syntax as in Step 4 on page 188.

**NOTE:** By default, this path is a DOS mapped drive path (for example, f:\headq\wpgate\api). However, this will not work, and you must edit the path to the syntax indicated above.

All other gateway options can be edited according to your needs; however, the gateway will now function with all other settings configured by default.

**6** Click OK.

# Configuring the GroupWise API Gateway

In order to complete the configuration of the GroupWise® API Gateway, you must configure Broker rights and modify the API's startup file. These procedures are discussed here.

# Configuring Broker Rights

One of the functions of the Broker object is to relay messages from the printer to the GroupWise API Gateway. The API Gateway then translates these messages into GroupWise mail messages that can be sent to the appropriate user or administrator.

The transfer of these messages takes place in the API input and output directories located in the gateway directory (see "Defining Required Gateway Properties" on page 188).

You must grant file rights to the Novell® Distributed Print Services™ (NDPS™) Broker object for the API Gateway directory to allow the broker to write to the API gateway directory. To do this, complete the following steps.

1 In the NetWare® Administrator utility, browse to the gateway directory.

2 Right-click the gateway directory object and select Details from the pop-up menu.

3 From the list of pages on the right-hand side of the Broker Details dialog box, select Trustees of this Directory.

4 Click the Add Trustee button.

5 In the window at the left of the Add Trustee dialog box, browse to the Broker object and double-click it.

6 Enable all file rights by clicking the Supervisor check box.

7 Click OK.

# Modifying the GroupWise API Gateway Startup File

A startup file is an ASCII text file that stores the startup switches that the GroupWise API Gateway uses. Startup switches configure the NetWare Loadable Module™ (NLM™) program to work in your specific network environment.

When you installed the gateway, a sample NGWAPI.PRM file was copied to the gateway directory. This sample file shows some of the startup switches that you can use.

You can use a text editor to make adjustments to the startup file. You can use a semicolon (;) at the beginning of a line to add comments or to disable a switch.

The GroupWise 4.1 API NLM gateway requires the use of the /Home switch to point it to the gateway home directory. Make sure that this switch is properly configured in the NGWAPI.PRM file. The proper syntax is /Home-*server\volume*:\*gateway directory*. Example: /Home-myserver\sys:\api41\wpgate\api41.

# Starting the Gateway

To load the gateway at the NetWare® system console prompt, complete the following steps.

**1** Access the system console.

**2** Load the gateway by typing

   **load *gateway path*\ngwapi.nlm**

   You may also include this line in the autoexec.ncf file.

# Using the Broker's Server Console Functions

By default, a Broker running on a server displays a user interface indicating the status of the brokered services it supports (usually three) and a list of the most recent Broker events that have occurred on that server. These events include error and warning conditions.

You can perform the following functions at this interface:

- **Unload the Broker and all enabled services.**  Press Alt+F10, or press Esc and Enter.

- **View a complete list of Broker events.**  Use any text editor to access sys:system\sys$log.err.

- **Clear the message box.**  Press F2.

- **Enable or disable a listed service.**  Highlight that service and press Enter. For information about the consequences of disabling a specific service, use the online F1 Help.

- **Add or change a Broker password.**  Press F4. An edit screen appears where you can enter the new password. You must then unload the Broker at the server console and bring it back up for the new password to take effect.

- ◆ **Bring up the Broker without showing the user interface.** When the Broker is unloaded, at the console prompt type **load broker** *brokername***/nui**.

# Managing NDPS Manager

A Novell® Distributed Print Services™ (NDPS™) Manager provides a platform for Printer Agents that reside on the server. An NDPS Manager must be created as an object in the NDS™ tree before you can create server-based Printer Agents.

## Loading the NDPS Manager

You do not need to load the NDPS Manager (ndpsm.nlm) to create an NDPS Manager object. However, it must be loaded for you to perform printer management tasks for printers controlled by this NDPS Manager through NetWare Administrator.

After you have created an NDPS Manager object, it stores information used by NDPSM.NLM. If you unload this NetWare Loadable Module™ (NLM™) program, it will be automatically loaded again when you create a Printer Agent for this NDPS Manager with NetWare Administrator.

Although the NDPS Manager does not need to be loaded for users to install controlled access printers on their workstations, the NDPS Manager must be loaded for users to install public access printers.

A specific NDPS Manager can be loaded only on one server. If it controls a printer attached directly to a file server, it must be loaded on the server the printer is attached to.

The NDPS Manager also must be loaded for users to submit print jobs to printers it controls.

**NOTE:** To autoload the NDPS Manager when you bring up the server, add the following line to your server's autoexec.ncf file:

**load ndpsm** *NDPS Manager name and context*

For example:

**load ndpsm .sales_manager.corp.acme**

## General Guidelines

Here are some guidelines for managing the NDPS Manager:

◆ In general, you should only create one NDPS Manager for each of the servers that will be controlling your NDPS printers. A single NDPS Manager can control multiple Printer Agents. (There is no hard limit.)

◆ You should consider assigning your Printer Agents to more than one NDPS Manager so that the printing load will be spread over multiple servers, facilitating load balancing and reducing the possibility of a single point of failure that could disable all printing on your network.

◆ In most cases, you should try to keep your NDPS Manager and the printers it controls within the same LAN segment for optimal printing performance. Also consider router hops and network traffic as you plan your NDPS setup.

◆ The PSERVER sapping name and NDPS Manager sapping name cannot be the same when both are running. Be sure you do not have a print server and an NDPS Manager advertising with the same SAP name at the same time. If this occurs, any printer that is configured to look for that SAP name will not know which device to connect to and will either not print at all or printer output will be incorrect.

**NOTE:** This problem is most likely to occur following upgrading of a printer to NDPS if you use the defaults and then do not unload the print server on which it was running before it was upgraded. However, it can occur for other reasons in a mixed environment as well.

◆ While you can perform some configuration and management tasks directly through the NDPS Manager console interface, the NetWare Administrator is the main tool for performing these tasks.

## Managing NDPS Manager Status and Database Functions

At the NDPS Manager on the server console, selecting the NDPS Manager Status and Control option from the Available Options menu opens the Status and Control window. From this window, you can view information about the length of time the current NDPS Manager has been running, the number of Printer Agents, status of the NDPS Manager, and NDPS Manager database options.

The following fields on this screen can be configured or changed. Use the online F1 Help for information about each option.

◆ **Status.** Controls the status of the NDPS Manager. The following options are available:

- **Cancel Unload.** If the NDPS Manager is to be unloaded after print jobs or all print jobs, Cancel unload will put the NDPS Manager back in a running state.

- **Unload Immediately.** The NDPS Manager will unload now. Currently printing jobs will be restarted the next time the NDPS Manager is loaded.

- **Unload After Active Print Job.** Finish the currently printing jobs, then unload.

- **Unload After All Print Jobs.** Finish all printable jobs. When there are no more printable jobs, unload.

