

Novell NetWare® 6.5

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BLADE SERVER INSTALLATION GUIDE

April 6, 2005



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Novell, Inc.
404 Wyman Street, Suite 500
Waltham, MA 02451
U.S.A.

www.novell.com

NetWare 6.5 Blade Server Installation Guide

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About This Guide

This guide provides an overview of NetWare® 6.5 Blade Server installations. The guide is intended for network administrators and is divided into the following sections:

- ♦ Chapter 1, “Overview: Blade Servers and NetWare,” on page 11
- ♦ Chapter 2, “Preparing to Install NetWare,” on page 13
- ♦ Chapter 3, “CD-Based Attended Installation of NetWare,” on page 21
- ♦ Chapter 4, “CD-Based Unattended Installation of NetWare,” on page 59
- ♦ Chapter 5, “PXE-Based Automated Installation of NetWare,” on page 63
- ♦ Chapter 6, “Installing Products and Updates,” on page 87
- ♦ Appendix A, “Keyboard Commands,” on page 89

Documentation Updates

For the most recent version of the *NetWare 6.5 Blade Server Installation Guide*, see the [NetWare 6.5 Product Documentation Web site \(http://www.novell.com/documentation/nw65\)](http://www.novell.com/documentation/nw65).

Documentation Conventions

In this documentation, a greater-than symbol (>) is used to separate actions within a step and items in a cross-reference path.

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When a single pathname can be written with a backslash for some platforms or a forward slash for other platforms, the pathname is presented with a backslash. Users of platforms that require a forward slash, such as UNIX*, should use forward slashes as required by your software.

User Comments

We want to hear your comments and suggestions about this manual and the other documentation included with NetWare 6.5. To contact us, use the User Comments feature at the bottom of any page in the online documentation.

1

Overview: Blade Servers and NetWare

This section describes what blade servers are, what their advantages are compared to traditional PC-based or rack mounted servers, and the benefits of running NetWare® 6.5 on the blade server architecture.

What are Blades?

Blade servers are a new trend in data center technology. Hardware manufacturers combine all server system hardware—one or more microprocessors, memory, disk drives, and network controllers—onto a single electronic circuit board, or *blade*. The blades are designed to plug into a system chassis and share common components such as power supplies, fans, CD-ROM and floppy drives, Ethernet switches, and system ports. Blade servers are sometimes referred to as *headless* devices because they have no monitor or keyboard of their own.

Individual blade servers come in various heights, including 5.25 inches (3U), 1.75 inches (1U), and smaller. (A U is a standard measure of vertical height in an equipment cabinet and is equal to 1.75 inches.) The thin, modular design of these blades allows more computing power to exist in a smaller space than typical 1U rack servers.

Blade servers can help cut network administration costs and improve server manageability by consolidating many widely distributed servers onto one rack. This decreases the amount of space needed in a data center and eliminates the need to travel between server locations. The shared networking and power infrastructure reduces the number of cables coming off of a rack and lowers the chance of an administrator accidentally unplugging the wrong device. The reduced heat output and power consumption can also help trim energy costs.

Another advantage of blade deployment is the ease and speed with which you can add more servers. Rather than spending hours installing a rack-mounting rail kit, administrators can plug in a new blade server in seconds. Replacing a damaged server is just as quick. Each blade is completely independent of the others; inserting or removing a blade has no effect on any other operational blade in the same chassis.

Blade servers are ideal for organizations with large data centers and for those that use server farms to host Web sites. Blade servers are typically used in a server cluster that is dedicated to a single application (such as file sharing, Web page serving and caching, and streaming audio and video content). In a clustered environment, blade servers can be set up to perform load balancing and provide failover capabilities.

NetWare 6.5 on Blades

NetWare 6.5 Support Pack 3 is a reliable, cost-effective platform for delivering secure, nonstop access to network and information resources and is engineered to host business-critical, open source-enabled services. NetWare 6.5 gives you choice and flexibility, creating greater application inter-operability, continuous availability, and tools that deliver new levels of productivity.

NetWare 6.5 easily installs on blade servers, either from an attached CD-ROM drive or using a PXE server to load a server image. You can then run your company's Web applications on reliable, stable NetWare blade servers, consolidate data storage for these blade servers on your company's SAN or NAS device, and simplify data management for the applications running on these blade servers using read-only volumes.

What's Next

To take advantage of the benefits offered by NetWare on blades, start by installing NetWare 6.5 on your blade server.

If your blade hardware manufacturer provides a NetWare deployment option, follow those procedures instead of the ones provided in this manual.

This manual describes how to perform an attended or unattended CD-based installation (using either IDE or USB CD-ROM drives) and a PXE-based installation using third-party disk imaging products. Whichever method you choose, start with [Chapter 2, "Preparing to Install NetWare," on page 13](#).

2

Preparing to Install NetWare

This chapter describes the conditions and requirements for installing NetWare® 6.5 onto blade server hardware. The preparatory steps discussed in this chapter apply for all of the installation methods outlined in subsequent chapters:

- ♦ “Meeting Hardware and Software Requirements” on page 13
- ♦ “Plan Your NetWare 6.5 Deployment” on page 14
- ♦ “NetWare Installation Prerequisites” on page 16
- ♦ “Preparing the Network with Deployment Manager” on page 17
- ♦ “What’s Next” on page 19

Meeting Hardware and Software Requirements

NetWare 6.5 will run on blade server hardware that has been approved by the manufacturer for running the NetWare 6.5 operating system. For more information on system specifications, contact the hardware manufacturer.

Meeting Hardware Requirements

Blade server hardware that has been approved for running NetWare 6.5 is listed on the [Novell Partner Products Web site \(http://www.novell.com/blade\)](http://www.novell.com/blade). Refer to this site for more information about hardware requirements.

If you plan to use one of the CD-based methods for installing NetWare onto your blade server hardware, the blade server will need access to a bootable CD drive that supports the El Torito specification.

Novell recommends that you install NetWare onto a clean, error-free disk drive. You should back up and remove any valuable files from the blade server’s disk drives prior to installing NetWare.

Software Requirements

You should download the NetWare 6.5 SP3 CD overlay ISO images and burn them to CDs for use when installing NetWare.

At the minimum, you need the following:

- NetWare 6.5 SP3 CD 1 (Operating System)*
- NetWare 6.5 SP3 CD 2 (Products)*
- NetWare 6.5 License/Cryptography* diskette or license files

Other Software

If you want to run the NetWare installation program from a source NetWare server on the network, you need the following:

- IP Server Connection Utility (for installing from a NetWare server running TCP/IP)

The IP Server Connection Utility is available from Novell. See [TID 10074248 \(http://support.novell.com/cgi-bin/search/searchtid.cgi?/10074248.htm\)](http://support.novell.com/cgi-bin/search/searchtid.cgi?/10074248.htm) for information about the `srvinst2.exe` download file.

This utility lets you log in to the source NetWare server from DOS on the machine you have prepared for NetWare 6.5. It provides a basic IP connection to complete an across-the-wire installation. Instructions are included with the download.

or

- Novell Client for DOS and Windows 3.1x (for installing from a NetWare server running IPX™)

This Novell Client version is no longer available for download. However, you might be able to find and use the Novell Client for DOS in an older NetWare software package.

Plan Your NetWare 6.5 Deployment

The information you need to gather and basic decisions you need to make before installing NetWare 6.5 are outlined below.

Determine What Services to Install

Novell networking services delivered as part of NetWare 6.5 include the following:

- ◆ Directory services and identity management including Novell eDirectory™ and Identity Manager
- ◆ File services including Novell Storage Services™ (NSS) and Novell iFolder®
- ◆ Print services including Novell iPrint
- ◆ Collaboration services including Virtual Office
- ◆ Open source services including Apache, Tomcat, MySQL*, and PHP/Perl
- ◆ Management consoles and interfaces common to all services through Novell iManager

The services you choose to install will depend largely on the intended purpose of your NetWare 6.5 server.

To simplify the process of installing special-purpose servers, Novell provides a patterned deployment feature. For example, if you want to install a NetWare 6.5 server with all of the components necessary to support a Web-based, user-configurable collaboration environment, you simply select the Virtual Office Server pattern during the NetWare installation.

Novell recommends that you choose a pattern installation if one exists for the intended purpose of your server. Options are also provided to install basic and customized NetWare servers.

Plan Your eDirectory Tree

If you are creating a new eDirectory tree on your network, you must do some additional planning before you install the first server into the tree.

The first server you install into a new eDirectory tree is important for two reasons: first, you create the basic structure of the tree during the server installation; second, this server will permanently host the Certificate Authority for your organization.

To ensure that your eDirectory tree meets your needs, take time to plan the following:

- ◆ Structure of the eDirectory tree. A well designed tree provides containers for servers, users, printers, etc. It is also optimized for efficient data transfer between geographically dispersed locations.
- ◆ Partitions and replicas. eDirectory allows the tree to be partitioned for scalability. Replicas (copies) of the partitions provide fault tolerance within the tree. The first three servers installed into an eDirectory tree automatically receive replicas of the tree's root partition. You might want to create additional partitions and replicas.
- ◆ Time synchronization. eDirectory requires that all NetWare servers be time synchronized. By default, the NetWare installation synchronizes time automatically with the first server in the tree. However, you might want to synchronize with an external time source using Network Time Protocol (NTP).

For more information on the eDirectory tree planning, see the *Novell eDirectory 8.7.3 Administration Guide*.

For more information on time synchronization with NTP, see the *Novell Network Time Protocol Administration Guide for OES*.

Rights Required for Installing NetWare Servers

To install the first NetWare 6.5 server in an eDirectory tree, the user who installs the server must have the Supervisor right at the [Root] of the eDirectory tree. If you are installing the server into a new tree, the Admin user that is created during the NetWare Install program has full rights to the root of the tree. Using the Admin account allows the installer to extend the eDirectory schema for NetWare 6.5 as necessary.

If you are installing the first NetWare 6.5 server into an existing NDS[®]/eDirectory tree, be sure to run the Novell Deployment Manager first to prepare the tree so it is compatible with the version of eDirectory that comes with NetWare 6.5. Deployment Manager requires access to a server with a Read/Write replica of the Root partition. See *“Preparing the Network with Deployment Manager” on page 17* for more information.

Rights Required for Subcontainer Administrators

For security reasons, you might want to create one or more subcontainer administrators with sufficient rights to install additional NetWare servers, without granting them full rights to the entire tree. A subcontainer administrator needs the following rights to install a NetWare server into the tree:

- Supervisor right to the container where the server will be installed
- Read right to the Security container object for the eDirectory tree
- Read right to the NDSPKI:Private Key Attribute on the Organizational CA object, which is located in the Security container
- Supervisor right to the W0 object located inside the KAP object in the Security container

These rights are typically granted by placing all administrative users in a Group or Role, and then assigning the above rights to the Group or Role.

Some of the products that can be selected to install along with NetWare 6.5 require schema extensions of their own. Only an administrator with rights at [Root] can extend the schema of an eDirectory tree; a subcontainer administrator would not have sufficient rights. One way to work around this is to have a root administrator install a NetWare 6.5 server with all products selected. This would take care of extending the schema for every possible server configuration. Subcontainer administrators could then install subsequent NetWare servers without having to worry about schema extensions.

Another option is to run the new Schema Update utility in Deployment Manager. This utility prompts you to select an NDS/eDirectory tree and then gives you the opportunity to select the products you plan to install on servers in that tree. After you have confirmed your product selections, the utility updates eDirectory with required and product schema extensions.

By default, the first three servers installed in an eDirectory partition will automatically receive a replica of the partition. To install a server into a partition that does not already contain three replica servers, the user must have either Supervisor rights at the [Root] of the tree or administrative rights to the container in which the server holding the partition resides.

Gather Server Hardware and IP Address Information

The NetWare installation program can automatically detect many network boards and disk storage devices and load the appropriate drivers. If you have hardware for which drivers are not included in NetWare, you need to know the device properties, such as the interrupt and port address.

For more information, contact the server hardware manufacturer.

If you plan to connect your server to the Internet using Internet Protocol (IP), you need the following configuration information:

- ◆ An IP address, subnet mask, and router (gateway) address
- ◆ The IP address of one or more domain name servers
- ◆ The name of your domain

To obtain this information, consult your network administrator or Internet service provider (ISP).

NetWare Installation Prerequisites

Depending on your NetWare and NDS/eDirectory versions, certain conditions must be met before you can install a NetWare 6.5 server into an existing network.

- ◆ Install a NetWare 6.5 server into a tree that has Novell® eDirectory™ 8.7 or later.

Installing into a tree with a version earlier than eDirectory 8.7 can make User objects unmanageable when using management utilities other than those that ship with NetWare 6.5.

- ◆ The server cannot be installed in a tree that contains NetWare 4.10 servers. All servers in the tree must be NetWare 4.11 or later.
- ◆ To ensure that Licensing works properly, all NetWare 4 and 5 servers in your tree need to be at the following minimum Support Pack level:

NetWare 4.11 and 4.2 servers must be at Support Pack 6a or later

NetWare 5.0 servers must be at Support Pack 4 or later

NetWare 5.1 servers must be at Support Pack 3 or later

NOTE: Novell recommends installing the latest Support Packs on all NetWare servers in your tree.

- ◆ Before you introduce a NetWare 6.5 server into an existing network, you must run the Novell Deployment Manager to update the network. See “[Preparing the Network with Deployment Manager](#)” on page 17 for more information.

Preparing the Network with Deployment Manager

Before you introduce a NetWare 6.5 blade server into an existing network or upgrade a blade server to NetWare 6.5, you must run the Novell Deployment Manager to update the network.

- 1** On a Windows 2000 or Windows XP Professional Edition workstation that has the latest Novell Client™ software installed on it, log in to your existing network as a user with the Supervisor right.

If you are prompted to log in again while running Deployment Manager, you can specify the IP address of the server by clicking Details.

- 2** Insert *NetWare 6.5 SP3 CD 1 (Operating System)*.

If you want to run the browser-based version of Deployment Manager and you have an Internet Explorer 5 or 6 browser installed, run `nwdeploy.exe` located at the root of the CD.

If you prefer to run a standalone version of Deployment Manager that does not require a browser, run `nwdeploynobrowser.exe` located at the root of the CD.

- 3** In the left frame of the Deployment Manager window, under the Network Preparation heading, click the Overview link to review the tasks that are available:

- ◆ Back Up Data
- ◆ Search Tree for eDirectory and NDS versions
- ◆ Prepare for New eDirectory
- ◆ Generate GUIDs on NetWare 4 Servers (Conditional)
- ◆ Prepare a Server for Upgrade
- ◆ Prepare a Novell Cluster for Upgrade (Conditional)
- ◆ Update the Certificate Authority (CA) Object
- ◆ Prepare for Universal Password
- ◆ Prepare for CIFS/AFP
- ◆ Verify NCI Keys
- ◆ Schema Update

- 4** Under the Network Preparation heading, click the Back Up Data link and follow the instructions that display to back up any server data and Novell eDirectory data.

Backing up your data is an optional step, but one that we recommend you complete.

- 5** Under the Network Preparation heading, click the Search Tree for eDirectory/NDS Versions link to update the NDS in your tree to a level that is compatible with the version of eDirectory installed by NetWare 6.5.

(Conditional) If the tree is using NDS, a compatible version of NDS *must* be running on all servers in the tree.

The View and Update NDS utility checks the NetWare and NDS versions of all servers and updates NetWare 4/NDS 6 and NetWare 5/NDS 7 servers to be compatible with eDirectory. It does not update NetWare servers already running eDirectory.

- 6** Under the Network Preparation heading, click the Prepare for New eDirectory link and follow the displayed instructions to extend the network schema.

This ensures that the new NetWare 6.5 server can communicate with an existing NDS/eDirectory tree.

This step requires that you have already updated NetWare 4/NDS 6 and NetWare 5/NDS 7 and 8 servers to be compatible with eDirectory as described in [Step 5](#). It also requires access to a server with a Read/Write replica of the Root partition.

- 7** (Conditional) If you have NetWare 4.11 or 4.2/NDS 6 servers in your tree, under the Network Preparation heading, click the Generate GUIDs on NetWare 4 Servers link and follow the instructions to generate the necessary GUIDs.

IMPORTANT: The GUID generator in Deployment Manager does not work with NetWare 4.10 servers, only with 4.11 or 4.2 servers. If there is a NetWare 4.10 server in your tree, it must be removed or you cannot install a new NetWare 6.5 server.

This step requires you to update NetWare 4.11 or 4.2/NDS 6 servers to be compatible with eDirectory and to extend the core schema of your tree, as described in [Step 5](#) and [Step 6](#). [Step 5](#) copied a new ds.nlm and a new sguid.nlm that support GUID generation to each selected NetWare 4 server. With these updated files in place, and with the core schema extended and synchronized, when ds.nlm is restarted on a NetWare 4.11 or 4.2/NDS 6 server it automatically generates GUIDs for objects in master replicas on that server.

Even though the new GUID generator for NetWare 4 helps to avoid GUID compatibility issues, problems can still occur. Always back up all file system trustees before any upgrade or migration to NetWare 6.5. If a problem does occur, see [TID# 10078892 - Trustee Assignments Appear to No Longer Work After NetWare 4x to NetWare 6x Upgrade](#) (<http://support.novell.com/cgi-bin/search/searchtid.cgi?/10078892.htm>) for more information.

- 8** Under the Network Preparation heading, click the Prepare a Server for Upgrade link and follow the displayed instructions to run a health check on the server that you are upgrading to NetWare 6.5.

The utility found in this section will perform a general health check on your server to ensure that the server meets the minimum requirements for the upgrade. This utility will report if problems are detected that could cause the upgrade to fail.

NOTE: Any references to upgrading, with respect to blade hardware, are limited to NetWare 6.5 to NetWare 6.5 upgrades.

- 9** (Conditional) If you are upgrading a cluster of NetWare servers, under the Network Preparation heading, click the Prepare Cluster for Upgrade link to follow the instructions to run the Prepare a Novell Cluster for Upgrade program.
- 10** Click the Update Certificate Authority Objects link under the Network Preparation heading and follow the instructions displayed to create or update a Security container object and a Certificate Authority (CA) object.

Novell Certificate Server™ is an integrated Public Key Infrastructure (PKI) built in to eDirectory. The NetWare installation process uses Novell Certificate Server to create an Organizational Certificate Authority and to issue certificates for applications that consume Secure Socket Layer (SSL) services.