- **Database Options.** The NDPS Manager database is composed of an index file and a data file. This database stores information about objects such as printers, jobs, schedulers, media, etc.

  - **Examine Database.** This option gives database statistics and lists the number of objects within each object class in the NDPS Manager database.

  - **Backup Database Options.** These options are used to enable automatic database backup and to determine whether the database will be backed up in NDS™ as well as on the local server. See "Optimizing Fault Tolerance" on page 144 for more information.

  - **Backup Database Files.** This option copies an image of the database.

  - **Restore Database from Backup.** This option is used to replace the current database with last backup.

  - **Resynchronize Database Files.** This option is used rebuild the database index file from the database data file.

  - **View Log File.** A log file, sys:system\dprepair.log, is created when the database is resychronized. Selecting this option lets you view the log.

  - **Delete Log File.** This option deletes the log file.

  - **Uninstall Database.** This option is used to remove the current NDPS Manager's database and supporting directories.

# **6** Troubleshooting

This section focuses on troubleshooting issues that might arise with Novell[®] Distributed Print Services[®] (NDPS[®] ) printing. It also presents general principles that can be of value for a variety of network printer configurations, and it provides help for troubleshooting problems with the printer itself.

# Initial Troubleshooting Steps

**INITIAL PRINTING PROBLEM**

Are there any error messages on printer, server, or client?

**YES**

Attempt to resolve the error and try again

SEE NOTE **A1**

**NO**

Try some quick fixes

SEE NOTE **A2**

Determine printing environment

SEE NOTE **A3**

All queue-based

SEE NOTE **A4**

All NDPS

SEE NOTE **A5**

Mixed NDPS and queue-based

SEE NOTE **A6**

Don't know

**GO TO CHART B**
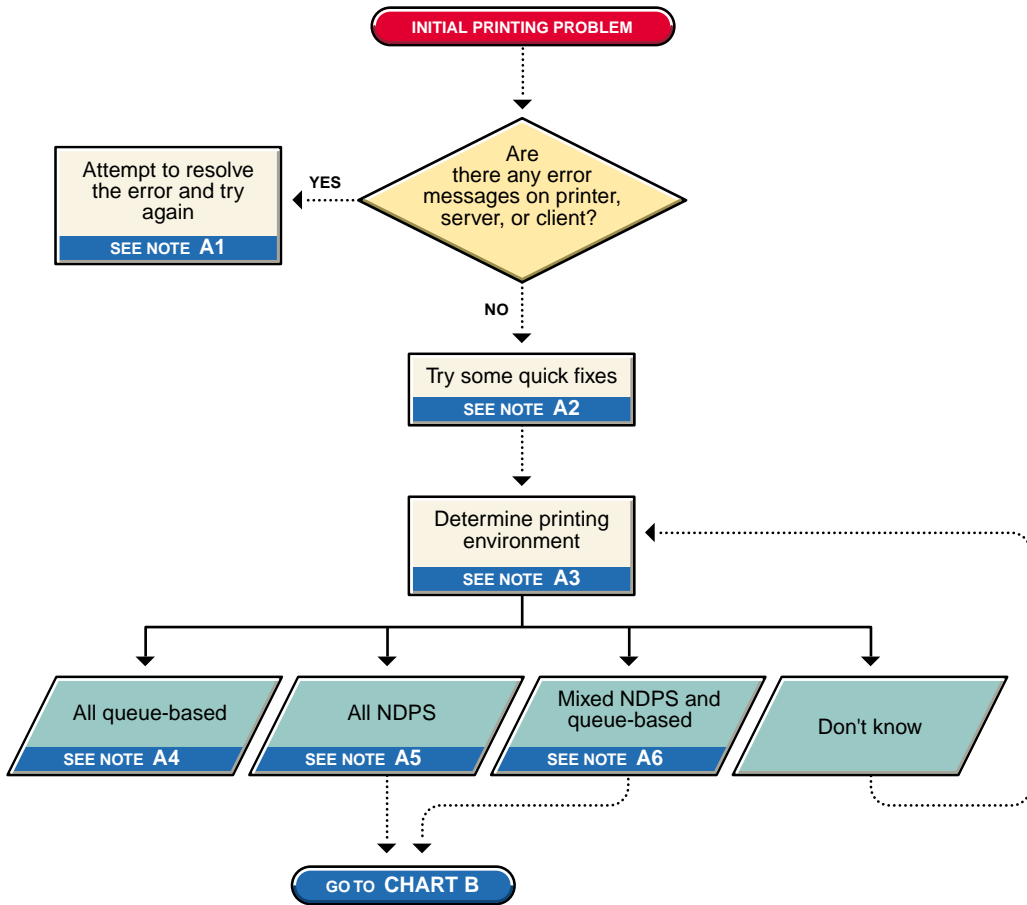
# A1. Attempt to resolve the error and try again

With many printing problems, an error will be reported on the printer, the client trying to print, or the server. If an error condition exists, use the information provided to try to resolve the problem and then try again. If the error is on the printer, see your printer's operating manual. If the error is on the server or the client, check the online documentation for possible help.

# A2. Try some quick fixes

Many times, printing problems occur due to simple or temporary conditions. The following list contains some common quick-fix techniques.

### If the problem is limited to a single workstation client, try the following:

- Check the printer's job list to ensure the job is getting to the spooling area.
- Review what has changed since the printer was working properly.
- Check printer forms and job configurations.

### If the problem is affecting other workstation clients, try the following:

- Check Printer Information in the Novell® Printer Manager for Novell Distributed Print Services™ (NDPS™) error messages.
- Look for printer error conditions (such as beeps or LCS panel lights) and printing error messages.
- Turn the printer off and on.
- Check the printer's cabling.
- Look for messages on the server console.
- Check the printer's job list to ensure the job is getting to the spooling area.
- Review what has changed since the printer was working properly.
- Check printer forms and job configurations.
- Search the online Novell Support Connection™ for known issues.
- Make sure you have the most current NDPS software.

# A3. Determining your printing environment

If there is no obvious solution to the problem, then you will need to begin analyzing your printing system. In order to find the problem, the printing environment being used must be identified.

NetWare provides two printing environments: the legacy queue-based printing (see "A4. All queue-based environment" on page 198) and the new

NDPS (see "A5. All NDPS environment" on page 199). Either print system may be used alone, or the two may be used together (see "A6. Mixed NDPS and queue-based environment" on page 199). Here are some ways to determine your printing environment:

- **User.** If the client platform is DOS, Macintosh*, OS/2*, or UNIX*, these clients are not directly supported by NDPS and can only print to a network printer by submitting jobs to queues.

  If the client platform is Windows* 3.*x*, Windows 95*, or Windows NT*, then they can be using either NDPS or queues. Check the printer configuration under the Windows control panel and check its network setting. Identify the network object being printed to and determine if it is a queue object or an NDPS printer object.