Novell delivered a base-level PKI with NetWare 5.0. Because your network might be configured with the NetWare 5.0 PKI, you should follow the steps outlined here to properly

upgrade from the NetWare 5.0 PKI and to correctly configure your network for Novell Certificate Server.

- 11** Click the Prepare for Universal Password link under the Network Preparation heading, read the explanation of the Universal Password feature of NetWare 6.5, click the Universal Password Deployment Guide link, then follow the step-by-step instructions in the deployment guide for setting up the Universal Password feature.
- 12** Click the Prepare for CIFS/AFP link under the Network Preparation heading and follow the instructions displayed to prepare your new NetWare 6.5 server so CIFS (Microsoft Windows native networking workstations) and AFP (Apple Macintosh native networking workstations) users can log in to it.
- 13** Click the Verify NCI Keys link under the Network Preparation heading and follow the instructions displayed to check your eDirectory tree for SDI key consistency.
- 14** (Optional) Click the Schema Update link under the Network Preparation heading and follow the instructions displayed to update the eDirectory schema for products that you intend to install on your servers.

This eliminates the need for future server installers to have Admin rights to the root of the tree.

After you have completed the tasks in the Network Preparation section, exit Deployment Manager and begin the NetWare 6.5 blade server installation.

What's Next

If you want to do an attended CD-based installation of NetWare 6.5, continue by completing the tasks described in [Chapter 3, “CD-Based Attended Installation of NetWare,”](#) on page 21.

If you want to do an unattended CD-based installation of NetWare 6.5, continue by completing the tasks described in [Chapter 4, “CD-Based Unattended Installation of NetWare,”](#) on page 59.

If you want to do an automated PXE-based installation of NetWare 6.5, continue by completing the tasks described in [Chapter 5, “PXE-Based Automated Installation of NetWare,”](#) on page 63.

3

CD-Based Attended Installation of NetWare

This chapter describes how to do an attended installation of NetWare® 6.5 on a blade server using an IDE or USB CD-ROM drive. If you want to do an unattended CD-based installation using a response file, see [Chapter 4, “CD-Based Unattended Installation of NetWare,” on page 59](#). If you want to do an automated PXE-based installation, see [Chapter 5, “PXE-Based Automated Installation of NetWare,” on page 63](#).

Installing a new blade server in attended mode using an attached CD-ROM drive is similar to performing a PC-based installation of NetWare. The process includes the following tasks:

- ◆ [Starting the Installation Program \(page 21\)](#)
- ◆ [Selecting the Initial Installation Settings \(page 22\)](#)
- ◆ [Choosing a Server Pattern \(page 27\)](#)
- ◆ [Naming the Server \(page 42\)](#)
- ◆ [Enabling Cryptography \(page 44\)](#)
- ◆ [Installing Networking Protocols \(page 45\)](#)
- ◆ [Setting Up Domain Name Service \(page 48\)](#)
- ◆ [Setting the Server Time Zone \(page 49\)](#)
- ◆ [Setting Up Novell eDirectory \(page 50\)](#)
- ◆ [Licensing the NetWare 6.5 Server \(page 52\)](#)
- ◆ [Selecting the Login Method \(page 52\)](#)
- ◆ [Completing the Server Installation \(page 58\)](#)

Starting the Installation Program

Before you begin the NetWare installation, make sure you have completed the preparatory steps outlined in [Chapter 2, “Preparing to Install NetWare,” on page 13](#).

IMPORTANT: If necessary, download the NetWare 6.5 SP3 Operating System and Products overlay images from [Novell's Product Download Web site \(http://www.novell.com/download\)](http://www.novell.com/download) and burn them to CDs before proceeding.

To begin the installation:

- 1** Assign a monitor, mouse, keyboard, and CD-ROM drive to the blade server following the manufacturer's recommendations.
- 2** Insert *NetWare 6.5 SP3 CD 1 (Operating System)* into the blade server's assigned CD-ROM drive.
- 3** Reboot the blade server hardware or, if you have access to the CD drive prompt, enter **install**.

Running the Installation Program

The remainder of this chapter describes how to run the NetWare Install program in attended mode.

Anticipating Installation Issues

- ◆ If a problem occurs (critical errors, the installation fails, etc.) during the installation procedure *before* the file copy and the Operating System installation is complete, you must start the installation again from the beginning.

If a problem occurs (critical errors, the install fails, etc.) during the product installation procedure *after* the file copy and the OS install is complete, the installation will finish. An error will be generated telling you which individual product installation failed, but the remaining products will install normally.

- ◆ For a complete list of known issues in this release of NetWare 6.5, see the “Installation/Upgrade” section of the *NetWare 6.5 Support Pack 3 Readme*.

Navigating in the Character-Based Screens

The initial screens of the installation program display in text-based mode. Auto-detected and default settings appear on each screen.

You can accept the detected and default settings, or you can modify the settings to meet the needs of your networking environment.

NOTE: To continue the installation with the standard settings, use the arrow keys to select Continue in the Options box and then press Enter.

To modify the settings, use the arrow keys to select Modify in the Options box and then press Enter. Select the field to be modified and press Enter. Select or enter the appropriate value.

Some screens require additional keystrokes in order to navigate through the interface. Information about screen navigation appears at the bottom of each screen.

Selecting the Initial Installation Settings

The initial server installation settings include choosing the language and regional settings, accepting the license agreements, and deciding whether to do a default or manual installation.

- 1** Select the language for the install, then press Enter.

This setting specifies the language for the install program only. You can select other language options, such as the language for the users or the operating system, later during the installation.

The next screen allows you to modify the regional settings.

- 2** Accept or change the default regional settings.

The defaults are the following:

- ◆ Country Code: 001 (USA)
- ◆ Codepage: 437 (United States English)
- ◆ Keyboard: United States

To accept the defaults, select Continue and press Enter.

To change the settings, select Modify and press Enter.

- 3** Press F10 to accept the Novell Software License Agreement.
- 4** Press F10 to accept the JReport Runtime License Agreement.

NOTE: Accepting each License Agreement means that you have read and agreed to the terms and conditions contained in the License Agreement.

Selecting Default or Manual Installation

The next screen allows you to select either a Default Installation or a Manual Installation.

The Default Installation automatically detects drivers and installs the NetWare server with the following default settings:

- ◆ 100 MB DOS partition (unless you have already created a larger one)
- ◆ 4 GB (4000 MB) volume sys: —any remaining disk space will be left as free space
- ◆ LAN and disk drivers auto-discovered and loaded
- ◆ Video mode: Super VGA Plug N Play
- ◆ Mouse: Auto-discovered and loaded

The Manual Installation allows you to choose specific configuration options for your networking environment. It also allows for the manual configuration of the default settings used in the Default Installation. You must choose Manual Installation to create volumes other than the sys: volume during the install.

NOTE: If you select a Default installation, you will still have the chance later in the installation to select the individual products that you want to install. You can also create additional volumes after the server is installed.

Default Installation

To choose the Default installation option:

- 1** If necessary, press Enter to toggle the install option to Default.
- 2** (Optional) If you have previously prepared a response file to automate the server installation, press F3 to specify the full path name of the response file.
- 3** Select Continue and press Enter.

A screen is displayed showing the default settings for the size of the sys: volume, LAN and disk driver discovery, and video mode.

- 4** Complete one of the following:
 - ◆ If you need to change the default settings, select Back and press Enter. This takes you back a screen so you can select the Manual installation option.
 - ◆ Select Continue and press Enter.

Prepare Boot Partition

If you have an existing boot partition on the server, but the NetWare Install program determines that it is not big enough for the install to continue, you will see an error message to that effect. Press Enter to see the Prepare Boot Partition screen showing the current settings for the DOS partition, NetWare partition (if any), and free space.

To modify the partition settings:

1 On the Prepare Boot Partition screen, select Modify and press Enter.

2 Make the desired changes.

You must delete the existing DOS partition in order to create a new one. Follow the on-screen prompts to complete the operation.

3 Select Continue and press Enter.

A screen is displayed showing the settings for the size of the sys: volume, LAN and disk driver discovery, and video mode.

4 Select Continue and press Enter.

To continue the Default installation, skip to [“Switch to Graphical Display Mode” on page 26](#).

Manual Installation

To choose the Manual installation option:

1 Press Enter to toggle the Default or Manual installation option to Manual.

2 (Optional) If you have previously prepared a response file to automate the server installation, press F3 to specify the full path name of the the response file.

3 Select Continue, then press Enter.

Prepare Boot Partition

The Prepare Boot Partition screen displays the default settings for the DOS partition, NetWare partition, and free space.

To accept the default settings:

1 Select Continue, then press Enter.

To modify the default settings:

1 On the Prepare Boot Partition screen, select Modify and press Enter.

2 Make the desired changes.

3 Select Continue, then press Enter.

Server Settings

The following defaults are set:

- ◆ A server ID number is provided.
- ◆ The option to load the server at reboot is set to Yes.

If you don't want to automatically restart the NetWare server after a reboot, change the setting to No.

- ◆ The option to modify the boot sector is set to DOS.

If NetWare is selected and DOS is the OS that normally boots when the system comes up, then the installation will modify the boot sector to load NetWare instead of DOS.

If DOS is selected and NetWare is the normal boot OS, then the installation will restore the DOS boot sector.

- ◆ The option to allow unsupported drivers is set to No.
If Yes is selected, then drivers that have not been tested and approved for NetWare are automatically selected and loaded if no other drivers are available.
- ◆ The video option is set to SVGA Plug N Play.

To modify any of these default settings or to edit the server SET parameters:

- 1** Select Modify and press Enter.

If you choose to edit the server SET parameters, a screen will display where you can specify new SET parameters or other commands (Load, etc.). SET parameters specified here are saved and run from the server's registry. All other commands specified here are saved and run from the startup.ncf file.

- 2** Make any desired changes.
- 3** Select Continue and press Enter.

Device Driver Settings

A file copy procedure begins to copy the necessary NetWare server files to the boot partition. After the file copy, the device drivers will be detected and you will be presented with a screen or screens where you can modify these settings.

If you do not want to modify the settings:

- 1** Select Continue and press Enter.

If you want to modify the settings:

- 1** Select Modify and press Enter.
- 2** Make any desired changes.
- 3** Select Continue and press Enter.

Existing NetWare Partition or Volume

The Novell Storage Services Management Utility (NSSMU) now displays. NSSMU is a console-based utility for managing storage devices on a server. NSSMU is the interface you use to set up at least your basic storage volumes during the installation of NetWare 6.5 and later.

If an existing NetWare partition or volume is discovered on the server, NSSMU indicates this. You are given two options: 1) Remove only the NetWare sys: volume and pool/partitions, 2) Remove all NetWare volumes and partitions.

- 1** Select the desired option.
- 2** Press Enter.

You next see a Create SYS Volume screen.

- 1** Select the sys: volume size option.
- 2** Specify the desired size of the sys: volume in MB.
- 3** Press Enter to select the Create option.
- 4** Press Enter again.

You now see the NSSMU Main Menu screen. On this screen, you can create or modify devices, partitions, pools, raid devices, and volumes.

To create or modify any of the options presented:

- 1 Select the desired option and press Enter.
- 2 Follow the on-screen prompts then, when finished, return to the Main Menu.
For more information, see “NSSMU” in the *NetWare 6.5 Utilities Reference*.
- 3 Select the Continue Installation option and press Enter.

Switch to Graphical Display Mode

The NetWare system files are copied to volume sys:. The file copy process takes several minutes.

If you are installing from the network, you are prompted to reconnect to the network. To continue the installation, type the password for the user that originally logged in. The file copy process continues for a few minutes. The NetWare installation program then switches to graphical display mode.

Although a mouse is recommended, you can use keyboard commands to navigate through the installation program. For more information on keyboard commands, see [Appendix A, “Keyboard Commands,” on page 89](#) for a table listing the graphical mode keyboard actions.

The following sections explain how to complete the NetWare installation.

Selecting the NetWare 6.5 SP3 Installation Option

In the Select Installation Type screen, you are prompted to select either Open Enterprise Server or NetWare 6.5 SP3 as the type of installation you require.

Open Enterprise Server

Open Enterprise Server includes NetWare 6.5 with Support Pack 3 fixes, and the following updated products:

- ◆ iManager 2.5
- ◆ Virtual Office 1.5
- ◆ QuickFinder Server 4.0 (replaces NetWare Web Search Server)

Select this option if you want to install any of these updated products. They will not be available for selection if you choose the NetWare 6.5 SP3 option.

IMPORTANT: There are new features in these three products that might affect your current NetWare 6.5 experience. See for details.

NetWare 6.5 SP3

NetWare 6.5 Support Pack 3 includes all the traditional NetWare 6.5 products. Three of these are different than the products available in OES NetWare:

- ◆ iManager 2.0.2
- ◆ Virtual Office 1.0
- ◆ NetWare Web Search Server

Select this option if you want a traditional Support Pack installation of NetWare 6.5 and do not want to install new versions of iManager, Virtual Office, and Web Search Server at this time.

You can run the product installation later and install iManager 2.5, Virtual Office 1.5, and QuickFinder Server 4.0. See the documentation for these products for more information.

Differences Between NetWare 6.5 SP3 and OES NetWare

iManager 2.5, which is included in OES NetWare, offers enhanced performance and a new administration interface that does not manage Virtual Office 1.0. For information about other changes from version 2.0.2, see the *Novell iManager 2.5 Administration Guide*.

In Virtual Office 1.5, which is included in OES NetWare, the administration interface has been removed from iManager and incorporated into Virtual Office. iManager 2.5 does not manage Virtual Office 1.0. For information about the new administration interface, see the *Novell Open Enterprise Server Virtual Office Configuration Guide*.

QuickFinder Server 4.0 is a Web and file system search engine that includes several new and enhanced features. Installing QuickFinder Server into an existing Web Search Server installation will require that you reindex the data. For more information, see the *QuickFinder Server 4.0 Administration Guide*.

Choosing a Server Pattern

After the file copy is complete, the Choose a Pattern page displays and you are given the opportunity to select the type of server you want to install. Clicking on the name of the special-purpose server (pattern) displays a description of that server in the Description window.

The following types of pattern installations are available in NetWare 6.5 SP3:

- ◆ [Customized NetWare Server \(page 28\)](#)
- ◆ [Basic Netware File Server \(page 30\)](#)
- ◆ [Pre-Migration Server \(page 30\)](#)
- ◆ Pre-Configured Servers
 - ◆ [DNS/DHCP Server \(page 31\)](#)
 - ◆ [exteNd J2EE Web Application Server \(page 32\)](#)
 - ◆ [LDAP Server \(page 33\)](#)
 - ◆ [NetWare AMP \(Apache, MySQL, PHP, and PERL\) Server \(page 34\)](#)
 - ◆ [NetWare Backup Server \(page 34\)](#)
 - ◆ [QuickFinder Server \(page 35\)](#)
 - ◆ [Network Attached Storage \(NAS\) Server \(page 36\)](#)
 - ◆ [Novell iPrint Server \(page 36\)](#)
 - ◆ [Apache/Tomcat Server \(page 37\)](#)
 - ◆ [Novell Nsure Audit Starter Pack Server \(page 38\)](#)
 - ◆ [iSCSI SAN Storage Server \(page 38\)](#)
 - ◆ [Management Server \(page 39\)](#)
 - ◆ [Novell iFolder Storage Services \(page 40\)](#)
 - ◆ [Virtual Office Server \(page 41\)](#)

The following sections provide additional information about the individual installation types and the products that they will install on your server.

Customized NetWare Server

This option gives you the freedom to install any combination of products you want.

After you select Customized NetWare Server and click Next, the Components page displays and you can choose which additional components to install.

To view a description of a component, place the cursor over the component name.

To select additional components to install, click the check box next to each component you want to install and then click Next.

The displayed default selections can be deselected if desired.

NOTE: The iManager installation might take up to 15 minutes to complete. During this installation, the page will not change.

The Customized NetWare Server pattern gives you the flexibility to install any of the NetWare files needed for setting up a server. The following table shows some of the components that you might want to select and the reasons for choosing them.

Component	Reason to Select
iPrint	Required for setting up printing on this server. If you select this option, select iManager also.
Novell DNS/DHCP Services	Required for setting up DNS or DHCP services on this server. If you select this option, select iManager also.
Novell iFolder [®] Storage Services	Lets you set up a software solution that lets your user's files follow them across multiple workstations and the Internet. Selecting this component also requires you to select these components: <ul style="list-style-type: none">◆ Apache 2 Web Server and Tomcat 4 Servlet Container◆ iManager◆ Refresh Native File Access Login Methods◆ WAN Connectivity

Component	Reason to Select
Novell iManager	<p>Required component for completing any of the Small Business Setup tasks. Setting up the server using the Small Business tasks requires you to select these components:</p> <ul style="list-style-type: none"> ◆ Apache 2 Web Server and Tomcat 4 Servlet Container ◆ GroupWise and Messenger File Copy ◆ iPrint ◆ Novell DNS/DHCP Services ◆ Novell iManager ◆ WAN Connectivity <p>Selecting this component also requires you to select these components:</p> <ul style="list-style-type: none"> ◆ Novell eGuide ◆ Refresh Native File Access Login Methods
Novell Virtual Office Framework	<p>Lets you set up a software solutions that let users set up and manage many of their own networking, information sharing, and data backup processes. It also lets users create project teams, organize projects, and collaborate with team members in real time from any location. Virtual Office optimizes the concept of self service for users, which significantly reduces support calls.</p> <p>Selecting this component also requires you to select these components:</p> <ul style="list-style-type: none"> ◆ Apache 2 Web Server and Tomcat 4 Servlet Container ◆ iPrint ◆ NetWare Web Search Server ◆ Novell eGuide ◆ Novell iFolder Storage Services ◆ Novell iManager ◆ Novell NetStorage ◆ Refresh Native File Access Login Methods ◆ WAN Connectivity
WAN Connectivity	<p>Required for setting Internet connectivity on this server. If you select this option, select iManager also.</p>

The following product components are installed by default and are needed for basic server operation. They are copied to the server when you select a Customized server type or any of the pattern installation options.