- *Server files.* At the server console look to see if the following are loaded:

  NDPSM.NLM- the server is using NDPS

  PSERVER.NLM - the server has been, or still is, using queue-based printing

- **NetWare Administrator.** Load NetWare® Administrator, and look at printing object configurations to determine printing setup.

## A4. All queue-based environment

If clients are submitting jobs to NetWare queues and the jobs are sent to the printer through the PSERVER.NLM, then you are using queue-based printing.

Printing in a queue-based system consists of submitting jobs to a queue, from which the print server sends the job to the printer based on the settings of the Printer object. In queue-based printing, a problem usually occurs in one of three general areas:

- Getting the print job into the print queue
- Transferring the job to the printer in the proper format
- Printing the job properly

For more information, see Troubleshooting General Printing Problems in your Queue-Based Print Services online documentation.

## A5. All NDPS environment

If you have the new client software and are submitting jobs to the printer through Printer Agents and a Print Device Subsystem, then you are using NDPS. See "Narrowing Your Focus" on page 200 for more information.

## A6. Mixed NDPS and queue-based environment

For backward compatibility, it is possible to be using both queue-based printing and NDPS together. Here are the two ways this can happen:

- ◆ Clients such as DOS, Macintosh, OS/2, and UNIX are unaware of NDPS and are unable to submit jobs to NDPS Printer Agents directly. The clients must therefore send jobs to a print queue. An NDPS Printer Agent can be configured to emulate a print server and service jobs from the queue to an NDPS printer.

- ◆ Some network printers can only receive jobs from a NetWare queue and print server (for example, remote printers). If a client is only configured to send jobs to a Printer Agent, the Printer Agent may be configured to transfer the job to a queue where it can be serviced by a print server.

Since two different print systems are being used, the problem could exist in either print system. See "Narrowing Your Focus" on page 200 to continue.

# Narrowing Your Focus

**START HERE**

Gather information on setup and configuration
SEE NOTE **B3**

Send job to same printer from other workstation(s)
SEE NOTE **B1**

**NO**

Has printing ever worked with the current configuration?
NOTE **B4**

Can other users print to the printer from their workstations?

**NO**

**YES**

**YES**

SEE **CHART G**

Has workstation printed to this printer before?
NOTE **B2**

**NO**

Gather information on setup and configuration
SEE NOTE **B3**

**YES**

GO TO **CHART C**
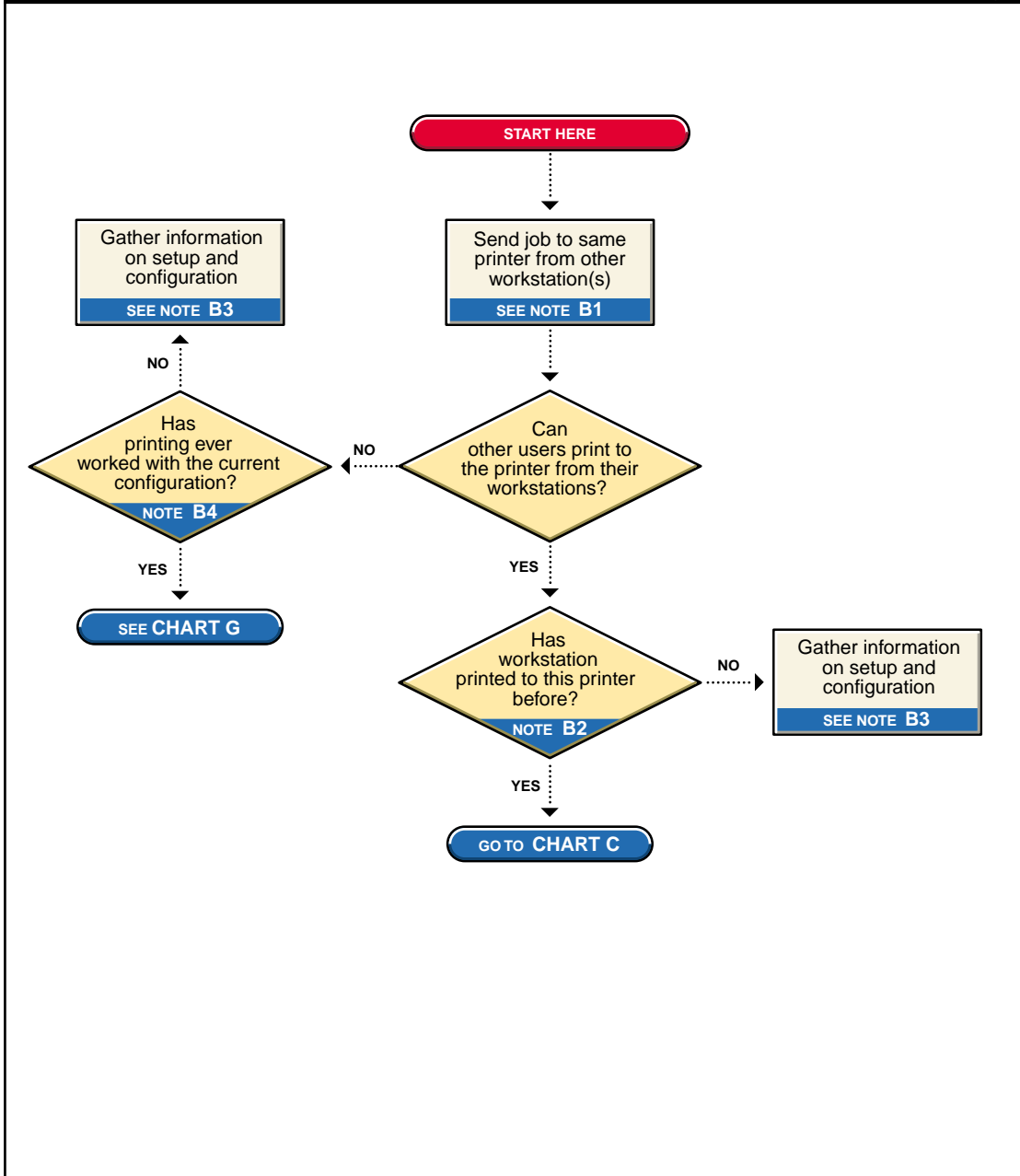
## B1. Send job to same printer from other workstation(s)

Try printing to the same printer from one or more different workstation. This will help you narrow your search to the specific workstation or to the whole printing system.

## B2. Has workstation printed to this printer before?

Has this workstation submitted jobs to this printer that printed successfully? Determine the following:

- ◆ Is this a new setup?
- ◆ Is this the first time printing was attempted from this workstation since any changes were made?
- ◆ Has this setup been working before and now is not?

If this is a new setup or a new configuration, then something may not be configured.

If a job sent from this workstation has been printed successfully before, go to "Determining Your Platform When Problem Affects Only One Workstation" on page 202 to further track the problem.

## B3. Gather information on setup and configuration

The initial setup may have been done incorrectly. Refer to "Creating NDPS Printers" on page 77 for more information.

## B4. Has printing ever worked with the current configuration?

Have any users been able to print jobs from their workstations using this configuration? Determine the following:

- ◆ Is this a new setup?
- ◆ Is this the first time printing since any changes were made?
- ◆ Has this setup been working before and now is not?

If this is a new setup, or a new configuration then something may not be configured properly.

If other users have been printing successfully, then go to "Tracking Jobs from a Workstation" on page 208 to further track the problem.

# Determining Your Platform When Problem Affects Only One Workstation

**DETERMINE WORKSTATION'S PLATFORM**

DOS, Mac, Unix (legacy, non-NDPS clients)

Windows 95, NT, 3.x

**GO TO CHART D**

Are queues being serviced by an NDPS printer?

**NOTE C1**

NO

Don't know

**SEE NOTE C4**

YES

Go to Troubleshooting General Printing Problems in *Queue-Based Print Services*

**SEE NOTE C2**

Go to Chart H

**SEE NOTE C3**
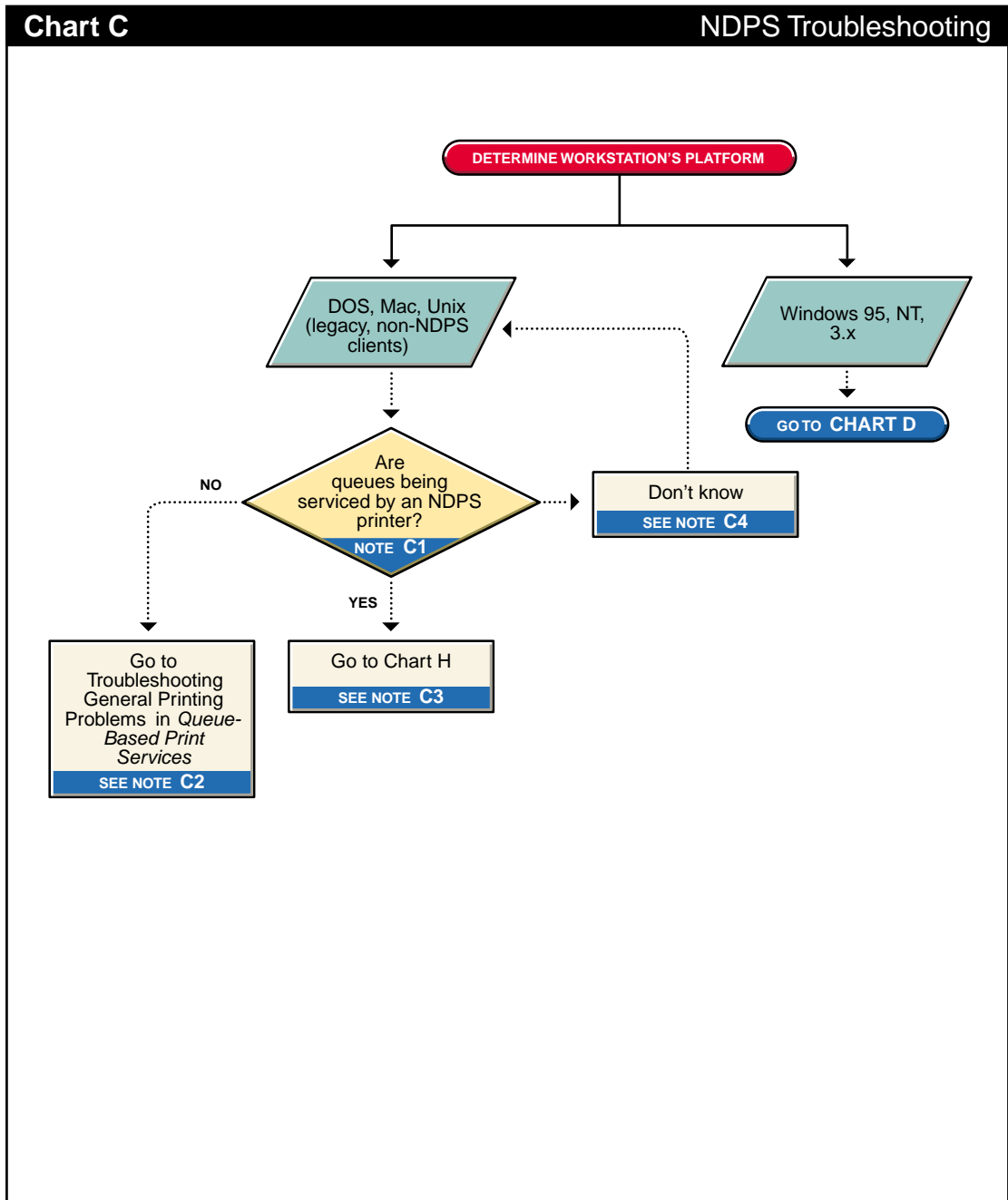
## C1. Are queues being serviced by an NDPS printer?

Clients running on DOS, Macintosh*, OS/2*, and UNIX* platforms are queue-based, meaning that they print to network printers by redirecting jobs to a queue. You will need to determine whether the network printer is being serviced by a queue-based print server (such as PSERVER.NLM) or if Novell® Distributed Print Services™ (NDPS™) is redirecting jobs through a Printer Agent.

## C2. All queue-based printing

If clients are submitting jobs to a queue that is being serviced by a print server, then the printing environment is all queue-based. For more information, see Troubleshooting General Printing Problems in your Queue-Based Print Services online documentation.

## C3. Queue-NDPS integration

The clients are unaware of NDPS and are unable to submit jobs to NDPS Printer Agents directly. The clients must therefore send jobs to a print queue. An NDPS Printer Agent can be configured to emulate a print server and service jobs from the queue to a NDPS printer. See for more information. Then go to .

## C4. Look in NetWare Administrator for NDPS Printer objects

Load NetWare Administrator and look to see if any NDPS Printer objects are defined.

- If no NDPS Printer objects are defined, there should be a Print Server object. Check the configuration of the print server to if the queue is configured to be serviced by it.

- If there are NDPS objects defined, look at the Printer objects to see if they are configured to emulate a print server and service jobs from a queue.

# Isolating Printing Problems Affecting Only a One Windows Workstation

**START HERE**

Check Status of printer in Windows Control Panel
**SEE NOTE D1**

Status is good

Status is not good

Check to see what network object installed printer is servicing
**SEE NOTE D2**

Printer is set for working off-line
**SEE NOTE D9**

Other possibilities
**SEE NOTE D10**

NDPS object (controlled access printer or public access printer)

Netware queue object
**SEE NOTE D5**

Check Status of printer in NDPS Printer Manager
**SEE NOTE D3**

Are queues going to an NDPS printer?
**NOTE D6**

**NO**

Go to Troubleshooting General Printing Problems in *Queue-Based Print Services*
**SEE NOTE D8**

Status is good

Status is not good

**YES**

Go to Chart H
**SEE NOTE D7**

**GO TO CHART E**

Determine problem from error message
**SEE NOTE D4**

# D1. Check status of printer in Windows Control Panel

Printing from a Windows* environment introduces several complexities which may or may not be related to the network or the printer. Some problems can be found and resolved right in the Windows environment. Check the status of the printer in the Windows Control Panel to see if any problems are evident.