Table 1 Default Components Installed with Customized and Preconfigured Server Patterns

Components	
Apache 2 Admin Server 2.0.52	Novell Licensing Services 5.0.2
Beans for Novell Services 1.1.0	Novell Modular Authentication Services (NMAS™) 2.3.7

Components	
ConsoleOne® 1.3.6d and Reporting Snapin	Novell Script for NetWare 2.0 (for PHP and Perl support)
eDirectory™ 8.7.3.5	Novell TLS Library 1.8.3
eDirectory Management Utilities Toolbox 8.7.3	Perl 5.8.4
LDAP Services 8.7.3	PHP 5.0.3
NDS iMonitor Services 2.3.0	Pervasive* SQL* 2000i 7.9.4
Novell Remote Manager (NRM) 3.0.1	Secure Authentication Services 1.7.5
Novell Certificate Server 2.7.6	Tomcat 4 Admin Instance 4.1.30
Novell International Cryptographic Infrastructure (NICI) 2.6.6	

After selecting the components and clicking Next, continue with [“Verifying Products to Install” on page 42.](#)

Basic Netware File Server

This option installs only the basic NetWare operating system. This option is appropriate if you want to get the server up and running quickly and install products later. The Basic NetWare File Server option copies only the files needed for a basic NetWare server, which are those installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

Pre-Migration Server

This option installs a NetWare server that an existing server will be migrated to at a later time using the NetWare Migration Wizard Utility. The Migration Wizard Utility connects the servers involved in a migration using one of two methods, SLP or the sys:\etc\hosts file.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The Pre-Migration Server option copies only the files needed for a Pre-Migration server, including those for the following products:

- ◆ eDirectory
- ◆ NDS iMonitor Services

- ◆ Novell Remote Manager
- ◆ Novell Certificate Server
- ◆ Novell International Cryptographic Infrastructure (NICI)
- ◆ Novell Licensing Services
- ◆ Novell Modular Authentication Services
- ◆ Novell Script for NetWare (for PHP and Perl support)
- ◆ Novell TLS Library
- ◆ Pervasive SQL 2000i
- ◆ Perl
- ◆ PHP
- ◆ Secure Authentication Services
- ◆ Storage Management Services (SMS)

In order to successfully complete a migration, either the `sys:\etc\hosts` file on the Pre-Migration Server must contain the IP address and server name of the source server involved in the migration, or SLP must be configured on the Pre-Migration Server.

For instructions on how to configure SLP on this server, see [“Installing IP and IPX” on page 46](#).

After completing the Pre-Migration Server installation, to modify the `sys:\etc\hosts` file on the Pre-Migration Server:

- 1** At the Pre-Migration Server’s server console, enter **edit**.
- 2** Press the Insert key.
- 3** Select `sys:`, then press Enter.
- 4** Select `etc`, then press Enter.
- 5** Select `hosts`, then press Enter > Enter.
- 6** Add the IP address and server name of the source server involved in the migration project.
Type the IP address and server name as `xxx.xxx.xxx.xxx Server_Name`.
- 7** Save the file.
- 8** Run the migration project.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42](#).

DNS/DHCP Server

This option integrates the Domain Name System (DNS) and Dynamic Host Configuration Protocol (DHCP) into the eDirectory database. Integrating these services into eDirectory provides centralized administration and enterprise-wide management of network (IP) addresses, configuration, and hostnames.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The DNS/DHCP Server option extends the schema for DNS/DHCP and creates a dedicated DNS/DHCP server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ Novell DNS/DHCP Services 6.1
- ◆ Novell iManager 2.5
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring DNS/DHCP after the installation, see the *OES Novell DNS/DHCP Services Administration Guide for NetWare*.

If you selected the DNS/DHCP Server option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

exteNd J2EE Web Application Server

This option installs a highly optimized configuration of the Novell exteNd™ Application Server (Enterprise Edition), a comprehensive J2EE server for deploying enterprise-class Web applications. It supports the full Java 2 Enterprise Edition standard: JavaServer* Pages (JSP pages), Enterprise JavaBeans* (EJBs), and all other J2EE 1.3 components and technologies. The Novell exteNd Application Server provides high performance, scalability, and reliability; support for rapid application development; application deployment facilities; and server management facilities.

Also included:

- ◆ A complete set of Web Services for building SOAP (Simple Object Access Protocol)-based applications that can use either the light or enterprise edition of the Novell UDDI server.
- ◆ Several working samples that can be modified for your own use. These include the J2EE Pet Store and SilverBooks, both examples of a simple ecommerce application.

IMPORTANT: You must also install Novell exteNd Workbench, the integrated development environment (IDE) designed specifically to help you build Web Services and J2EE applications and then deploy them to your J2EE server. For information on installing Novell exteNd Workbench, see the [Novell exteNd Workbench Release Notes \(http://www.novell.com/documentation/lg/workbench41/docs/relnotes.html\)](http://www.novell.com/documentation/lg/workbench41/docs/relnotes.html).

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The exteNd J2EE Web Application Server option creates a J2EE and Web Services server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Admin Server and Tomcat 4 Servlet Container
- ◆ Apache 2 Web Server
- ◆ exteNd J2EE Web Application Server 5.1
- ◆ MySQL
- ◆ Novell eGuide
- ◆ Novell iManager 2.5
- ◆ Refresh Native File Access Login Methods
- ◆ WAN Connectivity
- ◆ WAN Traffic Manager Services
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring an exteNd J2EE Web Application Server after the installation, see the Novell exteNd Application Server help.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

LDAP Server

This option installs Lightweight Directory Access Protocol (LDAP) Services for Novell eDirectory. This is a server application that lets LDAP clients (for example, Netscape* Communicator, Internet Explorer, or the Novell Import Conversion Export utility) access information stored in eDirectory. LDAP Services includes access to the following eDirectory features through LDAP: provisioning, account management, authentication, authorization, identity management, notification, reporting, qualification, and segmentation.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The LDAP Server option creates an LDAP server by copying only the files needed, including those for the following products:

- ◆ Refresh Native File Access Login Methods
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring LDAP after the installation, see “Understanding LDAP Services for Novell eDirectory” in the *Novell eDirectory 8.7.3 Administration Guide*.

After selecting this option, click Next and then proceed to “[Verifying Pattern Selection](#)” on [page 42](#).

NetWare AMP (Apache, MySQL, PHP, and PERL) Server

This option lets you host Web database applications on your NetWare 6.5 server. Available from the open-source community, Web database applications can be downloaded from the World Wide Web and easily deployed to your NetWare AMP server. Additionally, if you are familiar with the structured query language (SQL) and PHP or PERL scripting languages, you can develop and host your own Web database applications.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The NetWare AMP (Apache, MySQL, PHP, and PERL) Server option creates a NetWare AMP server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ MySQL
- ◆ NetWare FTP Server
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,”](#) on [page 29](#).

After selecting this option, click Next and then proceed to “[Verifying Pattern Selection](#)” on [page 42](#).

NetWare Backup Server

This option provides the infrastructure for backup and restore services on the NetWare platform. It lets you back up targets such as the file system, Novell eDirectory, and GroupWise® to removable tape media for off-site storage. The NetWare Backup Server has been designed to scale with optimized hardware configurations.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The NetWare Backup Server option extends the schema for SMS and creates a dedicated NetWare Backup Server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ Novell iManager 2.5
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring SMS after the installation, see the *Storage Management Services Administration Guide*.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

QuickFinder Server

This option installs the Novell QuickFinder Server, a search engine capable of indexing Web site and file server content. QuickFinder Server lets you easily add search functionality to your Web sites.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

QuickFinder Server creates a search server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ QuickFinder Server 4.0
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring QuickFinder Server after the installation, see the *QuickFinder Server 4.0 Administration Guide*

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

Network Attached Storage (NAS) Server

This option gives you multiple file protocol storage for your network. NetWare 6.5 supports Native File Access protocols (NFAPs), including Windows Networking (CIFS), Novell Networking (NCP), UNIX/Linux Networking (NFS), Macintosh Networking (AFP), and Web Storage (HTTP, HTTPS, FTP, and WebDAV). Multiplatform clients and application servers can access storage using their native protocols. This deployment includes NetStorage, which allows for Web-based sharing of and access to files. From any Web client, or through WebDAV for sharing, all your data is securely accessible. NetWare 6.5 is able to drop into and integrate with any of these environments seamlessly, as well as bridge these environments together.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The Network Attached Storage (NAS) Server option creates a NAS server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ CIFS/AFP
- ◆ NetWare FTP Server
- ◆ Novell NetStorage
- ◆ Refresh Native File Access Login Methods
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring NetStorage after the installation, see the *OES NetStorage Administration Guide for NetWare*.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

Novell iPrint Server

This option installs Novell’s recommended print solution. Novell iPrint lets users install printers and manage print jobs using an existing Internet connection and a Web browser. iPrint generates a Web page containing a list of available printers and lets administrators create maps with printer locations that aid users in finding the printer closest to them.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The Novell iPrint Server option installs and creates a dedicated iPrint server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ iPrint
- ◆ Novell iManager 2.5
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring iPrint after the installation, see the *OES iPrint Administration Guide for NetWare*.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

Apache/Tomcat Server

This option lets you deploy and host servlets and Java Server Pages (JSPs). It installs Apache Web Server 2.0 and the Jakarta-Tomcat Servlet Container 4.1 for use in hosting dynamic, application-driven Web sites. Novell eDirectory Java LDAP beans are also included to provide a broad range of eDirectory authentication and identity mechanisms that are customized for use in setting up browser-based access to protected information.

If you need more functionality than you can get from servlets and JSPs, consider installing the exteNd J2EE Web Application Server pattern instead.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The Apache/Tomcat Server option creates an Apache/Tomcat server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ MySQL
- ◆ Novell eGuide
- ◆ Novell iManager 2.5

- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,”](#) on page 29.

For information about configuring the Apache Web Server after the installation, see the *Apache Web Server for NetWare Administration Guide for OES*.

For information about configuring Tomcat after the installation, see the *Tomcat for NetWare Administration Guide for OES*.

After selecting this option, click Next and then proceed to “[Verifying Pattern Selection](#)” on page 42.

Novell Nsure Audit Starter Pack Server

This option installs the centralized auditing service that is built into NetWare 6.5. The auditing service collects security and system event data, filters the collected information to trigger real-time e-mail notifications, and enables centralized logging to a single data store.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The Novell Nsure Audit Starter Pack Server option creates a dedicated auditing server by copying only the files needed, including those for the following products:

- ◆ Novell iManager 2.5
- ◆ Novell Nsure Audit Starter Pack Server
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,”](#) on page 29.

For information about configuring the Novell Nsure Audit Starter Pack Server after the installation, see the *Novell Nsure Audit 1.0.2 Administration Guide*.

After selecting this option, click Next and then proceed to “[Verifying Pattern Selection](#)” on page 42.

iSCSI SAN Storage Server

This option creates an iSCSI Storage Server (also known as an iSCSI Target) out of a NetWare server. The NetWare iSCSI Storage Server includes LDAP access control so you can limit the servers on the iSCSI SAN that can access the storage on the iSCSI Storage Server.

iSCSI is an industry standard that lets you build low-cost, fully functional Storage Area Networks (SANs) using commodity LAN (Ethernet) hardware.

TIP: Improved storage system performance is possible with Gigabit Ethernet hardware.

With iSCSI, existing direct-attached or SAN-attached servers can be redeployed as iSCSI Storage Servers. This lets you improve the manageability and deployment of your storage while also adding high availability with Novell Cluster Services™, which Novell's iSCSI Storage Server fully supports.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The iSCSI SAN e Server option creates a dedicated iSCSI SAN Storage server by copying only the files needed, including those for the following products:

- ◆ iSCSI Target
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,”](#) on page 29.

For information about configuring the iSCSI SAN Storage Server after the installation, see *iSCSI 1.1.3 Administration Guide for NetWare 6.5*.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection”](#) on page 42.

Management Server

This option installs Novell iManager 2.0.2 and Novell ConsoleOne 1.3.6 network administration software. Both products together provide a complete management solution for your NetWare server environment.

Novell iManager provides a single Web-based management console for the administration of Novell products in NetWare 6.5. iManager standardizes all Novell Web-based administration utilities on a single management framework. iManager also provides a best-of-breed architecture for easy development of Web-based administration and management modules through open standard application interfaces.

Novell ConsoleOne 1.3.6 is the latest version of Novell's Java-based, GUI network management application.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 800 MHz processor
- 512 MB RAM
- IDE/SCSI
- 4 GB hard drive

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 1000 MHz processor
- 1 GB RAM
- SCSI

Recommended Requirements for Large Systems

- Xeon Quad processor
- 4 GB RAM
- Fibre Channel/iSCSI

The Management Server option creates a dedicated iManager server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ Novell eGuide
- ◆ Novell iManager 2.5
- ◆ Refresh Native File Access Login Methods
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring iManager after the installation, see the *Novell iManager 2.5 Administration Guide*.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

Novell iFolder Storage Services

This option installs Novell iFolder, a software solution that allows your user’s files to follow them across multiple workstations and the Internet. With iFolder, each user has a single virtual work folder that provides convenient and secure access to the most recent version of his or her documents. All the user needs is an active Internet connection and the iFolder client or a Web browser. The iFolder server helps guard against local data loss by automatically backing up user’s local files to the iFolder server, making them available for regularly scheduled data backup.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The Novell iFolder Storage Services option extends the eDirectory schema for iFolder and creates a dedicated iFolder server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Containers
- ◆ Novell iFolder 2.1x
- ◆ Refresh Native File Access Login Methods
- ◆ WAN Connectivity
- ◆ Files installed by default

See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,” on page 29.](#)

For information about configuring Novell iFolder 2.1 after the installation, see the *Novell iFolder 2.1 Installation and Administration Guide*.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection” on page 42.](#)

Virtual Office Server

This option addresses the need for users to be self sufficient with their IT needs. Virtual Office lets users set up and manage many of their own networking, information sharing, and data backup processes. It also lets users create project teams, organize projects, and collaborate with team members in real time from any location. Virtual Office optimizes the concept of self service for users, which significantly reduces support calls.

Minimum System Requirements

- Single processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 512 MB RAM

Recommended System Requirements

- Dual processor
- Server-class PC with a Pentium III 550 MHz or AMD K7 processor
- 1 GB RAM

The Virtual Office Server option creates a Virtual Office server by copying only the files needed, including those for the following products:

- ◆ Apache 2 Web Server and Tomcat 4 Servlet Container
- ◆ iPrint
- ◆ Novell eGuide
- ◆ Novell iFolder 2.1x
- ◆ Novell iManager 2.5
- ◆ Novell NetStorage
- ◆ Novell Virtual Office Framework
- ◆ QuickFinder Server 4.0

- ◆ Refresh Native File Access Login Methods
- ◆ Files installed by default. See [Table 1, “Default Components Installed with Customized and Preconfigured Server Patterns,”](#) on page 29.

For information about configuring Virtual Office after the installation, see the *Novell Virtual Office Configuration Guide*.

After selecting this option, click Next and then proceed to [“Verifying Pattern Selection”](#) on page 42.

Verifying Products to Install

After selecting the components that you want to install from the Components page, a Summary page appears displaying the names of the selected products and the disk space (in MB) required to install them.

If you want to change your product selection, click Back and make the necessary changes. After verifying the product names and space requirements, click Copy Files.

(Conditional, if installing from CD) When prompted, remove *NetWare 6.5 CD 1 (Operating System)*, insert *NetWare 6.5 CD 2 (Products)*, click OK.

Proceed to [“Naming the Server”](#) on page 42.

Verifying Pattern Selection

After selecting the special purpose server that you want to install, a Details page appears displaying a description of the selected pattern and the system requirements needed to successfully deploy it.

If you want to change your pattern selection, click Back and make the necessary changes. After verifying the description and system requirements for your selected pattern, click Copy Files.

(Conditional, if installing from CD) When prompted, remove *NetWare 6.5 CD 1 (Operating System)*, insert *NetWare 6.5 CD 2 (Products)*, click OK.

Proceed to [“Naming the Server”](#) on page 42.

Naming the Server

The NetWare server name must be unique from all other servers on the eDirectory tree. The name can be between 2 and 47 alphanumeric characters and can contain underscores (_) and hyphens (-), but no spaces. The first character cannot be a period (.).

IMPORTANT: The server name must be different from the name that you plan to use for the eDirectory tree.

- 1 On the Server Properties page, type the server name in the field provided.

(Optional) Edit the Config.sys File

At this stage of the installation, you can make changes or additions to the server’s config.sys file.

- 1 On the Server Properties page, click Advanced.
- 2 Click the Edit Config.sys tab.

- 3 Type the desired information into the config.sys field on the right side of the screen.
- 4 Click OK.

(Optional) Edit the Autoexec.bat File

At this stage of the installation, you can make changes or additions to the server's autoexec.bat file.

- 1 On the Server Properties page, click Advanced.
- 2 Click the Edit Autoexec.bat tab.
- 3 Type the desired information into the autoexec.bat field on the right side of the screen.
- 4 Click OK.

(Optional) Specify the Server's ID Number

The server requires a unique identification number. Changing the server ID number during this portion of the installation places the new server ID number in the autoexec.ncf file. The new server ID number takes effect after you reboot the server.

- 1 On the Server Properties page, click Advanced.
- 2 Click the Server Properties tab.
- 3 Type the desired server ID number into the field provided.
- 4 Click OK.

(Optional) Select Language Options

NetWare 6.5 can be customized to function in several languages.

- 1 On the Server Properties page, click Advanced.
- 2 Click the Language tab.
- 3 Select the desired server language from the drop-down list.

The server language determines which language the server console and error messages appear in.

- 4 Select the desired admin language from the drop-down list.

The admin language determines which language the network administrator User object uses to log in to the network. When additional eDirectory objects are created by the administrator, they use the same language as the admin language.

- 5 In the Additional Server Languages field, select the check box next to each language you want to install.

You can use NetWare server and client utilities in other languages, if the additional language is installed on the server.

- 6 Click OK.

After completing the previous optional steps, you are taken back to the Server Properties page.

- 7 Click Next.

Enabling Cryptography

The use of cryptography must be licensed on NetWare 6.5. To license cryptography, you must provide a cryptographic file (.nfk). This file is located either on the *NetWare 6.5 License/Cryptography* diskette or on the installation CD.

You might see a message stating that a region specific cryptography module was not found in the path specified. If this happens, click OK to proceed.

Before browsing to the cryptography file on the NetWare 6.5 License/Cryptography diskette, you must mount the floppy drive on your blade server.

Mounting a USB Floppy Disk as a Local FAT Volume

Local FAT volumes are available to the server but are not seen by users. By default, NetWare does not automatically mount local FAT volumes such as the floppy disk in a USB floppy drive during server installation. If your server uses a USB floppy drive, you will need to manually mount a floppy disk to install the NetWare license. Use the Local Fat Volume Mount (lfvmount) command to detect and mount any local FAT volumes not recognized by DOS and assign them a local drive letter.