Windows 3.*x* does not provide the same status reporting as Windows 95* and NT*. However, in Windows 3.*x*, you can still verify that the printer drivers are installed and configured to a port.

# D2. Check to see what network object the installed printer is servicing

Determine the network object print jobs are being redirected to.

**Windows 95**

1 Select the Printers folder from the Control Panel or the Start/Settings menu.

2 Highlight the installed printer and click File/Properties (or use the right-mouse-click Properties option).

3 Click the Details tab.

4 Look in Print to the Following Port.

Identify the network object being printed to and determine if it is a queue object or an NDPS printer object.

**Windows 3.*x***

1 Select printers from the Control Panel.

2 Highlight the installed printer, and click the Connect button.

If the port is identified as NDPS*xx*, then the jobs are being redirected to NDPS™.

If the port identified is an LPT port followed by a queue name, then the jobs are being redirected to a print queue. For more information on the queue and redirection settings, click the Network button. (The Network button is disabled for NDPS printers.)

## D3. Check status of printer in NDPS Manager

If the job did not appear in the job list, view information about the specific installed printer:

1 From the Printer Manager window, select the desired printer.

2 From the Printer pull-down menu, select Information.

The Printer Information dialog shows the current status and state details about the printer you choose.

a. Status tells you if there is a problem with the printer.
b. State details tell you what the problem is and why it exists.

3 Confirm the following:

- You installed the correct NDPS printer.

- The printer you installed routes to the Printer Agent you expected.

- The Printer Status information indicates that everything is all right.

- The Printer Agent is still available.

Information about the following items is also shown in this dialog:

Printer Name
Installed Name
Number of jobs
Description
Location
Context
Port (assigned by NDPS)
Default Printer (Yes or No)

4 Make sure the port is an NDPS port and that the context contains the correct Printer object.

## D4. Determine problem from error message

With many printing problems, an error will be reported on the printer, the client trying to print, or the server. If an error condition exists, use the information provided to try to resolve the problem and then try again. If the error is on the printer, see your printer's operating manual. If the error is on the server or the client, check the online documentation for possible help.

## D5. NetWare queue object

This printer is queue-based, meaning that the print driver prints to network printers by redirecting jobs to a queue.

## D6. Are queues going to an NDPS printer?

The next thing you need to know is whether the network printer is being serviced by a queue-based print server (such as PSERVER.NLM) or if NDPS is redirecting jobs through a Printer Agent. Load NetWare® Administrator and look to see if any NDPS Printer objects are defined.

- ◆ If no NDPS Printer objects are defined, there should be a Print Server object. Check the configuration of the print server to see if the queue is configured to be serviced by it.

- ◆ If there are NDPS objects defined, look at the Printer objects to see if they are configured to emulate a print server and service jobs from a queue.

## D7. Queue-NDPS integration

The clients are submitting jobs to a print queue which is then being serviced by NDPS Printer Agents. See "Printing Problems When Integrating NDPS with Queue-Based Components" on page 217 for more information.

## D8. All queue-based printing

If clients are submitting jobs to a queue that are being serviced by a print server, then the printing environment is all queue-based. For more information, see Troubleshooting General Printing Problems in your Queue-Based Print Services online documentation.

## D9. Printer is set for working off-line
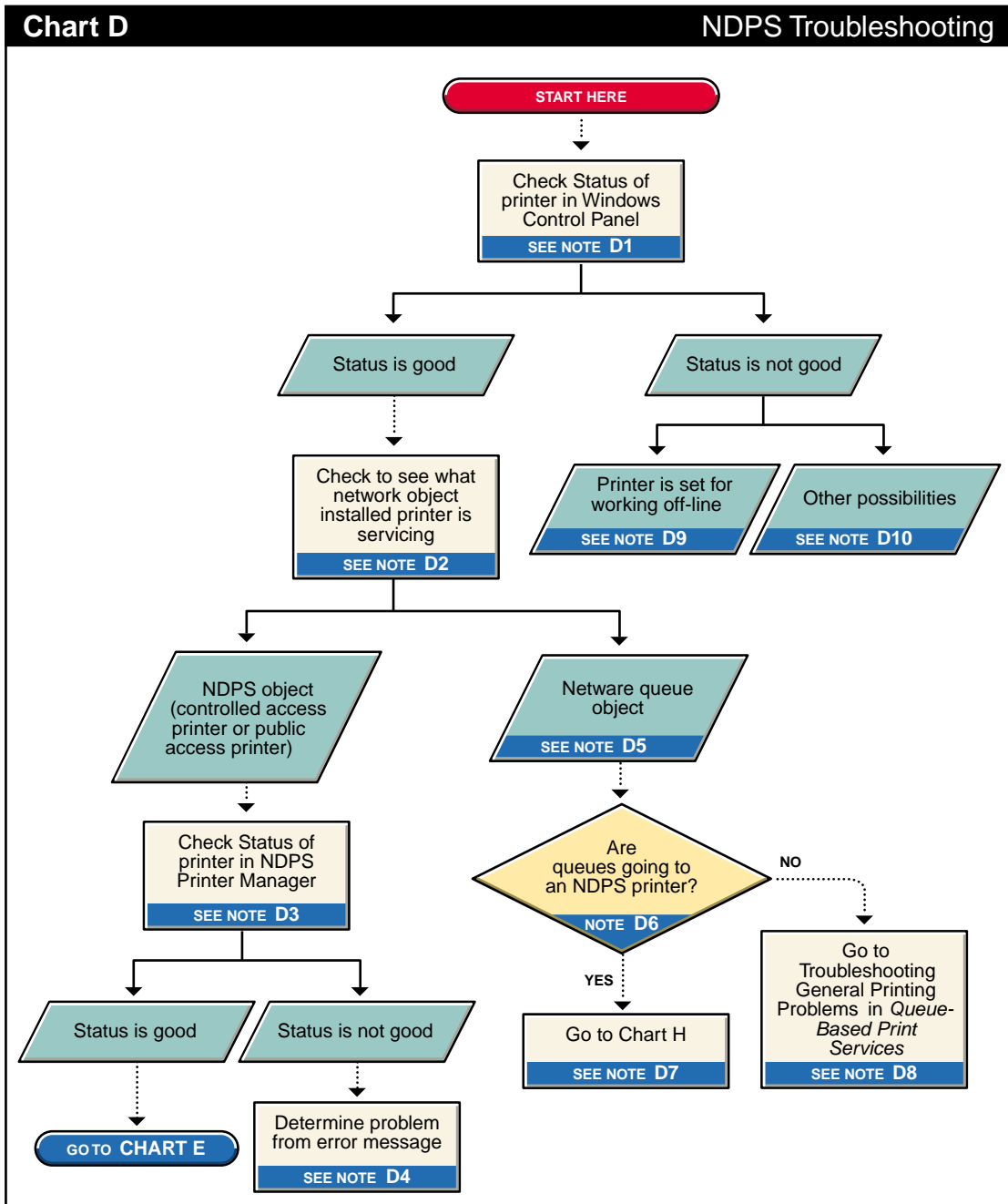
Under certain circumstances, the printer may be set for working off-line. This can happen if Windows loses communication with the network, for example. A user may also set it off-line. If the printer is set to work off-line, reset it to online and try to print. If you cannot set the printer to online, then Windows has lost communication with the network print system. Reboot the workstation and if the condition still exists, check the client's connection to the network.

## D10. Other possibilities

Other negative status flags.

# Tracking Jobs from a Workstation

START HERE

Pause output of
NDPS printer

**SEE NOTE** E1

Resend print job
from the workstation

Check job list in
NetWare
Administrator

**SEE NOTE** E2

Does print job appear
in the job list?

SEE **CHART F**

No

Yes

Resume printer
output

**SEE NOTE** E3

SEE NOTE E6

No

Is job still in
job list?

Recheck the job list

No

Did job print?

Yes

SEE NOTE E5

Yes

SEE NOTE E4
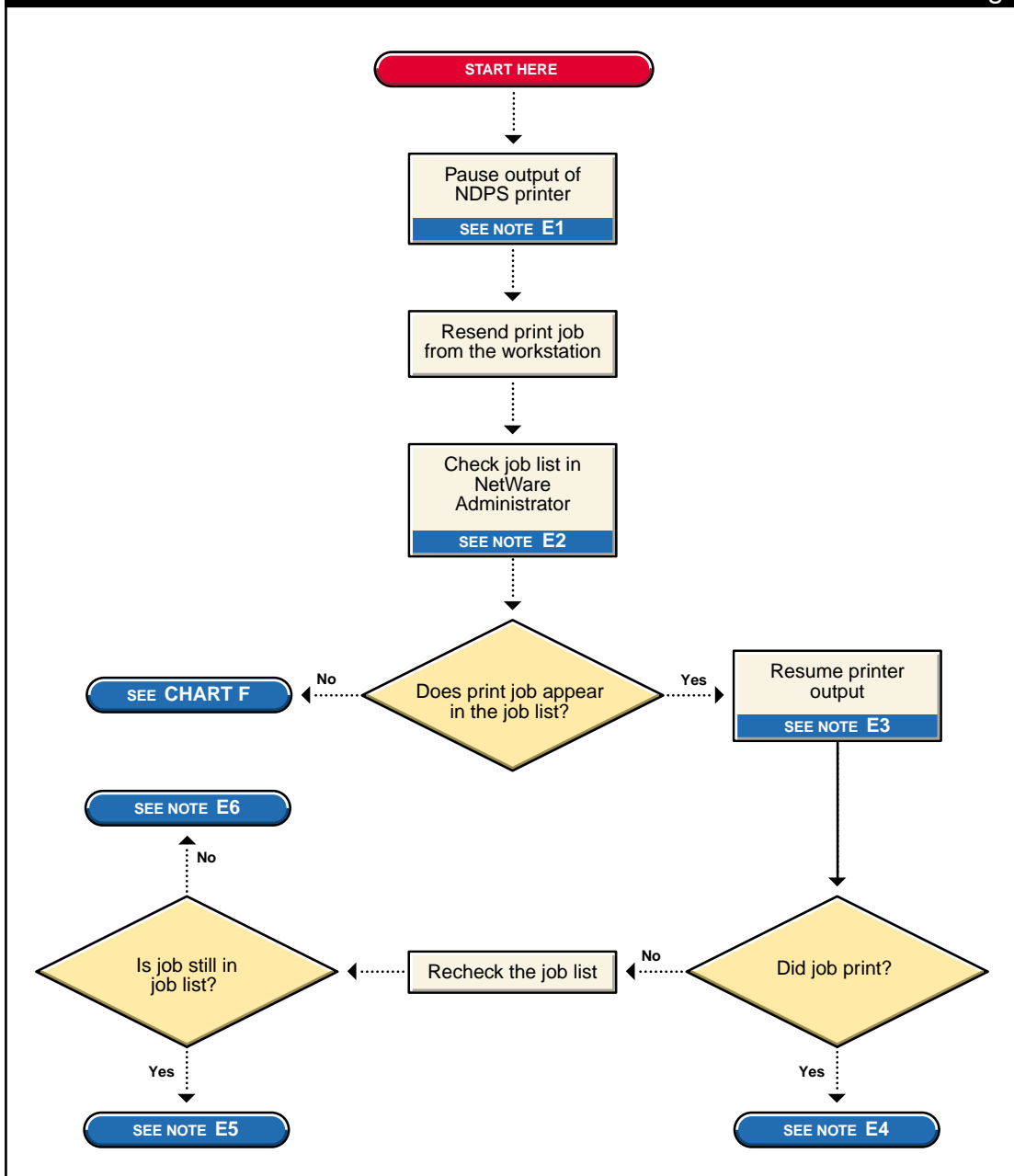
## E1. Pause output of NDPS printer

One method of troubleshooting is putting stops in the printing process, then resending a job and testing how far in the process the job gets. The first stop you can make is pausing the printer output.

Pausing printer output is a common technique used when troubleshooting printing; it forces Novell® Distributed Print Services™ (NDPS™) to spool your print job and save it as a file. Stopping and evaluating the printing process midway helps you to identify early problems and limits your troubleshooting to a few components.

**To pause printer output for a controlled access printer, do the following:**

1 Locate the NDPS Printer object in NetWare® Administrator.

2 Double-click the NDPS Printer object to open its Details page.

3 Click the Pause Output button.

The Pause Output button changes to a Resume Output button.

**To pause printer output for a public access printer, do the following:**

1 Load NDPSM.NLM at the server console.

2 Select the Printer Agent and press Enter.

3 Select Status and Control and press Enter.

4 Select Pause Output and press Enter.

After printer output is paused, send a test job to the printer and see if it gets to the spooling area. See

## E2. Check job list in NetWare Administrator

You can view the job list for a controlled access printer from NetWare Administrator, the server console, or the workstation Printer Manager. To view the job list from NetWare Administrator for a controlled access printer, do the following:

1 In NetWare Administrator, open the Details page of the NDPS printer object.

2 Click Jobs.

3 Click Job List.

The job list for a public access printer can be viewed from either the server console or the Novell Printer Manager.

## E3. Resume printer output

To resume printer output for a controlled access printer, do the following:

**1** In NetWare Administrator, locate the NDPS Printer object.

**2** Double-click the NDPS Printer object to open its Details page.

**3** Click the Resume Output button.

**4** The Resume Output button changes to a Pause Output button.

## E4. Job printed this time, but nothing was changed.

If the job printed now, there is no authoritative explanation as to why it didn't print the first time. If you followed these steps, no configurations have been changed, only the job was paused and released. Try printing the job again and see if normal printing continues. If not, try pausing the printer again and see if any other symptoms occur.