To mount local FAT volumes:

At the system console prompt, enter:

```
lfvmount
```

The lfvmount command affects only the current local FAT volumes. You must re-enter this command each time you change a floppy disk in the USB floppy drive.

To configure automatic detection:

You can use the associated Set parameter (`set auto lfvmount= on | off`) to configure automatic detection. When this parameter is set to On, NetWare automatically detects and mounts a local FAT volume as you insert the media into the drive. It then assigns a drive letter to the volume. To set automatic detection on, enter this command at the system console prompt:

```
set auto lfvmount=on
```

When this parameter is set to Off (default), NetWare does not automatically detect and mount local FAT volumes. You must use the lfvmount command to manually mount them as needed. To prevent the automatic mounting of local FAT volumes for a server, enter this command at the system console prompt:

```
set auto lfvmount=off
```

If entered at the system console, this Set parameter remains in effect until you change it or until you reboot the server.

To make the Set parameter persistent through a server reboot:

If you want to make the automatic detection setting persistent after a server reboot, add the appropriate Set command to the server's startup.ncf file. If no value is set in the startup.ncf file, NetWare does not automatically mount the local FAT volumes. You must use the lfvmount command to manually mount local FAT volumes as needed.

To list information about local FAT volumes mounted on the server:

To display a list of local FAT volumes that are currently mounted and see detailed information about them, you can use the Local Fat Volumes command. At the system console prompt, enter:

```
lfvolumes
```

For help with the lfvmount command:

The lfvmount command appears in the console-based help for console commands. To view help information for this command, enter this command at the system console prompt:

```
help lfvmount
```

Specifying the Encryption File

To mount a USB floppy drive and specify the location of the encryption file:

- 1 Enter **lfvmount** at the server console prompt.
The floppy drive assignment now displays.
- 2 On the Encryption page, browse to the *NetWare 6.5 License/Cryptography* diskette.
Ensure that you browse to the drive letter assigned in Step 1. This will *not* be A:.
- 3 Select the .nfk file.
- 4 Click OK > Next.

Installing Networking Protocols

NetWare 6.5 can process IP (Internet Protocol) network packets and traditional IPX™ (Internetwork Packet Exchange™) packets. Both protocols can be assigned to a single network board, which allows the server to communicate using IP and IPX.

- ♦ [“About the Internet Protocol \(IP\)” on page 45](#)
- ♦ [“About IPX” on page 46](#)
- ♦ [“Using Both IP and IPX” on page 46](#)
- ♦ [“Installing IP and IPX” on page 46](#)

About the Internet Protocol (IP)

The Internet protocol (IP) lets your network share data with other IP networks, including the Internet. Using IP requires a unique IP address, a subnet, and a router or gateway address.

- ♦ **IP Address**—Identifies each device on the network. The address consists of 32 bits, which are represented as decimal values separated by periods, such as 123.45.67.89.
If your server will connect to the Internet, you must obtain a unique IP address. For information on receiving an IP address, contact your Internet service provider (ISP).
- ♦ **Subnet Mask**—Lets you break up your network into smaller networks. Your network might have too many nodes or might be too geographically dispersed to manage as a single network.
Dividing your network into smaller networks allows the network routers to filter and reduce the network activity seen by any of the nodes. However, dividing your network and using several network addresses might not be appropriate on a large network that needs to appear to network administrators as a single network.

- ◆ **Router (Gateway)**—The address of the router that connects two different environments, such as a LAN and the Internet.

You can specify a specific router (gateway) address or you can rely on the network to automatically find the nearest router. If you specify the address, remember that the router must exist on your network segment.

Installing IP will automatically bind to the Ethernet_II frame type.

When IP is selected, passive support for IPX is also provided. If an IPX request arrives at the server, NetWare will process the IPX request. This passive support for IPX is called Compatibility Mode and is automatically enabled to provide service for applications that require IPX.

TIP: You can disable Compatibility Mode by removing the `LOAD SCMD` command from the server's `autoexec.ncf` file. When IPX Compatibility Mode is disabled, the server will process only IP packets. Applications that require IPX will not function properly.

About IPX

Novell's traditional protocol, Internetwork Packet Exchange (IPX), lets you continue using IPX-based applications. If IPX, but not IP, is installed on your server, it will actively process IPX packets and ignore packets using other protocols, such as IP.

During the installation program, existing IPX frame types will be detected. The installation program will detect one of the following conditions.

- ◆ **A single IPX frame type**—If a single frame type is detected, it will be installed.
- ◆ **Multiple IPX frame types**—If detected, you will be prompted to choose the frame types that you want to install.
- ◆ **No IPX frame types**—If no frame types are detected, Ethernet_802.2 will be installed by default.

Using Both IP and IPX

If you have network clients or applications that require IPX and IP, you can install both protocols. Both protocols can be bound to a single network board. When selected, both IP and IPX protocols are actively supported. The server will process IP requests using IP, and it will broadcast and reply to IPX requests using IPX.

Installing IP and IPX

- 1** On the Protocols page, select a network board.
- 2** Select the IP check box.
- 3** Type the required IP information for the selected network board.
- 4** Select the IPX check box if you are installing IPX on the selected network board.

If you choose to install IP and not IPX, the `SERVERID` reference is not used and is removed from `autoexec.ncf`. You can add IPX after the server installation by adding the `SERVERID 8_digit_number` command after the `SERVERNAME` command in `autoexec.ncf`.

- 5** Repeat this procedure for each network board in the server.

(Optional) Configuring SLP

Service Location Protocol (SLP) is an IETF standard for enabling network-based applications to automatically discover the location, including the address or domain name and other configuration information, of a required service. Using SLP, clients can connect with and make use of services on an IP network. Without SLP, network resources must be manually configured or specified in a separate configuration file.

SLP should be configured properly if the server is going to be a part of a migration using the NetWare Migration Wizard utility.

- 1** On the Protocols page, click Advanced.
- 2** Click the SLP tab.
- 3** Either specify the IP addresses of the Directory Agents on your network or, if no Directory Agents exist on your network, check the Configure This Server as a DA check box.
- 4** (Optional) To enable multicasting, select the Enable Multicast Routing on This Server check box.
- 5** Click OK.

(Optional) Configuring SNMP

Network management utilities use Simple Network Management Protocol (SNMP) to record and communicate information about network devices. Using an SNMP-compatible utility, you can set and monitor threshold levels and specific events such as packets per second or error rates. The information is then sent to the destination address of the workstation running the SNMP-compatible management utility.

- 1** On the Protocols page, click Advanced.
- 2** Click the SNMP tab.
- 3** (Optional) Type a hardware description, server location, and administrator in the fields provided.
- 4** Type the IPX and IP destination addresses of the devices that will receive the SNMP information in the fields provided.
- 5** Click OK.

(Optional) Configuring IPX Compatibility

When enabled, IPX compatibility provides passive support for IPX-based applications without binding IPX. Although the server does not broadcast services using RIP and SAP, NetWare processes any IPX request that arrives at the server.

- 1** On the Protocols page, click Advanced.
- 2** Click the IPX Compatibility tab.
- 3** Load IPX compatibility.

This option is available only if you did not check the IPX box in [“Installing IP and IPX” on page 46](#).

 - 3a** Select the Load IPX Compatibility check box.
 - 3b** Type the eight-digit hexadecimal compatibility mode network number in the field provided or accept the default shown.
 - 3c** Select the preferred IP address from the drop-down list.

4 Load the migration agent.

This option is available only if you checked the IPX box in “Installing IP and IPX” on page 46.

NetWare regulates IP and IPX protocols using a Migration Agent. A Migration Agent regulates the protocol function on different network segments. If a Migration Agent is not enabled, packets are not forwarded onto network segments communicating with a different protocol. For more information, see the online help file associated with this screen.

4a Select the Load the Migration Agent on This Server check box.

4b Type the eight-digit hexadecimal compatibility mode network number in the field provided or accept the default shown.

4c Select the preferred IP address from the drop-down list.

5 Click OK.

You are taken back to the Protocols page.

6 Click Next.

Entering a Hostname for Each IP Address

If you bound two different IP addresses to two or more network boards, the hostnames page will display. If you have only one network board, or you bound two or more network boards with the same IP address, skip to “Setting Up Domain Name Service” on page 48.

You must specify a hostname for each of the IP addresses that were bound in “Installing Networking Protocols” on page 45. The hostname is the name of the DNS server that will resolve to your IP address. If you do not know the hostname, contact your network administrator.

You must also determine which IP address will be the Primary IP address. The Primary IP address will be the default IP address for all TCP/IP services.

1 Type a hostname in the field provided for each IP address.

2 Select the IP address you want to specify as the primary IP address.

3 Click Next.

Setting Up Domain Name Service

The IP protocol identifies computers and systems by their assigned IP addresses, such as 123.45.56.89. Domain Name Service (DNS) allows a specific server on the network to maintain a list of simple, readable names that match IP addresses. Applications (or protocols) that require IP addresses rather than names can use a DNS server to translate from one form to another.

TIP: If this server will not be available to the Internet, you can skip this screen and ignore any associated error messages.

1 If you want this server to be available to the Internet, provide the following information on the Domain Name Service page:

- ◆ **Host Name**—The simple, readable name on the DNS server that matches this NetWare server’s name (or the name that you have bound to the network board).

You can set up the host computer name on the DNS server to use the NetWare server name.

NOTE: If you bound two different IP addresses to two or more network boards in [“Installing Networking Protocols” on page 45](#), the Host Name field will not display on this screen. This is because you specified the hostname on the [Entering a Hostname for Each IP Address](#) screen described in the previous step. The remainder of this screen remains the same.

- ♦ **Domain Name**—The hierarchical name that represents the organization of your network, such as acme.com.
 - ♦ **Domain Name Server**—The IP address of the DNS server that maintains the list containing this NetWare 6.5 server’s simple, readable name and IP address. For more information, contact your network administrator or Internet service provider.
- 2** (Optional) If you want the install to verify the domain name service information for you, select the Verify the DNS Information check box.
 - 3** Click Next.

Setting the Server Time Zone

Keeping accurate time is a critical function for servers in an eDirectory tree. The reported time must be synchronized across the network in order to provide expiration dates and time stamps to establish the order of events taking place in eDirectory.

Follow these steps to set the server’s time zone:

- 1** On the Time Zone page, select the correct time zone setting from the available list.
- 2** Select the check box if you want the system to adjust automatically for Daylight Saving Time.

By default, the NetWare 6.5 installation synchronizes time automatically with the first server in the tree. However, you might want to set up a different time synchronization scheme or synchronize with an external time source using Network Time Protocol (NTP).

To change the default time synchronization settings, continue with the time synchronization configuration instructions below. Otherwise, skip to [“Setting Up Novell eDirectory” on page 50](#).

(Optional) Configure Time Synchronization

- 1** On the Time Zone page, click Advanced.
- 2** On the Time Synchronization page, select the time protocol that you want.

NetWare servers can use one of two available protocols for time synchronization: NTPv3 or Timesync. Select the protocol that best fits your network’s needs.

- ♦ Select NTPv3 to use Network Time Protocol for synchronizing time on your network. (The xntpd.nlm that provides NTP time packets is also capable of providing Timesync packets for servers that require them, such as NetWare 5.0 and 4.2 servers.)

If you select this option, further configuration might be required to fully implement your time server hierarchy. For more information, see the [Novell Network Time Protocol Administration Guide for OES](#).

- ♦ Select Timesync to use the legacy time synchronization mechanism built in to NetWare. (The timesync.nlm that provides Timesync packets is also capable of providing NTP packets for interoperability with other time servers.)
- 3** (Conditional) If you selected Timesync in [Step 2](#), select the time server type that you want.

NetWare distinguishes four types of time servers. Three of these provide network time: Single Reference, Reference, and Primary. All other servers are called Secondary time servers because they receive their time from the time providers.

The first NetWare server installed in a tree is automatically set up as a Single Reference time server. All subsequent NetWare servers are automatically set up as Secondary time servers. This default configuration works well for most small networks. If your network requires a different time synchronization configuration, you can change the time server type. (For more information, see the *Network Time Management for NetWare Administration Guide for OES*.)

4 (Optional) If you do not want to accept the defaults, configure Timesync time sources by selecting Use Timesync Configured Sources.

4a Type the time sources in the fields provided (up to three).

Timesync time sources can be specified in one of three different formats:

- ◆ IP Address
- ◆ DNS Name
- ◆ Server Name (IPX required)

4b (Conditional) If your time source uses Network Time Protocol (NTP), select the NTP check box to the right of the time source.

5 Click OK.

After completing the previous optional steps, you are taken back to the Time Zone page.

6 Click Next.

Setting Up Novell eDirectory

Novell eDirectory provides global access to all networking resources. eDirectory allows users with the proper access rights to log in to the network and view and access network resources.

Network resources such as servers and printers are presented hierarchically in an eDirectory tree. Users log in to the eDirectory tree with a single login name and password instead of logging in to specific servers.

Before completing this task, you should understand the concepts relating to eDirectory trees, containers, and context.

- ◆ **Tree Name**—The top level of the available network resources. It must be unique from other eDirectory tree names on the network.
- ◆ **Containers**—Much like subdirectories, containers contain network objects. The server can be installed into two types of container objects: Organization (O) and Organizational Unit (OU).
- ◆ **Context**—The context, much like DOS directory paths, denotes the full path of a network object in the eDirectory tree. For example, a NetWare server might be installed into an Organizational Unit (OU) named Sales under the Organization (O) named Acme. The context would be denoted as OU=Sales.O=Acme or Sales.Acme.

To set up eDirectory, you must choose one of the following options:

- ◆ [Install the Server into an Existing eDirectory Tree \(page 51\)](#)
- ◆ [Creating a New eDirectory Tree \(page 51\)](#)

1 Click the radio button next to the eDirectory option you want.

2 Click Next.

Install the Server into an Existing eDirectory Tree

Installing your server into an existing eDirectory tree incorporates the server into your network.

The server can be installed in any Organization (O) or Organizational Unit (OU) container in the eDirectory tree where you have the Supervisor right. You can create containers during the installation program.

- 1 Type the tree name in the field provided.
- 2 Type the context for the Server object in the field provided.
- 3 Click Next.
- 4 Type the full eDirectory context for the Admin object.
- 5 Type the password for the Admin object.
- 6 Click OK.

IMPORTANT: If this is the first NetWare 6.5 server to be installed into an existing eDirectory tree, you are asked if you have run the Deployment Manager as described in [“Preparing the Network with Deployment Manager” on page 17](#).

If you have not run the Deployment Manager, you can run it on a workstation, return to the server console, and click Yes, or you can click No, cancel the installation, run Deployment Manager, then restart the installation. Deployment Manager (nwdeploy.exe or nwdeplynobrowser.exe) is located at the root of *NetWare 6.5 SP3 CD 1 (Operating System)* and is run from a Windows workstation.

If you have updated NDS/eDirectory on all servers but have not yet prepared the network for eDirectory 8, you will be prompted to modify the schema. When prompted, you must provide the administrator name and password for the entire eDirectory tree.

Creating a New eDirectory Tree

Create a new tree if you are creating a new network or if this server requires a separate eDirectory tree. The resources available on the new tree will only be available to users logged in to the new tree.

- 1 Type a tree name.
Each eDirectory tree must have a name unique from other eDirectory trees on the network.
- 2 Type the context for the Server object in the field provided or browse to the context by clicking the Browse button.
NOTE: If you click the Browse button, you can add or delete containers in your tree.
- 3 Type the context for the default Admin user.
- 4 Type a password for the Admin user.
- 5 Retype the password for the Admin user.
- 6 Click Next.

eDirectory Summary

The eDirectory Summary screen is now displayed. Now that you have created a new eDirectory tree or installed the server into an existing eDirectory tree, the NetWare Server object and Volume objects will be installed in the container you specified.

If you have created a new eDirectory tree, a user (default name Admin) with Supervisor rights to the eDirectory tree is created in the same eDirectory container as the NetWare Server object.

- 1 Verify that the information on the eDirectory Summary screen is accurate.
- 2 Record the Admin password and any other relevant information before proceeding.
- 3 Click Next.

Licensing the NetWare 6.5 Server

NetWare must have a valid license in order to function as a server. You can install the license from the *NetWare 6.5 License/Cryptography* diskette or browse to a directory that contains NetWare licenses.

If you installed a license at the beginning of the installation, you can choose to use that license, or you can install a different one.

Install without Licenses—Although the server can be installed without a license, the unlicensed server will allow only two user connections. After installation, you can use the Novell iManager utility to install additional licenses.

- 1 On the Licenses page, browse to the *NetWare 6.5 License/Cryptography* diskette or directory containing your NetWare license.
- 2 Select the .nlf file.
- 3 Click OK.
- 4 (Optional) If you want to install your server without licenses, select the Install Without Licenses check box.
- 5 Click Next.
- 6 If prompted, select where you want to install the license in the tree and then click Next.

LDAP Configuration

If you selected a Manual Installation at the beginning of the NetWare installation, (see [“Selecting Default or Manual Installation” on page 23](#)), you will now see the LDAP Configuration page. On this page, you can configure LDAP on the server. If you are not performing a manual install, continue with [“Selecting the Login Method” on page 52](#).

- 1 Specify the ports for Clear Text and SSL/TLS, or accept the defaults provided.
- 2 Select the Require TLS for Simple Bind with Password check box if you want that feature activated.
- 3 Click Next.

Selecting the Login Method

NMAS server components are installed automatically when you run the NetWare installation program. You need to select the login methods you want to install.

Select the login methods that you want to install into eDirectory by checking the appropriate check boxes on the Novell Modular Authentication Service screen. When you select a login method, a description of the component appears in the Description box. For more information on login methods, see [“Managing Login and Post-Login Methods and Sequences”](#) in the *Novell Modular Authentication Services 2.2 Administration Guide*.

The NDS and Challenge Response login methods are installed by default.

- 1** On the Novell Modular Authentication Service page, select the login method you want to use from the options provided.

Click Select All if you want to install all the login methods into eDirectory. Click Select Clear All if you want to clear all selections (except for the two default methods).

- 2** Click Next.

IMPORTANT: The NMAS client software must be installed on each client workstation where you want to use the NMAS login methods. The NMAS client software is included with the Novell Client software.

DNS/DHCP Installation

If you selected to install DNS/DHCP on the Components page or if you selected a pattern installation that installs DNS/DHCP, you now see the DNS/DHCP Installation page. If you did not select DNS/DHCP on the Components page, continue with [“iFolder Server Options” on page 53](#).

You must specify the NDS context of three different items on this page. They are:

- ◆ DNS/DHCP Locator Object
- ◆ DNS/DHCP Group Object
- ◆ RootSrvr Zone

All three fields are populated with a default NDS context. To change the following contexts from the defaults:

- 1** (Optional) Change the DNS/DHCP Locator object context.
 - 1a** Click the Tree button to the right of the DNS/DHCP Locator Object NDS Context field.
 - 1b** Browse to and select the NDS context that you want.
 - 1c** Click OK.
- 2** (Optional) Change the DNS/DHCP Group object context.
 - 2a** Click the Tree button to the right of the DNS/DHCP Group Object NDS Context field.
 - 2b** Browse to and select the NDS context that you want.
 - 2c** Click OK.
- 3** (Optional) Change the RootSrvr Zone context.
 - 3a** Click the Tree button to the right of the RootSrvr Zone NDS Context field.
 - 3b** Browse to and select the NDS context that you want.
 - 3c** Click OK.
- 4** Click Next.

iFolder Server Options

If you selected to install Novell iFolder Storage Services on the Components page or if you selected a pattern installation that installs iFolder, you now see the iFolder Server Options page. If you did not select Novell iFolder Storage Services on the Components page, continue with [“MySQL Options” on page 54](#).

There are six fields on this page that have values that can be modified:

- ◆ **LDAP Host Name or IP**—The DNS name or IP address of the server that acts as your eDirectory LDAP server.
 - ◆ **LDAP Port, 389 (Clear Text) 636 (SSL)**—The LDAP port type that you want to use, based on your security needs, for data exchanges between your LDAP server and your iFolder server.
 - ◆ **LDAP Context for Admins**—The LDAP context of the container where your iFolder Admin User objects are located.
 - ◆ **iFolder Server Host Name or IP**—The DNS name or IP address of your iFolder server. The DNS name or IP address you provide must enable the iFolder server to be accessed from the users' computers.
 - ◆ **iFolder Admin Names**—The default user ID for the iFolder administrator for this iFolder server. You can assign more than one user ID to be an iFolder administrator. If you are specifying more than one name, separate them with semicolons and with no spaces. All entries cannot exceed 256 characters, including the semicolons. For example: admin;jsmith;jdoe.
 - ◆ **User Database Path**— The path to the directory on the iFolder server where user data for all the iFolder accounts will be stored.
- 1 Modify any of the server options for iFolder that are displayed on the page, or accept the default settings that are provided.
 - 2 Click Next.

MySQL Options

If you selected to install MySQL on the Components page or if you selected a pattern installation that installs MySQL, you now see the MySQL Options page. If you did not select MySQL on the Components page, continue with [“exteNd Application Server - Details” on page 55](#).

- 1 Click the Browse icon to browse to the directory where you want the MySQL databases to be stored.

The database must reside on an NSS volume. The default location is `sys:/mysql/data`.

- 2 Type the Root password in the field provided.

The MySQL root user is created as a supervisor who can do anything. Specifying a password for the MySQL root user is recommended. If the root password field is left empty, anyone can connect as root without a password and be granted all privileges.

- 3 Confirm the Root password in the field provided.

This password must match the password specified in the previous field.

- 4 (Optional) Select the Secure Installation check box if you want secure installation enabled.

By default, the root user can connect either from the local host or remotely. An anonymous user is also created that can connect from the local host or remotely and do anything with databases that have a name of "test" or starting with "test_". This means any local user can connect without a password and be treated as the anonymous user. A test database is also created.

If this box is checked, the root user is only allowed to connect from the local host, a root password is required, and the anonymous user and the test database are not created.

- 5 Click Next.

exteNd Application Server - Details

If you selected to install the exteNd Application Server on the Components page or if you selected a pattern installation that installs exteNd, you now see the exteNd Application Server - Details page. This page specifies some basic settings about the application server's configuration. If you did not select exteNd Application Server on the Components page, continue with [“Novell Nsure Audit Starter Pack—Component Selection” on page 56](#).

- 1** Type the user name for the application server's administration account in the field provided.
The install will create a user with this name and assign Locksmith privileges to it. To better secure the application server, specify a username other than the default (admin).
- 2** Type the password for the Admin name in the field provided.
To better secure the application server, specify a password other than the default (admin).
- 3** Confirm the password in the field provided.
- 4** Type the HTTP port number that the application server will listen on in the field provided.
By default, port 80 is used by the Apache HTTP Server installed with NetWare. However, when the application server's Web Server Integration (WSI) module for Apache is in use, it redirects requests from the Apache server (listening on port 80) to the application server (port 83).
- 5** Select Restrict Access if the application server is to be initially configured to restrict user access.
For more information on restricting access, click the Help button.
- 6** Click Next.

exteNd Application Server - Database Options

You now see the exteNd Application Server - Database Options page. This page specifies settings for configuring the MySQL database to be used as the application server's SilverMaster. If you did not select exteNd Application Server on the Components page, continue with [“NetStorage Install” on page 57](#).

- 1** Type the name of the machine hosting the MySQL database in the field provided. Localhost is the default.
- 2** Type the port number for the MySQL database on the host machine in the field provided. 3306 is the default.
- 3** Type the MySQL user name to be used by the application server when logging in to the database.
The install will create a user with this name in the MySQL database and grant that user rights to the SilverMaster system tables needed by the application server. To better secure the MySQL database, specify a user name other than the default (appserver).
- 4** Type the password for the database username in the field provided.
To better secure the MySQL database, specify a password other than the default (appserver).
- 5** Confirm the password in the field provided.
- 6** Type the name of the MySQL database in the SilverMaster Name field provided.
SilverMaster50 is the default.

- 7 Select Execute SilverMasterInit if you want to populate the MySQL database with the SilverMaster system tables needed by the application server.

This option is selected by default. Retain the default unless this install is for a secondary application server in a cluster.

- 8 Click Next.

Novell Nsure Audit Starter Pack—Component Selection

If Novell Nsure Audit Starter Pack was one of the products you selected to install on the Components page, or if you selected the Novell Nsure Audit Starter Pack pattern installation, you now see the Component Selection page. The Component Selection page allows you to select which Nsure Audit components you want to install to the current server. If you did not select Novell Nsure Audit Starter Pack on the Components page, continue with [“NetStorage Install” on page 57](#).

- 1 (Optional) Select Install Secure Logging Server.

This installs the Secure Logging Server (lengine.nlm), mdb.nlm, and the channel drivers (lgd*.nlm) to the current server. It also creates a Logging Server object in the Logging Services container.

- 2 (Optional) Select Autoconfigure MySQL.

This creates the MySQL Channel object in the Logging Services' Channel container.

- 3 (Optional) Select Install Platform Agent.

This installs the Platform Agent (logevent.nlm), the Caching Module (lcache.nlm), and the NetWare and eDirectory instrumentations (auditNW.nlm and auditDS.nlm respectively).

- 4 Specify the IP address or hostname of the Secure Logging Server that the Platform Agent will connect to.

- 5 Click Next.

Novell Nsure Audit Starter Pack—Database Options

If you selected Autoconfigure MySQL in [“Novell Nsure Audit Starter Pack—Component Selection” on page 56](#), the Database Options page displays. The options on this page are used to define the MySQL Channel object.

If you did not select Autoconfigure MySQL, continue with [“NetStorage Install” on page 57](#).

- 1 Type the IP Address or hostname of the MySQL database server in the field provided.

If a hostname is specified, only the first address associated with that name is used.

- 2 Type the MySQL port number where the Secure Logging Server will connect to the database server in the field provided.

If this field is left blank, the Secure Logging Server uses the default MySQL port assignment, 3306.

- 3 In the field provided, type the user account name that the Secure Logging Server uses to log in to the database.

This account has all privileges to the default database and can log in from any IP address.

The default username for the NetWare 6.5 data store is auditusr.

IMPORTANT: On NetWare 6.5, MySQL installs in Secure Mode. In Secure Mode, the default MySQL administrative account, Root, only has rights to log in at the database server. Therefore, if you want the logging server to use the Root account to log in to the database, MySQL and the Secure Logging Server must be located on the same server and you must specify a loopback address ("127.0.0.1" or "localhost") in the MySQL Database Host field.

- 4 Type the password the logging server uses to authenticate with the database in the field provided.

The default password for the NetWare 6.5 data store is "auditpwd."

- 5 Type the password again in the password confirmation field.
- 6 In the field provided, type the name of the database to which the logging server writes events.

The default database name is "naudit."

The MySQL driver, lgdmsql.nlm, automatically creates this database when the logging server first loads the MySQL Channel object configuration in memory.

- 7 Type the database table name to which the logging server writes events in the field provided.

The default table is "log." The MySQL driver, lgdmsql.nlm, automatically creates this table when the logging server first loads the MySQL Channel object configuration in memory.

- 8 Click Next.

NetStorage Install

If Novell NetStorage was one of the products you selected to install on the Components page, or if you selected a pattern installation that installs NetStorage, you now see the NetStorage Install page. NetStorage provides simple access to file storage on a Novell network from any Internet-enabled machine. If you did not select Novell NetStorage on the Components page, continue with [“Completing the Server Installation” on page 58](#).

- 1 Type the IP address or DNS name of a server in your eDirectory tree that has the master replica or a read/write replica of eDirectory in the field provided.
- 2 (Optional) Type the IP addresses or DNS names of servers in other eDirectory trees that have at least read/write eDirectory replicas, or specify the same IP address or DNS name you used for the primary eDirectory server but with a different context.

You can add two alternate eDirectory server URL and context settings. These alternate settings are used to allow NetStorage to find User objects that exist in contexts other than what you specified for the primary eDirectory server. The alternate settings also allow NetStorage to find user objects with the same name in different eDirectory trees. The alternate URL and context settings are optional, but can help provide users with an additional level of access to NetStorage.

- 3 (Optional) Type the IP address or DNS name and the port number that you assigned to Novell iFolder in the fields provided.

The iFolder DNS name or IP address and the port number are optional, but if specified, will allow NetStorage users to access and manipulate files and directories on the iFolder server.

- 4 Click Next.

Completing the Server Installation

After the installation is finished, remove *NetWare 6.5 SP3 CD 2 (Products)* and click Yes to reboot the server.

If you selected to load the server on reboot, the NetWare 6.5 server software will automatically load when the computer reboots.

If you selected to not load the server on reboot, you can load it manually. To load the server manually, reboot the computer by clicking Yes. When the computer reboots, change to the startup directory containing the NetWare server files (c:\nwserver) and enter **server**.

Your NetWare 6.5 server installation is now complete. In addition to installing the products necessary for your server to run as designed, two volumes were created on the server: sys: and _admin. These volumes are required for the server to function and must not be deleted.

What's Next

After rebooting the server, continue by completing the tasks described in [Chapter 6, “Installing Products and Updates,”](#) on page 87.

The NetWare 6.5 Welcome screen provides helpful information for getting the most out of your new NetWare server. To access the Welcome screen, open a browser on a workstation with access to the new server and go to <http://xxx.xxx.xxx.xxx>, where [xxx.xxx.xxx.xxx](#) is the new server's IP address.

IMPORTANT: Apache and Tomcat must be installed on the server in order for the Welcome screen to be displayed. If you chose a Basic server installation, or a Customized installation without these two components, you will not see the Welcome screen.

For further information on the management of your server's operating system, see the [NetWare 6.5 Server Operating System Administration Guide](#). For information on managing your network using Novell iManager 2.0.2, see the [Novell iManager 2.0.x Administration Guide](#).

4

CD-Based Unattended Installation of NetWare

This chapter describes how to do an unattended installation of NetWare® 6.5 on a blade server using an IDE or USB CD-ROM drive. If you want to do an attended CD-based installation, see [Chapter 3, “CD-Based Attended Installation of NetWare,”](#) on page 21. If you want to do an automated PXE-based installation, see [Chapter 5, “PXE-Based Automated Installation of NetWare,”](#) on page 63.

Installing a new blade server in unattended mode using an attached IDE or USB CD-ROM drive involves the additional step of generating a response file. The response file supplies server configuration parameters such as server name and IP address to the NetWare Install program. The installer starts the Install program with the /RF option and the remainder of the installation proceeds without requiring any further intervention.

Novell also offers a “pre-load” installation option where installers can download an image of a partially installed NetWare 6.5 server and copy it, along with other necessary files, to a bootable CD. Using this boot CD speeds up the overall installation process because it eliminates the need to copy the initial NetWare system files from the distribution CDs.

The CD-ROM based unattended installation process includes the following tasks:

- ◆ [Generating a NetWare Response File \(page 59\)](#)
- ◆ [Creating the NetWare Pre-Boot CD \(page 60\)](#)
- ◆ [Starting the NetWare Installation Program \(page 60\)](#)
- ◆ [Completing the Server Installation \(page 62\)](#)

Generating a NetWare Response File

To create a NetWare response file for the blade server installation, you can either edit an existing response file or generate a new one using the Novell Deployment Manager utility.

For instructions on how to edit an existing response file, see the [NetWare 6.5 Response File Installation Guide](#).

To generate a new response file with Deployment Manager:

- 1** At a Windows workstation, insert *NetWare 6.5 SP3 CD 1 (Operating System)* into the CD drive.
- 2** Run the `nwdeploy.exe` program (or `nwdeploynobrowser.exe` if you want to run the nonbrowser version) located at the root of the CD.
- 3** Click the Automate an Installation link under the Install/Upgrade Options heading for instructions on automating the NetWare installation using a response file.
- 4** Click the Response File Generator link to access the Response File Creation utility, which assists you in creating response files.

- 5 Follow the instructions in “Using the Response File Generator” in the *NetWare 6.5 Response File Installation Guide* to specify the server name, IP address, and other information for the new server.

Be sure to select the Factory Install/Blade Image option when asked if the response file is for a new server, an upgrade, a factory install or a headless blade image.

- 6 Copy the response file you created with the Response File Generator to a floppy diskette or to a directory on the workstation’s hard drive.

Creating the NetWare Pre-Boot CD

If you want to save time by using the “pre-load” installation option, complete the steps below to create a NetWare pre-installation image file and burn it to a bootable CD. Otherwise, skip to “Starting the NetWare Installation Program” on page 60.

NOTE: References to “USB” in this chapter also apply to systems with IDE CD-ROM drives.

- 1 At a workstation with Internet access, point your browser to the [Novell Blade Server Deployment Web site \(http://www.novell.com/blade\)](http://www.novell.com/blade).
- 2 Select the option to download the NetWare 6.5 pre-load image for CD-ROM based deployment.
- 3 Copy the response file you created with the Response File Generator to the folder that contains the image downloaded in [Step 2](#).
- 4 Edit the autoexec.bat file that will run along with the downloaded image so that the line reading

```
install
```

is changed to read

```
install /RF=response_file_DOS_path\filename
```

- 5 Burn the downloaded image and related files to a blank, unformatted CD-ROM disk using the CD burning software of your choice. Be sure to select the option to make the CD bootable.
- 6 Label the newly burned CD as *NetWare 6.5 Pre-Load Boot CD*.

Starting the NetWare Installation Program

Before you begin the NetWare installation, make sure you have completed the preparatory steps outlined in [Chapter 2, “Preparing to Install NetWare,” on page 13](#). Then follow the steps in the appropriate section below, depending on whether you are doing a normal unattended CD-based installation or a CD-based installation with the “pre-load” option.

Normal Unattended CD-Based Installation

To start the NetWare installation process:

- 1 Assign a monitor, mouse, keyboard, and CD-ROM drive to the blade server following the manufacturer’s recommendations.
- 2 Insert *NetWare 6.5 SP3 CD 1 (Operating System)* into the blade server’s assigned CD-ROM drive.

- 3 At the CD drive prompt, enter

```
install /RF=response_file_DOS_path\filename
```

The unattended installation of NetWare begins. The Install program uses the parameters included in the specified response file to configure the server. If you have included all the required parameters in the response file, the only intervention required is to switch from CD 1 to *NetWare 6.5 SP3 CD 2 (Products)* as prompted. After you have done this, proceed to “**Completing the Server Installation**” on page 62.

Pre-Load CD-Based Installation

To begin the NetWare installation process:

- 1 Assign a monitor, mouse, keyboard, and CD-ROM drive to the blade server following the manufacturer’s recommendations.
- 2 Insert the *NetWare 6.5 Pre-Load Boot CD* into the CD-ROM drive and boot the blade hardware.
- 3 When prompted, press **c** to copy the NetWare pre-installation image from the CD to the local storage media on the blade server hardware.

IMPORTANT: Make sure that the blade hardware’s BIOS is set to boot from the CD drive.

NOTE: You also have the option to press **r** to view the Readme file on the CD, or to press **e** to exit the installation.

Pressing **c** also creates and formats a 500 MB DOS partition on the blade server hardware, and then loads DOS to that partition.

- 4 When prompted, remove the *NetWare 6.5 Pre-Load Boot CD*.
- 5 Press any key to reboot the blade server.

The blade server will reboot to the newly-installed bootable DOS partition.

NOTE: After the server reboots, you are given the opportunity to increase the size of the DOS partition if you want. If you need a larger DOS partition, press **E** to exit and then use a third-party partition management utility to modify the partition size. Reboot to continue the NetWare installation.

- 6 Press **c** to continue.
- 7 When prompted, insert *NetWare 6.5 SP3 CD 1 (Operating System)* and press any key to continue the installation.

IMPORTANT: Do not insert *NetWare 6.5 SP3 CD 1 (Operating System)* until the blade server has completed the reboot and you are prompted to insert the CD.

The unattended installation of NetWare begins. The autoexec.bat file launches the Install program, which locates the response file specified by the /RF parameter. Install uses the parameters included in this response file to configure the server. If you have included all the required parameters in the response file, the only intervention required is to switch from CD 1 to *NetWare 6.5 SP3 CD 2 (Products)* as prompted. After you have done this, proceed to “**Completing the Server Installation**” on page 62.

Completing the Server Installation

After the installation is finished, the blade server hardware reboots. If you enabled the option to load the server on reboot, the NetWare server software will automatically load when the blade server reboots.

If you disabled the option to load the server on reboot, you can load it manually. To load NetWare on the blade server manually, change to the startup directory containing the NetWare server files (c:\nwserver) and enter **server**.

Your NetWare 6.5 server installation is now complete. In addition to installing the products necessary for your server to run as designed, two volumes were created on the server: sys: and _admin. These volumes are required for the server to function and must not be deleted.

What's Next

After rebooting the server, continue by completing the tasks described in [Chapter 6, “Installing Products and Updates,” on page 87](#).