## E5. Job did not print and is still in the job list.

If the job does not print and is still in the job list, then check for job holds, delays, and priority settings.

## E6. Job did not print but is no longer in the job list.

If the job did not print, yet the job is not in the job list, then the job was sent to the printer and no error was reported back to the system. Check these issues:

- Are you are checking the correct physical printer?

- Are you are using the correct print driver in your application?

- Are your drivers and printers talking the same language, for example Postscript* or PCL*?

- Is there a banner configuration?

# Checking Printer Output and Using Test Files

```
                          START HERE
                              
                     Check availability of
                       network printer
                      SEE NOTE  F1
                              
                      Pause output of
                       NDPS printer
                      SEE NOTE  E1
                              
                     Use Printer Manager
                     to drag and drop test
                            file
                      SEE NOTE  F2
```

```
                          Does print job        Yes      Resume printer
   SEE NOTE  F3  ◄── No ── appear in the job list? ──────►    output
                            NOTE  E2                       SEE NOTE  E3


   SEE NOTE  F6
        ▲
        No
        
   Is the job still in  ◄──── Recheck the job list ── No ── Did the job print?
     the job list?
        
        Yes                                                     Yes
        
   SEE NOTE  F5                                             SEE NOTE  F4
```

# F1. Check availability of network printer

Make sure that the printer is set to accept jobs. In NetWare® Administrator, verify that input is not paused.

# F2. Drag and drop a test file

A good technique for helping to isolate the nature of the printing problem is to send test print files through the drag-and-drop method. This method avoids problems that might be caused by an application or printer driver and allows you to focus on the network and printer-related issues.

You can print any printer ready file (see below), such as a text file, from the Windows* 95* Explorer or the Windows 3.*x* File Manager by selecting the file in the file list and dragging it to the icon in the main NDPS™ Printer Manager window for the printer you want to use.

To send a test file to an NDPS printer, do the following:

1 Open Windows Explorer (Windows 95) or File Manager (Windows 3.*x*) and locate the appropriate test file.

2 Open the Novell Printer Manager workstation utility.

3 Drag and drop the test file onto your NDPS printer.

### Determining If the File Is Printer-Ready

NDPS drag-and-drop printing supports only printer-ready files. If the file is not printer-ready, the print job will print corrupt output or nothing at all.

A printer-ready file is a file formatted in a language the printer understands. PostScript and PCL (Printer Command Language) are two common printer languages.

Most data files are not printer-ready. Files are made printer-ready during the printing process. When you print a file, the application uses a printer driver specific to your printer to convert the file from an application-specific format into the printer's language.

Typically, printer-ready files are created from an application by printing to a file instead of printing to the printer.

ASCII files are often considered printer-ready, since most printers recognize ASCII.

## F3. Check for error messages

With many printing problems, an error will be reported on the printer, the client trying to print, or the server. If an error condition exists, use the information provided to try to resolve the problem and then try again. If the error is on the printer, see your printer's operating manual. If the error is on the server or the client, check the online documentation for possible help.

Also confirm that your NDPS objects are configured properly.

## F4. Test file prints but jobs from application do not

If the test file prints but jobs from the application do not, then there is a problem with the way the job is being formatted by the application or handled by the driver. Reinstall the current print driver provided by the printer manufacturer. Also try printing from different applications to determine whether one application works while another does not. If this is the case, the problem is related to the application itself.

## F5. Job is being held in spooler

The job is being held in the job spooler. Check for job holds, delays, and priority settings. If one of these conditions exists, change the status to print the job. If the job prints, then see
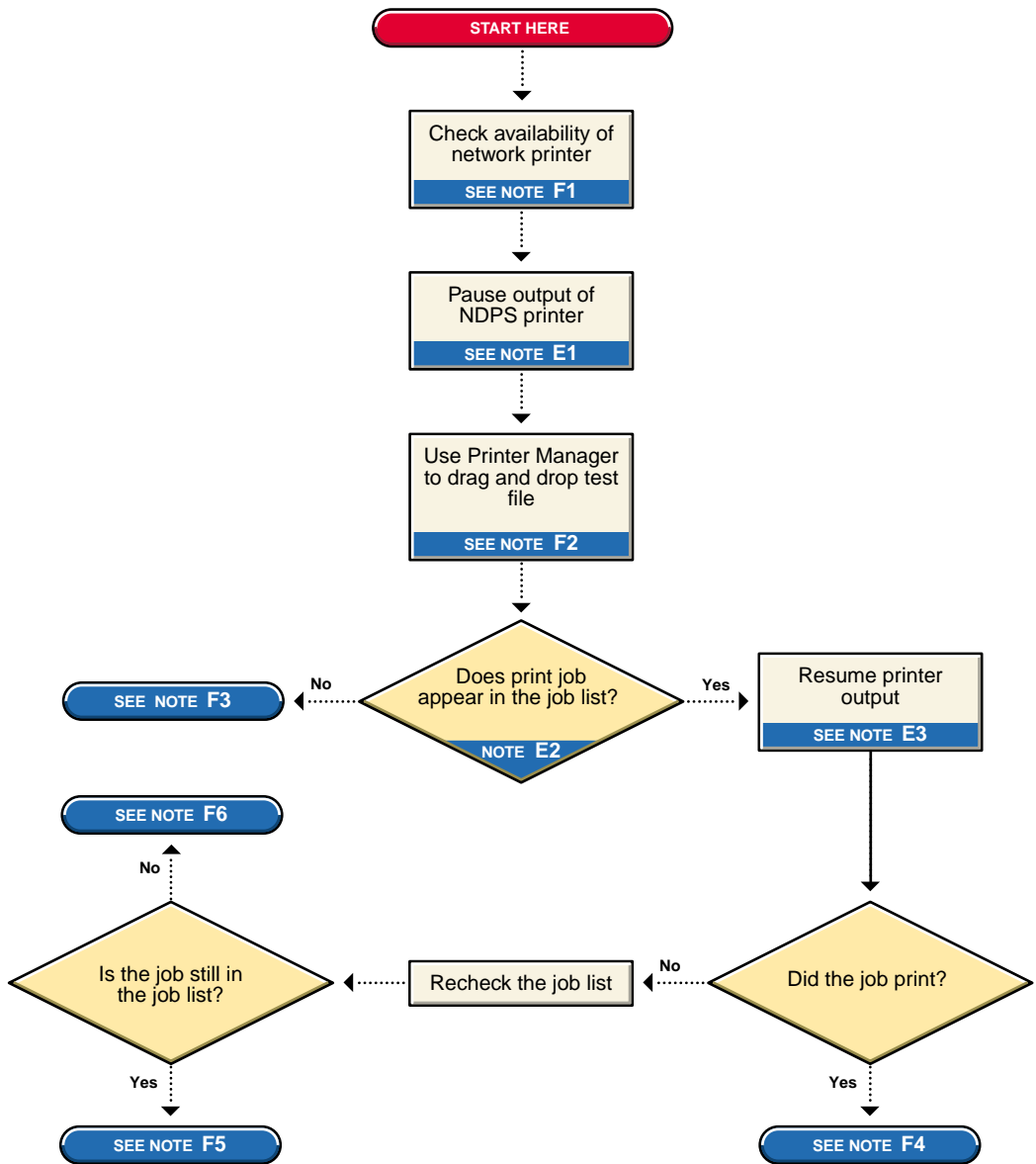
## F6. Job did not print but is no longer in the job list

If the job did not print, yet the job is not in the job list, then the job was sent to the printer and no error was reported back to the system. Make sure you are checking the right physical printer.