The NetWare 6.5 Welcome screen provides helpful information for getting the most out of your new server. To access the Welcome screen, open a browser on a workstation with access to the new server and go to <http://xxx.xxx.xxx.xxx>, where [xxx.xxx.xxx.xxx](#) is the new server's IP address.

IMPORTANT: Apache and Tomcat must be installed on the server in order for the Welcome screen to be displayed. If you chose a Basic server installation, or a Customized installation without these two components, you will not see the Welcome screen.

For further information on the management of your server's operating system, see the [NetWare 6.5 Server Operating System Administration Guide](#). For information on managing your network using Novell iManager 2.0.2, see the [Novell iManager 2.0.x Administration Guide](#).

5

PXE-Based Automated Installation of NetWare

When installing NetWare® 6.5 on “headless” blade server hardware, you can save time and effort by taking advantage of the Preboot Execution Environment (PXE). A component of the Intel* WfM (Wired for Management) specification, PXE (pronounced “pixie”) allows networked computers that are not yet loaded with an operating system to be configured and booted remotely. By incorporating PXE with an image creation and deployment utility, you can perform an image-based installation of NetWare that automates much of the file transfer and server configuration process. PXE server and imaging utilities are available from a number of third-party vendors.

This chapter describes how to install NetWare 6.5 on a blade server using a PXE environment to automate the procedure. It then gives practical examples of how this might be done using specific software tools.

Overview of PXE-based Operating System Installation

This section provides a brief overview of how to install new operating system software, such as NetWare, to a blade server using PXE.

Required Components

You need several basic components in order to deploy software onto blade server hardware in a PXE environment.

- Blade server hardware
- PXE server
- TFTP server
- DHCP server
- Reference server
- Image Repository server

Blade Server Hardware

The blade server hardware is normally a new device with nothing installed on it. However, you can use the method outlined in this chapter to install NetWare onto a blade server that already has operating system or application software installed on it.

WARNING: Restoring a NetWare 6.5 server image overwrites any existing data on the blade server. You should back up any needed data prior to installing NetWare 6.5.

As the target machine, the blade server must be enabled as a PXE client. PXE client capabilities are typically found in the BIOS programming of the hardware.

PXE Server

The purpose of the PXE server is to communicate with the PXE client and send it the files it needs to boot up. The PXE server must be configured with a downloadable boot image that will be sent to the PXE client when it initializes.

Some imaging solution vendors provide their own PXE server. For other solutions, you can configure a DHCP server to provide this functionality.

TFTP Server

The TFTP (Trivial File Transfer Protocol) server is generally a service that is loaded on an existing server to handle TFTP requests from a client. Configuration varies depending on the TFTP server being used. Some PXE server software has TFTP capabilities built in. Refer to the documentation for your particular software for details.

DHCP Server

PXE relies on DHCP (Dynamic Host Configuration Protocol) for communication between the PXE client and server. You therefore need a DHCP service that can respond to DHCP requests from a booting PXE client. Depending on the imaging solution you choose, you may need to configure the DHCP server to handle PXE client extensions so it can service DHCP requests from a booting PXE client. If you already have a global DHCP server but don't want to change its configuration, you can add a proxy DHCP server to handle the PXE client extensions and respond to PXE requests. In either case, the configuration identifies a particular network bootstrap program (NBP). The NBP is the program that is first downloaded to a booting PXE client.

In some cases, the DHCP server must be on the same local network segment as the PXE client because the standard PXE protocol does not route packets across networks. However, some vendors have modified the TFTP protocol to be able to route PXE packets.

Reference Server

The Reference server serves as a platform for creating the NetWare server image. You install NetWare 6.5 on this server and then use a third-party image management utility to create an image of that server's hard drive and store it for subsequent deployment on the blade server hardware. The software that creates the images runs on either the reference server or on an attached workstation.

Image Repository Server

The Image Repository server is used to store the NetWare server images and the other files that will be downloaded to the blade server. Depending on the third-party tools you choose, this can be either a Windows or a Linux machine.

Understanding the Basic PXE Boot Process

This section provides a general overview of how the PXE boot process works. For details on the PXE environment, see the [Preboot Execution Environment Specification \(http://www.pix.net/software/pxeboot/archive/pxespec.pdf\)](http://www.pix.net/software/pxeboot/archive/pxespec.pdf).

Briefly, when a PXE-enabled client boots, it requests an IP address from the DHCP/PXE server. The server replies with an address to be used by the PXE client. The PXE client then requests the network bootstrap program (NBP), which is downloaded to the PXE client via TFTP. Control is

then transferred to the NBP, which requests a bootable image from the TFTP server. The bootable image is downloaded to the client via TFTP.

When the download is complete, the NBP transfers control to the bootable image. The bootable image executes and performs whatever instructions and programs are contained in the image.

Practical Example Using Portlock Storage Manager

This section illustrates a practical example of how to install NetWare 6.5 on a blade server that has been enabled as a PXE client. The imaging software used in this example is Portlock's Storage Manager utility.

Portlock Storage Manager is a tool to help network administrators rapidly copy, create, clone, image, restore, and resize DOS, NetWare, and NSS partitions and volumes. It allows you to create an image file of an entire hard disk, such as a disk containing the NetWare operating system files, and then restore this image to a remote device, such as a blade server. Portlock Storage Manager runs on DOS, Windows, NetWare, and Linux machines. For more information on this product, visit the [vendor's Web site \(http://www.portlock.com\)](http://www.portlock.com).

TIP: This example has been verified to work as described with the specific software components and versions mentioned. However, this is not the only possible way to achieve the end result. Other vendors supply products with similar functionality and those products could be used as well. Check the blade server portion of the [Novell Partner Products Web site \(http://www.novell.com/blade\)](http://www.novell.com/blade) for additional Novell verified solutions.

NetWare PXE Installation Procedure

For this example procedure, the following software versions are used:

- ◆ Novell® NetWare 6.5 with Support Pack 3
- ◆ Portlock Storage Manager 3.26 (DOS and Linux versions)
- ◆ Novell SUSE® Linux 9

In this example, a single machine running Linux functions as the proxy DHCP server, the TFTP server, the PXE server, and the Image Repository server. It runs the standard dhcpd and tftpd daemons (configured for PXE services), and the nvlmbpd Imaging Policy Engine daemon.

The Novell-supplied components you need for this procedure are available for download from the [Partner Products Web site \(http://www.novell.com/blade\)](http://www.novell.com/blade).

The NetWare PXE installation process with Portlock Storage Manager comprises the following steps:

1. Perform initial preparation.
2. Install the blade server hardware.
3. Create the NetWare reference image and response file.
4. Create the DOS floppy image files.
5. Create/copy files on the Image Repository Server.
6. Boot the blade server.

Before beginning the actual installation process, it is helpful to understand some of the key components of this deployment solution.

nvlnbpd

Nvlnbpd is a Novell-supplied Linux daemon located and running on the Image Repository server. (Although this example uses SUSE Linux, nvlnbpd also runs on Red Hat* versions of Linux.) It is an imaging policy engine that can be used by many different imaging solutions. For this example, its main responsibility is to determine which floppy boot image to download to a PXE client (booting blade server).

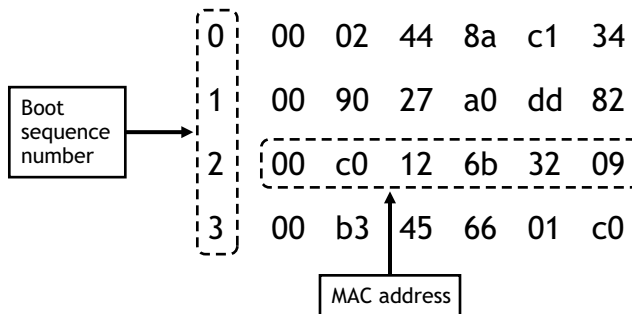
Nvlnbpd determines which floppy image to download by reading the pxenics configuration file (explained below). The TFTP service running on the Image Repository server handles the actual downloading of the floppy boot images to the PXE client/blade server. Nvlnbpd also responds to UDP boot filename requests from nvlntp.sys.

nvlntp.sys

Nvlntp.sys is the Novell Network Bootstrap Program (NBP). It is downloaded to the PXE client/blade server from the Image Repository server via TFTP. Its main responsibility is to gather hardware configuration information about the PXE client and send it to nvlnbpd via UDP. It also makes a UDP request for a boot image filename, which is then used in a TFTP response to download the floppy boot image from the Image Repository server. When the boot image download is completed, nvlntp.sys transfers control to the boot image file.

pxenics

The pxenics file is created automatically by nvlnbpd and is located on the Image Repository server. This simple text file records the MAC address and a current boot sequence number for each PXE client/blade server that communicates with nvlnbpd. Entries are dynamically added and updated as new and existing blade servers go through the bootup process.



The boot sequence number indicates the various stages a blade server goes through during the NetWare installation process. Nvlnbpd uses this information to determine what action to take or which floppy image to send to a booting blade server. Each time the blade hardware boots, the boot sequence number is incremented by 1 until it reaches the maximum value of 3.

Boot Sequence Number	Nvlnbpd Interpretation
0	The PXE client (blade server) has never booted before; nvlnbpd is seeing it for the first time. It records a new entry in pxenics containing the blade server's MAC address. The boot sequence number is incremented to 1.
1	The PXE client has booted once. Nvlnbpd will send the floppy boot image filename floppy1.img. The boot sequence number is incremented to 2.

Boot Sequence Number	Nvlnbpd Interpretation
2	The PXE client has booted twice. Nvlnbpd will send the floppy boot image filename floppy2.img. The boot sequence number is incremented to 3.
3	The PXE client has booted a third time. Nvlnbpd tells it to boot from its local hard disk.

NOTE: If an error occurs during the blade server installation process, you can reset the nvlnbpd counter by opening the pxenics file in a text editor and changing the boot sequence number for the appropriate entry to 0. Be sure to change only the boot sequence number; do not modify the associated MAC address.

Perform Initial Preparation

In this example scenario, the DHCP, TFTP, and PXE services are all hosted on a single Linux machine. The Linux server also functions as the Image Repository server. It is assumed that you have installed the DHCPD and TFTPD daemons on the Linux server. These services should be appropriately configured for the PXE environment, as described below.

TFTP Setup

The location of the default home directory from which all files are downloaded via TFTP is specified in the `\etc\xinit.d\tftp` configuration file. If you change the location of the files from how they are laid out in the example directory structure described below, you must change the `-s` argument in the `server_args` parameter. For example, if you copy the components to `\home\blades\nvl_tftp`, edit the tftp configuration file as follows (the `-s` parameter change is indicated in bold):

```
service tftp
{
    socket_type      = dgram
    protocol         = udp
    ...
    server_args      = -u nobody -s /home/blades/nvl_tftp
    ...
    cps              = 100 2
    disable          = no
}
```

DHCP Setup

To configure your DHCP service to handle PXE requests, ensure that the `DHCPD_INTERFACE` entry in the `\etc\sysconfig\dhcpd` configuration file is set to the appropriate interface that will support DHCP. For example:

```
DHCPD_INTERFACE="eth0"
```

To support PXE extensions, add the following entries to the `\etc\services` file:

```
pxe          67\tcp
pxe          67\udp
```

tftp	69\tcp
tftp	69\udp
tftp-mcast	1758\tcp
tftp-mcast	1758\udp
pxe	4011\udp

To ensure that these entries are added to the correct section of `\etc\services`, search on the port number (67, 69, 1758, and 4011) to locate and then add the new entry.

Storage Manager Setup

These instructions assume you have installed Storage Manager on the Linux server. Refer to the Portlock documentation for instructions on how to install and run this utility.

Install the Blade Server Hardware

Refer to the manufacturer's instructions for information on how to install the blade server into the chassis. Make sure the blade server has a connection to the network. Also assign a monitor, mouse, and keyboard to the blade server following the manufacturer's recommendations.

Your blade hardware should be enabled as a PXE client.

Create the NetWare Reference Image and Response File

For this example, you need a NetWare 6.5 server installation image. You can use Portlock Storage Manager to create this image file after you perform a base installation of NetWare on the Reference server. (Check the [Novell Partner Products Web site \(http://www.novell.com/blade\)](http://www.novell.com/blade) to see if a generic NetWare reference image is available for the blade server hardware you are using. If so, you can download and use that image file instead of generating your own server image file.)

Although it is advisable to use a machine that closely matches the blade server's hardware configuration for the Reference server, the NetWare installation process will do a full hardware check and load the appropriate drivers for any new hardware found when the imaged operating system comes up on the blade server.

IMPORTANT: If necessary, download the NetWare 6.5 SP3 Operating System and Products overlay images from [Novell's Product Downloads Web site \(http://www.novell.com/download\)](http://www.novell.com/download) and burn them to CDs before proceeding.

Run the NetWare Install program on the Reference server:

- 1** If the server is not down, enter **down** at the server console.
- 2** Insert *NetWare 6.5 SP3 CD 1 (Operating System)* into the server's CD drive.
- 3** Restart the server.
- 4** When prompted, press any key to interrupt the installation preparation.
- 5** Enter **p** to specify installation parameters.
- 6** Enter **[inst: image]**.

This parameter tells the INSTALL program to perform a base installation (sometimes referred to as a *factory installation*).

- 7** Enter **i** to continue the installation.

WARNING: Any data currently on the reference server will be lost due to the new installation.

Follow the prompts and insert the requested CDs to install the NetWare operating system. Make sure you specify DOS and NetWare partition sizes that are compatible with the blade server's disk drives. If you need to, refer to the instructions starting with [“Running the Installation Program” on page 22](#) to complete the installation.

- 8 When the base installation is complete, run the Portlock Storage Manager utility and create an image of the NetWare image installation.

In this example, the image file is named `nw65sp3.img`. Note the location of this file; you will need to copy it to the appropriate directory on the Image Repository server.

Create or Edit the Installation Response File

A temporary response file is created automatically when you run the NetWare Install program. It is named `response.tmp` and is stored in the `c:\nwinst.tmp` directory on the Reference server's DOS partition. You can either edit the server parameters in this file or create your own response file using the Deployment Manager utility included with NetWare 6.5.

To edit the existing `response.tmp` file, follow the instruction in the [NetWare 6.5 Response File Installation Guide](#).

To create your own response file:

- 1 At a Windows workstation, insert *NetWare 6.5 SP3 CD 1 (Operating System)*.
- 2 Run `nwdeploy.exe` (or `nwdeploynobrowser.exe` if you want to run the non-browser version) located at the root of the CD.
- 3 Click the Automate an Installation link under the Install/Upgrade Options heading for general instructions on automating the NetWare 6.5 installation using a response file.
- 4 Click the Response File Generator link to access the Response File Creation utility, which assists you in creating response files.
- 5 Follow the instructions in [“Using the Response File Generator”](#) in the *NetWare 6.5 Response File Installation Guide* to specify the server name, IP address, and other information for the new server.

Be sure to select the Blade Image option when asked if the response file is for a new server or a headless blade image.

Note the location of the completed `response.tmp` file. You will need to copy it to the appropriate location on the Image Repository server.

Create the DOS Floppy Image Files

For this example, you must create or edit two DOS floppy image files that are used when booting the blade server hardware. You can use Storage Manager to create these floppy disk images.

Floppy1.img File

The first DOS floppy image (`floppy1.img`) is responsible for booting DOS on the blade server hardware, downloading the Storage Manager files to a RAM drive via TFTP, loading the Novell Client, preparing the blade server hard drive, and using Storage Manager to image the blade's hard drive with the `oessp1.img` file.

For this example, `floppy1.img` contains the following files:

`\command.com`

`\himem.sys`

```
\emm386.exe
\vdisk.sys
\fdisk.com
\format.com
\config.sys
\autoexec.bat
\ramdisk.exe
\tftpget.exe
\phs11st.bat
\clrdisk.exe
\genclnt.exe
\reboot.exe
\client32\net.cfg
\client32\nios.exe
\client32\nbic32.nlm
\client32\ls132.nlm
\client32\cmsm.nlm
\client32\ethertsm.nlm
\client32\tcpip.nlm
\client32\xxxxxx.lan
```

The first eight files are standard files for a bootable DOS floppy disk (although you must edit the autoexec.bat file as explained below). The next six files are Novell utilities called by the autoexec.bat file. The remaining files are needed to load the Novell DOS Client. The information stored in the hwdrv file allows the appropriate LAN driver to be loaded for your blade server hardware. (See [“Create/Copy Files on the Image Repository Server” on page 75](#) for details on the hwdrv file.)

The config.sys file for floppy1.img is as follows:

```
device=a:\himem.sys
device=a:\emm386.exe noems
device=a:\vdisk.sys 7128 /e
files=50
buffers=50
stacks=9,256
lastdrive=Z
```

Note the creation of the RAM disk via the vdisk.sys command. This is necessary because the Storage Manager files will be loaded onto and run from this RAM disk.

The autoexec.bat file for floppy1.img is as follows:

```
@echo off
prompt $p$g
set nlanguage=english
ramdisk.exe
call setrmdsk.bat
call phs11st.bat
genclnt hwdrv strtclnt.bat
call strtclnt.bat
clrdisk.exe
%ramdisk%
stormgr.exe
a:\reboot.exe
```

The floppy1.img file is downloaded to the blade server via TFTP from the Image Repository server. When the download is complete, the blade server boots from this image. The commands in the config.sys and autoexec.bat files do the following.

- ◆ Boot DOS and create a RAM disk in the blade server's memory.
- ◆ Run ramdisk.exe to locate the RAM disk and create setrmdsk.bat. When run, this batch file sets an environment variable (%RAMDISK%) to the drive letter of the RAM disk.
- ◆ Call the phs11st.bat file, which uses tftpget.exe to copy files needed for this specific example from the Image Repository server (in this case, the Portlock Storage Manager imaging software and the hwdrv file).
- ◆ Run genclnt.exe, which uses the information found in the hwdrv file to dynamically build a batch file that loads the Novell Client.
- ◆ Run clrdisk.exe to clear the partition table on the blade server's hard drive. This is easier than using the DOS FDISK utility to remove any existing partitions.
- ◆ Change to the RAM disk, which now contains the Storage Manager utility files, and start stormgr.exe. At this point, the menued Storage Manager utility comes up and the installer must select the appropriate options to "restore" the base NetWare image (oessp1.img) to the blade server. Refer to the Portlock documentation for details.

After the imaging process has completed, the blade server reboots.

Floppy2.img File

The second DOS floppy image (floppy2.img) is responsible for downloading via TFTP a response file, along with other files such as server licenses and NICI keys as appropriate. These files are downloaded onto the blade's hard drive that was imaged during the execution of floppy1.img.

For this example, floppy2.img contains the following files:

```
\command.com
\himem.sys
\emm386.exe
```

```
\vdisk.sys
\config.sys
\autoexec.bat
\ramdisk.exe
\tftpget.exe
\phy21st.bat
\getsrvm.exe
\reboot.exe
```

The first six files are standard DOS files for a bootable floppy disk (again, you will edit the autoexec.bat file as described below). The remaining files are Novell utilities called by the autoexec.bat file.

The config.sys file for floppy2.img is as follows:

```
device=a:\himem.sys
device=a:\emm386.exe noems
device=a:\vdisk.sys 7128 /e
files=50
buffers=50
stacks=9,256
lastdrive=Z
```

The autoexec.bat file for floppy2.img is as follows:

```
@echo off
prompt $p$g
set nlanguage=english
ramdisk.exe
call setrmdsk.bat
getsrvm.exe
call setsrvm.bat
call phs21st.bat
a:\reboot.exe
```

The floppy2.img file is downloaded to the blade server via TFTP from the Image Repository Server. When the download is complete, the blade server boots from this image. The commands in the config.sys and autoexec.bat files do the following.

- ◆ Boot DOS and create a RAM disk in the blade server's memory.
- ◆ Run ramdisk.exe to locate the RAM disk and create setrmdsk.bat. When run, this batch file sets an environment variable (%RAMDISK%) to the drive letter of the RAM disk.
- ◆ Run getsrvm.exe to request a name for the NetWare server being installed. Upon receiving a server name in response, a setsrvm.bat file is created that runs a Linux shell script called

genresponse. This script copies over a dynamically generated response.tmp file containing a unique server name and IP address, based on the matching MAC address entry in the response_ip file. (See “Create/Copy Files on the Image Repository Server” on page 75 for details about genresponse and the response_ip file.)

- ♦ Run the phs2lst.bat file, which uses tftpget.exe to copy files needed for this specific example from the Image Repository server (in this case, the license files, device drivers, and support modules, depending on the machine type).

After the files are copied, the blade server reboots.

Floppyimages File (Optional)

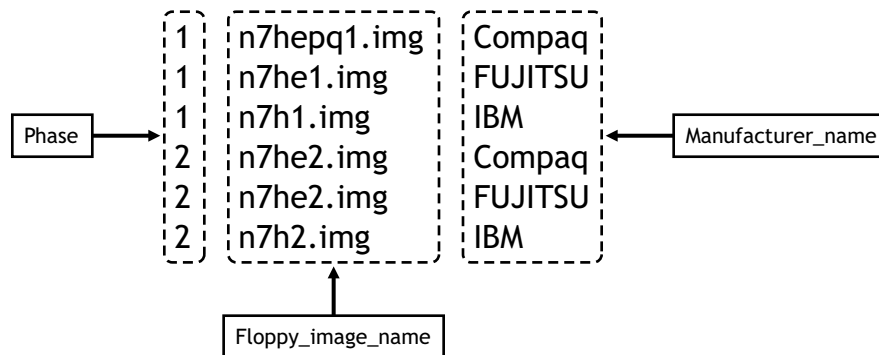
If your situation requires it, you can substitute different floppy images in place of the default floppy boot image files (floppy1.img and floppy2.img). This is made possible through the use of the floppyimages configuration file.

Using a floppyimages file provides more flexibility to enhance the PXE client boot process. For example, you might have blade servers from several hardware vendors that need to boot in different ways. Perhaps a high memory manager (such as emm386.sys) is needed to support the imaging software or the Novell DOS Client. You might need special device drivers that are not included in the default floppy boot images. The floppyimages file allows you to customize floppy boot images for different hardware manufacturers.

You must create the floppyimages file and associated boot images manually, and store them in the appropriate directories on the Image Repository Server. Floppyimages is a text file that lists the image filenames to be used, preceded by a phase number. This phase number should match the boot sequence number in the pxenics file. Each entry in the floppyimages file takes the form

Phase Floppy_image_name Manufacturer_name

where *Phase* is the phase number, *Floppy_image_name* is the name of a customized boot image, and *Manufacturer_name* is the character string reported in the SMBIOS table of the machine’s System BIOS. Any entry that does not have a matching *Manufacturer_name* is ignored and the default floppy boot images are downloaded instead.



This sample floppyimages file shows the customization that can be achieved when you have a mixture of blade servers from HP*/Compaq*, Fujitsu Siemens*, and IBM*. When the HP/Compaq blade server boots the first time, it receives the boot image n7hepq1.img rather than floppy1.img. When it boots the second time, it receives n7he2.img rather than floppy2.img. By contrast, a Fujitsu blade server receives a different image file, n7he1.img, when it first boots, but the same image as the HP/Compaq when it boots again. The IBM blade server receives altogether different boot images.

You can either create these custom boot images from scratch or edit the Novell boot images, using your preferred image editor. Name each image file using a suitable filename convention and create floppy images based on the filenames you choose. Be sure the floppy disk is DOS bootable.

In Linux, you can use the `dd` command to write image files to a floppy disk and then write the modified contents of the floppy disk back to an image file. For example, to write image `n7he2.img` to a floppy diskette, use the following syntax:

```
dd if=n7he2.img of=/dev /fd0 count=1 bs=1440k
```

After you have modified the contents of the floppy disk, use the following syntax to write the disk back to an image file:

```
dd if=dev /fd0 of=name_of_image
```

Create/Copy Files on the Image Repository Server

Now you need to create the `hwdrv`, `response_ip`, and `startpxe` files for your particular blade server hardware. After you have created these files, you can copy them into the appropriate directories on the Image Repository server.

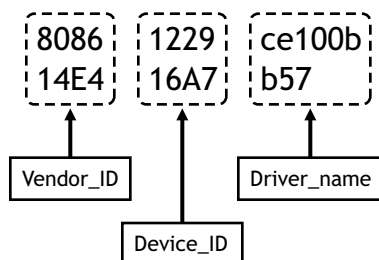
The `hwdrv` File

`Hwdrv` is a simple text file that stores information about the LAN drivers for multiple PXE clients (blade servers). The floppy boot image `floppy1.img` uses this information to load the proper LAN driver for the Novell DOS Client. Creating this file relieves you from having to manually edit the LAN driver load sequences for multiple blade servers with different LAN hardware configurations.

Each line of the `hwdrv` file takes the form

```
Vendor_ID Device_ID Driver_name
```

where *Vendor_ID* and *Device_ID* come from the PCI Configuration Space and *Driver_name* is the name of the corresponding Novell DOS Client LAN driver, without any extension.



This example shows two entries: one for Intel* CE100B LAN hardware and the other for Broadcom* B57 LAN hardware. You can find the vendor ID and device ID for many industry standard PCI LAN boards by using a freeware utility called `pci.exe`. Download the files for this utility (`pci.zip` and `pcidevs.txt`) from the [Datafast Web site \(http://members.datafast.net.au/dft0802/downloads\)](http://members.datafast.net.au/dft0802/downloads).

NOTE: There are no copyright restrictions on the use or distribution of this utility. However, Novell does not provide support for this tool.

The `pcidevs.txt` file lists the vendor and device IDs for most LAN hardware. If your is not listed, extract the `pci.zip` file onto a bootable floppy diskette (or use a virtual floppy if your blade server

doesn't have a floppy drive attached). Boot the machine from the floppy disk and then execute this command:

```
pci -d > report.txt
```

This produces a report detailing all the PCI devices detected, along with their respective vendor IDs and device IDs. For example, on a machine with an integrated Broadcom Gigabit Ethernet LAN board, pci.exe reports the following:

```
Vendor 14E4h Broadcom Corp  
Device 16A7h BCM5703X NetXtreme Gigabit Ethernet
```

The vendor ID for this LAN hardware is 14E4; the device ID is 16A7.

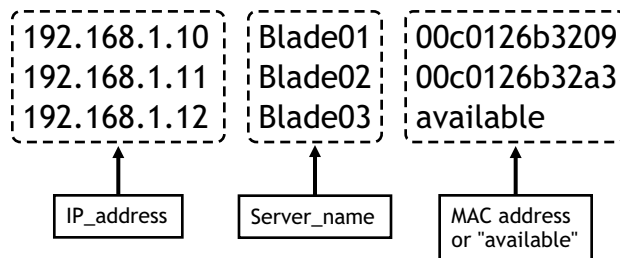
Genresponse and the Response_ip File

The PXE deployment method described in this section allows for customized response files, which define unique characteristics for a NetWare server, to be dynamically created for each blade server. This is achieved using a Novell-supplied Linux script named genresponse and an associated configuration file named response_ip.

If you want to install NetWare on multiple blade servers from a single base response file, you must create the response_ip file manually. Each line of this file takes the form

```
IP_address Server_name MAC_address | available
```

where *IP_address* is an IP address that can be assigned to the blade server when NetWare is installed and *server_name* is the name to be assigned to that blade server. The third field is either the the MAC address of the blade server that should use the IP address and server name, or the keyword "available" (meaning the IP address and server name have not yet been assigned to a blade server). Entries containing "available" are ignored until the keyword is replaced with a valid MAC address associated with a particular blade server.



When a new blade server boots for the second time and receives the floppy2.img boot file, the autoexec.bat commands invoke getsrvnm.exe and call the setsrvnm.bat file. The following events occur during this portion of the installation process:

- ◆ Genresponse checks the response_ip file for an entry that matches the MAC address of the booting PXE client/blade server.
- ◆ If a match is found, a directory is created on the Image Repository server based on the *server_name* entry.
- ◆ The base response file you created or edited previously (response.tmp) is copied into this directory.

- ◆ Genresponse uses the Linux SED utility to modify the Server Name and IP Address parameters in response.tmp, substituting the values contained in the response_ip file.
- ◆ The customized response.tmp file is copied from the Image Repository server to the c:\nwinst.tmp directory on the blade server's DOS partition.

When the blade server performs a local boot, the NetWare 6.5 INSTALL program uses the customized response.tmp file to configure the server's name and IP address.

Startpxe

Startpxe is a Linux script file you can create to launch all the daemons needed for the PXE-based deployment of your blade servers. For example:

```
/etc/init.d/dhcpd start ./etc/init.d/tftpd start ./nvl_tftpd/nvlnbpd
```

This script assumes that none of the required services is currently running. It starts the DHCP and TFTP server daemons and then launches the nvlnbpd daemon.

Directory Structure on the Image Repository Server

For the purposes of this example, create the following directory structure on the Image Repository server:

```
\nvl_tftp
  nvlnbp.sys
  nvlnbpd
  floppy1.img
  floppy2.img
  floppyimages (optional)
  hwdrv
  genresponse
  response_ip
  startpxe
\nvl_tftp\portlock
  stormgr.exe
  stormgr.clm
  stormgr.lic
  tcpipn.nlm
  Linux Storage Manager executable
  NetWare 6.5 reference image (nw65sp3.img)
\nvl_tftp\nwref1
  response.tmp
  license files
  support files
\nvl_tftp\server_name
  response.tmp
```

Note that one or more *server_name* directories might be created dynamically, based on the entries in the response_ip file.

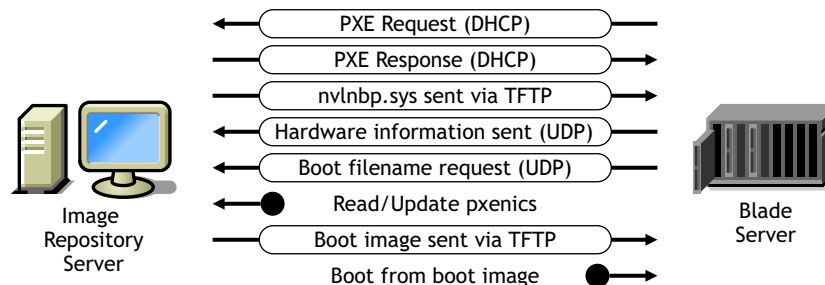
Additional Automation with Portlock's Restore Utility

Storage Manager is a menu-driven utility that is not scriptable. This requires the installer to manually select the appropriate options to launch the imaging process. For those who want to automate this portion of the procedure, Portlock provides a trimmed-down version of Storage Manager which can automate just the image restore process. This utility, called `restore.exe`, uses an INI file in which you can specify what image file to download, where it is located, and what method to use to retrieve it. For more information about how to obtain and use this utility, see [Portlock's Web site \(http://www.portlock.com\)](http://www.portlock.com).

Boot the Blade Server

After all the files are in the appropriate directories on the Linux DHCP/PXE server and all the necessary services are started (including `nvlndpd`), you can power on the blade servers to be installed. This section describes the automatic NetWare installation process step by step, assuming you are using the default floppy boot images and the full version of Storage Manager.

The blade performs a PXE boot and requests an IP address from the DHCP service. The Image Repository server (which is also the DHCP/PXE server in this case) responds by delivering an IP address and the name of the NBP (`nvlndp.sys`) to the blade. After `nvlndp.sys` is downloaded to the blade hardware via TFTP, it takes control and sends a UDP request to the server for hardware information and a boot filename. The UDP packet is received by `nvlndpd`, which reads the `pxenics` file to determine how to proceed.



The first time the blade hardware boots, `nvlndpd` doesn't find a matching entry in `pxenics` and, therefore, concludes that this is a new PXE client. It creates an entry in `pxenics` containing the blade hardware's MAC address and the boot sequence number of 1. Based on this information, `nvlndpd` determines that `floppy1.img` should be downloaded. `Nvlndp.sys` downloads this floppy image to the blade via TFTP and transfers control to `floppy1.img`. This image file now executes as if the blade had booted from this image.

`Floppy1.img` runs through its `autoexec.bat` file which, in effect, sets up a RAM drive and copies the Storage Manager files to it, downloads `hwdrv`, and dynamically builds a batch file to start the Novell DOS Client. The Novell DOS Client executes up to the loading of TCP/IP. Storage Manager then executes and displays its main menu. After the installer selects the appropriate options, Storage Manager proceeds to image the blade server's hard drive with the `oessp1.img` stored on the Image Repository server. After the imaging is complete, the blade server reboots.

This time as the blade performs a PXE boot (boot sequence number 2), `nvlndpd` determines from `pxenics` that `floppy2.img` is to be downloaded. `Nvlndp.sys` downloads `floppy2.img` and transfers control to it, and then `floppy2.img` runs as if the blade booted from that image. Among other things, this image requests the name of the soon-to-be-installed NetWare server via `getsrvnm.exe`. `Getsrvnm` sends a UDP packet to `nvlndpd`, which creates a process that executes `genresponse`. `Genresponse` reads the `response_ip` file to find the server name and IP address that are to be used for this blade server. It also copies and modifies the `response.tmp` file to contain the found server

name and IP address. The server name is then sent to the blade. Using the returned name, the blade downloads the response.tmp file that was prepared for it by the genresponse script and places it in the c:\nwinst.tmp directory on the blade's imaged hard drive. Other files, including licenses and NICI keys, are also downloaded as necessary. The blade server then reboots.

Upon the third sequential PXE boot (boot sequence number 3), nvlbnpd reads pxenics and determines that the blade server should now perform a local boot. Upon receiving this reply, nvlbnp.sys exits and lets the blade boot from the next bootable device, which is the blade's imaged hard drive. At this point, the NetWare reference image (oessp1.img) is in place. The NetWare server.exe program loads and resumes the installation process. Because a response.tmp file exists in c:\nwinst.tmp, the installation proceeds using the parameters specified in the response file.

NOTE: In order to achieve a fully automated installation, you must have manually edited the response.tmp file to provide the necessary eDirectory™ parameters (tree name, context, etc.).

At the end of the NetWare installation, the blade performs a PXE boot as always. Again the blade hardware is told to perform a local boot. The blade boots from the hard drive's DOS partition and starts the NetWare server. This time the server is fully installed and comes up configured with the server name and IP address specified in the customized response.tmp file.

Your OES NetWare server operating system is now installed. In addition to installing the products necessary for your server to run as designed, two volumes were created on the server: sys: and _admin. These volumes are required for the server to function and must not be deleted.

To install additional products on your server, see “[What's Next](#)” on page 87.

Practical Example Using PowerQuest DeployCenter

This section illustrates a practical example of how to install NetWare 6.5 on blade hardware that has been enabled as a PXE client. The imaging software used in this example is PowerQuest* DeployCenter and related utilities.

TIP: This example has been verified to work as described with the specific software components and versions mentioned. However, this is not the only possible way to achieve the end result. Other vendors supply products with similar functionality and those products could be used as well. Check the [Novell Blade Server Web site \(http://www.novell.com/blade\)](http://www.novell.com/blade) for additional Novell-verified deployment solutions.

PowerQuest Components

DeployCenter

PowerQuest DeployCenter 5.5 is a tool to help network administrators rapidly deploy disk images to both servers and workstations across the network. Its ImageCenter component allows you to create an image file of an entire hard disk, such as a disk containing the NetWare operating system files, and then restore this image to a remote device, such as a blade server. It also includes a PXE server to increase the flexibility and control of remote unattended deployments. For more information on this product, visit the [vendor's Web site \(http://www.powerquest.com\)](http://www.powerquest.com).

NOTE: PowerQuest was recently purchased by Symantec*. The URL above redirects you to the Symantec Web site, which contains the most recent product information.

DeployCenter installs and configures a Windows-based PXE server that makes the following assumptions:

- ◆ You already have a DHCP service running on your network. (PXE relies on DHCP.)
- ◆ The DHCP service does not already supply PXE services. (If it does, you need to disable PXE on the DHCP server as explained in the PowerQuest documentation.)

- ◆ You are installing the PXE server on a machine that is different from the machine that runs the DHCP service.
- ◆ The machine running the PXE server has a static IP address assigned to it.
- ◆ The machine that you install the PXE server on already has its domain or workgroup name set.

PXE Server

PowerQuest's PXE server can be configured to define several network boot programs to choose from when a PXE-compliant computer is booted. The choices can be selected from a menu of network boot programs, or you can assign a boot program to a specific machine.

The PowerQuest PXE server uses the Universal Network Device Interface (UNDI) protocol to transfer the bootstrap program and virtual floppy program. This lets the PXE client and server communicate and download files without loading any specific LAN drivers.

DeployCenter includes a PXE configuration utility that simplifies the setup and use of PXE to deploy images across a network. Using this utility, you can assign a virtual floppy to a specific MAC address. (Every computer has a NIC with a unique MAC address assigned to it. This unique address makes it possible to identify computers on a network.)