# Printing Problems Affecting All Users

## Chart G — NDPS Troubleshooting

**START HERE**

Determine degree of printing problems
**SEE NOTE G1**

- No print jobs are printing from any networked printer
  **SEE NOTE G2**
- No print jobs are coming from a specific printer(s)
  **SEE NOTE G3**
- Jobs are printing but are slowed or corrupted
  **SEE NOTE G4**

Determine printing environment
**SEE NOTE A3**

- Printer Agent is pulling jobs from a queue
  **SEE NOTE A6**
- Printer receiving jobs from an NDPS Printer Agent

- Printer is a q-based printer serviced by a Print Server
  **SEE NOTE A4**
- Printer Agent is submitting print jobs to a queue
  **SEE NOTE A6**
- Don't know

Go to Troubleshooting General Printing Problems in *Queue-Based Print Services*

See **CHART H**

Check Status of NDPS printer in NetWare Administrator
**SEE NOTE G5**

**Do print jobs appear in the job list?**
**NOTE E2**
- No → **Go to CHART E**
- Yes → **See Note G7**

**Does the NDPS status screen show any errors?**
- No
- Yes → **See Note G6**

## G1. Determine severity and scope of printing problems

If printing is affecting all users, determine the degree of severity of the printing problems. Can no users print from a specific printer(s), or are no jobs printing from any network printer? Or are jobs printing, but printing slowly?

## G2. No print jobs are printing from any networked printer

If no users can print at all from any network printer, the problem is probably a universal problem such as

- The printing system is disabled or printing system files are unloaded.

- The server(s) is in a critical state due to problems with memory, disk space, LAN connections, etc.

- The LAN has a bottleneck or is otherwise dysfunctional.

## G3. No print jobs are coming from a specific printer

If the printing problem is limited to a certain printer then the problem is either at the printer itself, or the configuration of the printer. Continue to determine which printing environment you are using.

## G4. Jobs are printing slowly or are corrupted

Jobs may be printing but are either slow or appear corrupt.

### Slow Printing

There are several explanations for slow printing.

If only one workstation is having problems with 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 spooler. Look at the print status of the application to determine if this is the case.

If all workstations are having the problem, one of the following conditions might exist:

- 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 printers).

- XON/XOFF may need to be enabled (serial printers).

- Your hardware (cable, port, printer) may be faulty.

**Job Corruption**

If jobs are printing in pieces, 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 jobs that contain large graphics.

## G5. Check status of NDPS Printer in NetWare Administrator

Go to the main Printer Control page for the printer in NetWare Administrator, then select Printer Information. From the Printer pull-down menu, select Information. The Printer Information dialog shows the current status and state details about the printer you chose.

## G6. A problem is identified in an error message

Try to determine problem from the status or error message and resolve it.

- Make sure that job input or output is not paused.

- Check for any details that are grayed out and not available; these may show you a problem.

## G7. Jobs are getting to the job list but the printer is unable to print them

Do the following:

- Make sure there are no holds or delays.

- Make sure the printer is configured properly.

- Check the status of the gateway if one is being used. (A gateway is always needed unless the Printer Agent is embedded in the printer itself.)

See for more information.

# Printing Problems When Integrating NDPS with Queue-Based Components



**Chart H** — NDPS Troubleshooting

**PROBLEM:** jobs sent through a queue are not printing

Non-NDPS Client → Queue → NDPS Printer Agent → NDPS Printer
Printer is receiving jobs from an NDPS Printer Agent which is pulling the print jobs from a queue.

**or**

NDPS Client → NDPS Printer Agent → Queue → Queue-based Printer
Printer is receiving jobs forwarded to a queue by an NDPS Printer Agent.

Check Printer Agent job list
**SEE NOTE E2**

See **NOTE H5**

Reconfigure spooling
**SEE NOTE H2**

Are print jobs getting to Printer Agent job list? — **NO** → Check spooling configuration of the printer **SEE NOTE H1** → **NO** → Is the job spooling configured with the correct queue name?

**YES**

See **CHART E**

**YES**

Check job list for queue
**SEE NOTE H3**

Make sure jobs are redirected to queues correctly
**SEE NOTE H4** ← **NO** — Are print jobs in queue job list? — **YES** → Make sure NDPS printer input is not paused
**SEE NOTE E3**
or reconfigure spooling
**SEE NOTE H1**

## H1. Check the printer's spooling configuration.

Make sure the printer is configured to service the queue you are expecting the job to go to. See "Optimizing Print Job Spooling" on page 135 for more information.

## H2. Reconfigure spooling for this printer.

The spooling configuration specifies a different queue than the one you want this printer to service. See "Optimizing Print Job Spooling" on page 135 for information on how to configure job spooling.

## H3. Check the job list for the queue.

Make sure the job is actually getting to the queue. See Viewing or Modifying Print Jobs in the Queue-Based Print Services documentation for more information.

## H4. Make sure the job is being redirected to the queue properly.

Many applications are not designed for network printing. CAPTURE is a command-line utility that configures print job redirection from applications not designed for NetWare® print services. See Setting Up CAPTURE for Applications Not Designed for Network Printing in the Queue-based Print Services documentation for more information. You can also use the Capture Printer Port function in the graphical Novell® Client™ management utility to perform the same tasks in Windows*.

## H5. Make sure the Printer Agent is configured to forward jobs to the queue.

NDPS™ users can submit jobs through NDPS Printer Agents to printers and print systems that still require queues, such as the following:

- Printers controlled by PSERVER.NLM (either locally attached or attached directly to the network) running on servers that have not been upgraded to NDPS

- Printers attached directly to the network that are configured for queue-server mode

- Mainframe systems using NetWare® HostPrint® and certain proprietary systems

See "Configuring Queue-Based Printers" on page 95 for more information.

# 7 Using Third-Party Gateways

A number of printer vendors have created their own gateways to run with Novell® Distriputed Print Services®.  The documentation for implementing these gatewas is in PDF format and  is located in the \NOVDOCS\DOC\ENGLISH\PDFDOCS directory on the Documentation CD.  Updated documentation for the gateways is located on the Novell DeveloperNet Web site (http://developer.novell.com/devres/nest/ndpsdown.htm).

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