For simplicity, the example configuration outlined below illustrates how to use the PXE client menu to select the appropriate virtual floppy for the blade server. Refer to the PowerQuest documentation for details on assigning virtual floppies to specific MAC addresses.

Understanding the PowerQuest PXE Boot Process

The following sequence of events occurs when you power on the PXE client:

1. The PXE client boots up and requests the IP address from a DHCP server.
2. The PXE client requests a bootstrap program from the PXE server.
3. The PXE server downloads the bootstrap program from the PXE server using MTFTP (Multicast Trivial File Transfer Protocol).

IMPORTANT: If you are attempting to access a PXE server across a router or switch that does not allow MTFTP to pass, the error message "Error: No boot file name received" is displayed. To resolve the error, make sure that all routers and switches are configured to allow MTFTP.
4. The PXE client runs the bootstrap program and displays a menu of available virtual floppies.
5. You select a virtual floppy program from the menu. The PXE client loads the operating system from the virtual floppy disk and runs any startup commands (such as those contained in the autoexec.bat file for DOS).

NetWare 6.5 PXE Installation Procedure

For this example procedure, the following software versions are used:

- ◆ Novell NetWare 6.5 with Support Pack 3
- ◆ PowerQuest DeployCenter 5.51
- ◆ PowerQuest Deploy Toolkit 5.52 (included with DeployCenter)
- ◆ Microsoft Windows NT/2000/2003 Server

The NetWare installation process consists of the following steps:

1. Perform initial preparation.
2. Install the blade server hardware.

3. Create the NetWare 6.5 server image.
4. Create or edit the installation response file.
5. Create the virtual floppy disk and related files.
6. Run the PXE configuration utility.
7. Boot the blade server.

Perform Initial Preparation

These instructions assume you have already installed DeployCenter and the Deploy Toolkit. Refer to the PowerQuest documentation for instructions on how to install and run these utilities.

It is also assumed that you have installed the PowerQuest PXE server and configured it for the PXE environment. In this example, the PXE server is installed on the Windows server.

Install the Blade Server Hardware

Refer to the manufacturer's instructions for information on how to install the blade server into the chassis. Make sure the blade server has a connection to the network. Also assign a monitor, mouse, and keyboard to the blade server following the manufacturer's recommendations.

Your blade hardware should be enabled as a PXE client.

Create the NetWare 6.5 Server Image

For this example, you need a NetWare 6.5 server installation image. You can use PowerQuest's ImageCenter to create this image file.

First, run the NetWare Install program on the Reference server to create a base server installation:

- 1** If the server is not down, enter **down** at the server console.
- 2** Insert *NetWare 6.5 SP3 CD 1 (Operating System)* into the server's CD drive.
- 3** Restart the server.
- 4** When prompted, press any key to interrupt the Bootable NetWare boot sequence.
- 5** Enter **p** to specify installation parameters.
- 6** Enter **[inst: image]**.
- 7** Enter **i** to continue the installation.

WARNING: Any data currently on the reference server will be lost due to the new installation.

Follow the prompts to install the NetWare operating system. Make sure you specify DOS and NetWare partition sizes that will fit on the blade server's disk drives. If you need to, refer to the instructions starting with "[Running the Installation Program](#)" on page 22 to complete the installation.

- 8** Load the ImageCenter utility and create an image of the NetWare 6.5 installation on the reference server.

Refer to the PowerQuest documentation for instructions on how to run this utility.

- 9** Save the server image file as `oesall.pqi` (or another name of your choosing) and copy the compressed file to the `\images` folder on the Image Repository server.

Create or Edit the Installation Response File

A temporary response file is created automatically when you run the NetWare Install program. It is named `response.tmp` and is stored in the `c:\nwinst.tmp` folder on the server's DOS partition. You can either edit the server parameters in this file or create your own response file using the Deployment Manager utility included with NetWare.

To edit the existing `response.tmp` file, follow the instructions in the *NetWare 6.5 Response File Installation Guide*.

To create your own response file.

- 1** Start the Deployment Manager utility on a workstation by inserting *NetWare 6.5 SP3 CD 1 (Operating System)* and running `nwdeploy.exe` (or `nwdeplnoybrowser.exe`) from the root of the CD.
- 2** Click the Automate an Installation link under the Install/Upgrade Options heading for instructions on automating the NetWare installation using a response file.
- 3** Click the Response File Generator link to access the Response File Creation utility, which assists you in creating response files.
- 4** Follow the instructions in “Using the Response File Generator” in the *NetWare 6.5 Response File Installation Guide* to specify the server name, IP address, and other information for the new server.

Be sure to select the Factory Install/Blade Image option when asked if the response file is for a new server, an upgrade, a factory install or a headless blade.

- 5** Copy the finished response file (named `response.tmp` by default) to a folder named `\fores.tmp` on the Image Repository server.
- 6** Also copy the server license (`*.nlf`) and NICI foundation key (`*.nfk`) files to the `\fores.tmp` folder.

Create the Virtual Floppy Disk and Related Files

You can use PowerQuest's tools to create the virtual floppy file that you'll need to boot the blade hardware and transfer the NetWare server image file to it. A virtual floppy disk is a file that is an exact and complete image of a floppy disk. The image contains information on the disk format and structure, including FAT, boot sector, directories, and all files. You can use virtual floppies with DeployCenter in place of standard floppy disks, making it possible to boot a machine without inserting a physical floppy disk. PowerQuest products use `.vfd` as the extension for virtual floppy disks.

The easiest way to create a virtual floppy disk is to use the Boot Disk Builder that comes with DeployCenter. After you create the boot disk, you can use VF Editor to edit the files for your particular configuration.

- 1** On a Windows workstation with DeployCenter installed, start the Boot Disk Builder.
- 2** Select the option to build Microsoft TCP/IP Boot Disks, then click Next.
- 3** Specify the Microsoft TCP/IP settings, then click Next.

These settings include the username and password to connect to a Microsoft Windows network and log on to a network share (in this case, on the Image Repository server). Be sure to check Login Automatically to do an unattended installation.

Specify the UNC path to map network drive G: to the `\images` folder on the Image Repository server. For this example, the UNC path is `\\fred\images`.

- 4** Specify the ImageCenter location and command line parameters, then click Next.
For this example, select Boot Disk and leave the command line parameters box blank.
- 5** Select PXE Universal Driver (UNDI) as the network adapter, then click Next.
- 6** Select Obtain an IP Address from a DHCP Server, then click Next.
- 7** Select Virtual Boot Disk File, type the path and filename for the virtual floppy file, then click Finish to create the file.
- 8** Answer “No” when prompted whether you want to save these settings for future use, then click Exit.

Now you must modify some of the files included on the virtual floppy disk, using VF Editor.

- 1** Start VF Editor and open the virtual floppy file you just created.
- 2** Drag the autoexec.bat file from the VF Editor window to the desktop.
- 3** Right-click the autoexec.bat file you dragged to the desktop, then select Edit from the pop-up menu.
- 4** Edit the contents of the autoexec.bat file so that it looks like the following:

```
@echo off
@prompt $p$g
set tz=mst7dmt
kicknic
cd net
enmod
stuffit /f:stuffit.dat
net initialize /dynamic
netbind
tcptsr
tinyrfc
net start basic
net use G: \\fred\images
a:
cd\
rem call pqdotask
pqidplyd /cmd=script.pqs /img=g:\oesall.pqi /nrb /wfs /ide=on /ndbg /ifc
```

Make sure the “net use G:.” line maps to the UNC path of your Image Repository server.

Pqidplyd.exe is a special DOS version of ImageCenter designed for a “hands-free” deployment of the image file. It does not include any graphical user interface. All commands to be run are specified in a script command file. Therefore, you need to comment out (rem) the “call pqdotask” line when using pqidplyd.

The parameters for pqidplyd call the commands contained in the script.pqs file; identify the NetWare 6.5 server image file to copy; and set options to suppress normal reboot during

program exit, wipe the first sector after deleting all partitions, enable UDMA to improve performance on machines with an IDE hard disk controller, prevent the debug file from being created, and ignore file system checks.

- 5** Save the changes to the autoexec.bat file and drag it back into the VF Editor window. Answer “Yes” when asked if you want to inject the file and if you want to replace the existing autoexec.bat file.
- 6** In the VF Editor menu, click File > Save and then close VF Editor.

Now you need to create a script.pqs file that includes the commands you want pqidplyd to run, and copy the files necessary to run pqidplyd from the virtual floppy disk.

- 1** Using a text editor, open a new file.

- 2** Type the following commands:

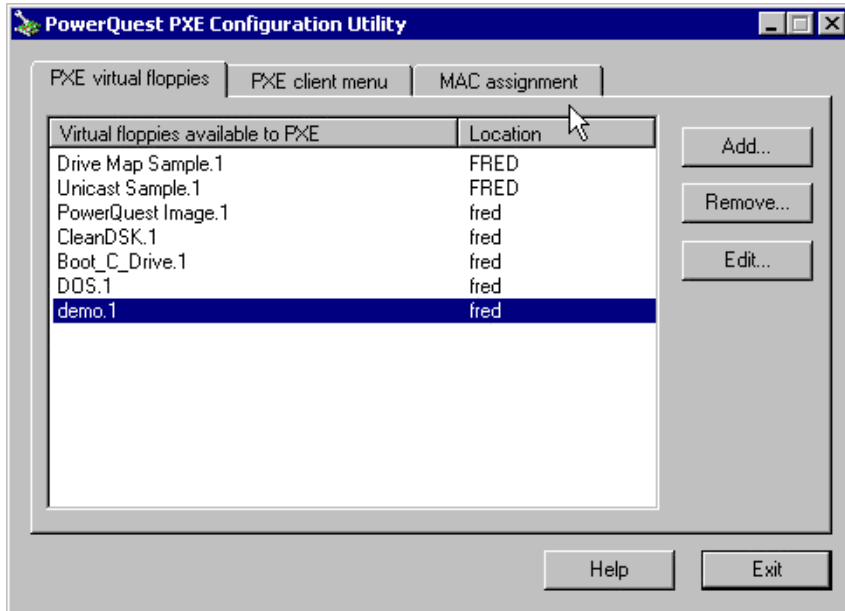
```
select drive 1
if GetTotalPartitions >= 2 goto copy
:image
message “image”
delete all
select freespace first
select image all
restore
goto exit
:copy
message “copy”
copy “g:\fores.tmp\xxxxxxx.nfk” “c:\nwinst.tmp\xxxxxxx.nfk”
copy “g:\fores.tmp\yyyyyyy.nlf” “c:\nwinst.tmp\yyyyyyy.nlf”
copy “g:\fores.tmp\response.tmp” “c:\nwinst.tmp\response.tmp”
```

Replace xxxxxxxx and yyyyyyy with the server license and NICI foundation key filenames, respectively.

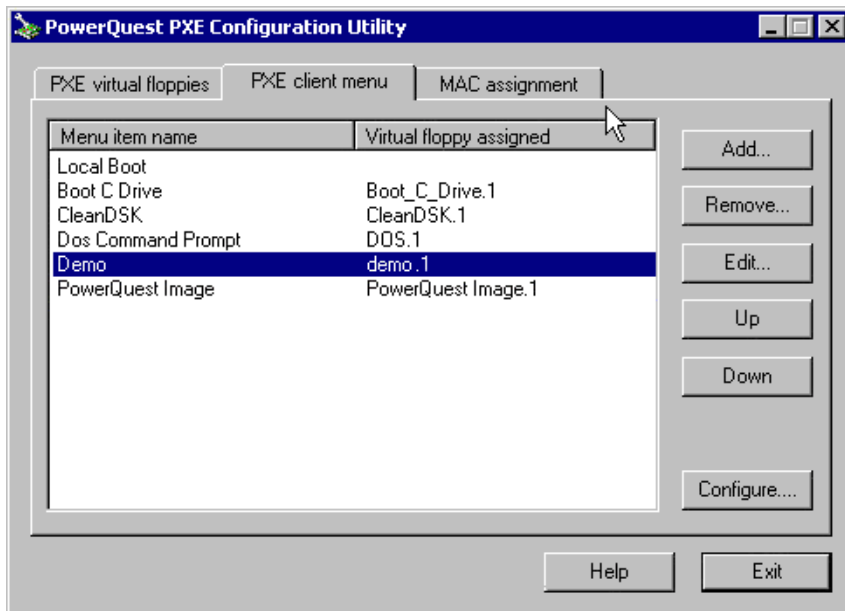
- 3** Save the text file as script.pqs and place a copy of it on the desktop.
- 4** With VF Editor open to the Demo virtual floppy file, drag the script.pqs file into the VF Editor window. Answer “Yes” when asked if you want to inject the file.
- 5** Drag the following files from the Deploy Toolkit folder into the VF Editor window:
 - ◆ Pqidplyd.exe
 - ◆ Pqidplyd.rtc
- 6** In the VF Editor menu, click File > Save and then close VF Editor.

Run the PXE Configuration Utility

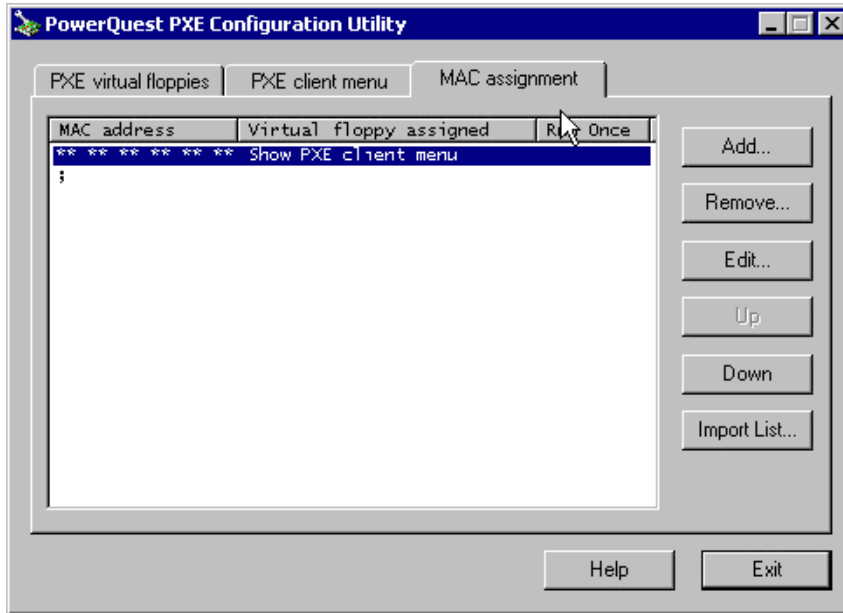
Start the PXE configuration utility and click Add to create a new virtual floppy entry. For this example, the virtual floppy is named demo and is located on the Image Repository server named fred.



Click the PXE Client Menu tab, then click Add to create a new menu item name. For this example, the menu item name is Demo and the virtual floppy assigned is demo.1.



Click the MAC Assignment tab, then click Add to create a new MAC assignment. For this example, type the information as shown in the following figure to show the PXE Client Menu for all MAC addresses.



Boot the Blade Server

Before you launch the image copying process, make sure the PXE server is up and accessible on the same network as the blade server hardware. The Image Repository server (fred, in this example) must also be up and running on the network.

1 Power on the blade server.

The PXE client enabled on the blade server hardware is activated and sends an initial TFTP request to find a DHCP server. When a connection is established between the PXE client and the PXE server, the PXE server sends the network boot loader to the client. The client then loads the PowerQuest ImageCenter utility.

2 When the ImageCenter main screen appears, select the option to run the demo virtual floppy and then click OK.

The demo.vfd file is downloaded to the PXE client. It loads DOS and runs the autoexec.bat, which connects to the Image Repository server and runs pqidplyd with the parameters you specified.

After the NetWare server image has been downloaded, reboot the blade server hardware. When it starts up again, it will resume the NetWare installation using the parameters specified in the response file. To avoid further user intervention, you must have manually edited the response.tmp file to specify the eDirectory parameters (tree name, context, etc.).

Your OES NetWare server operating system installation is now installed. In addition to installing the products necessary for your server to run as designed, two volumes were created on the server: sys: and _admin. These volumes are required for the server to function and must not be deleted.

To install additional products on your server, see [“What’s Next” on page 87](#).

What’s Next

After the server comes up fully installed with the NetWare operating system, continue by completing the tasks described in [Chapter 6, “Installing Products and Updates,” on page 87](#).

The NetWare 6.5 Welcome screen provides helpful information for getting the most out of your new NetWare server. To access the Welcome screen, open a browser on a workstation with access to the new server and go to `http://xxx.xxx.xxx.xxx`, where `xxx.xxx.xxx.xxx` is the new server's IP address.

IMPORTANT: Apache and Tomcat must be installed on the server in order for the Welcome screen to be displayed. If you chose a Basic server installation, or a Customized installation without these two components, you will not see the Welcome screen.

For further information on the management of your server's operating system, see the *NetWare 6.5 Server Operating System Administration Guide*. For information on managing your network using Novell iManager 2.0.2, see the *Novell iManager 2.0.x Administration Guide*.

6

Installing Products and Updates

After installing or upgrading to Novell® NetWare® 6.5, you should install the latest software updates. You can also install additional products or services and configure them to work in the new environment.

This chapter covers the following post-installation tasks:

- ◆ “Installing Additional Products” on page 87
- ◆ “Installing or Updating Novell Client Software” on page 88
- ◆ “Installing Product Updates” on page 88
- ◆ “Other Post-Installation Tasks” on page 88

Installing Additional Products

You can now install other networking products on your NetWare 6.5 server. For specific product information, see the product documentation in the [NetWare 6.5 online documentation \(http://www.novell.com/documentation/nw65\)](http://www.novell.com/documentation/nw65).

Although many products can be installed during the Customized NetWare Server installation, some additional products such as Novell Cluster Services™ can be installed only after completing the server installation. You can install additional products using Novell Deployment Manager (remotely) or from the GUI server console page (locally).

IMPORTANT: When installing additional products through the post-install procedure, make sure you use the same version overlay CDs as the version of NetWare on the server. If the server is running OES/NetWare 6.5 SP3, you must use the SP3 overlay CDs.

Installing Additional Products Remotely Using Novell Deployment Manager

- 1 Log in to the network from a Windows workstation running Novell Client™ software.
- 2 Run `nwdeploy.exe` (or `nwdeploynobrowser.exe` for the non-browser version), located at the root of *NetWare 6.5 SP3 CD 1 (Operating System)*.
- 3 Under Post-Install Tasks, click the Install NetWare 6.5 Products link.
- 4 Follow the on-screen instructions for adding the desired products.

Installing Additional Products Using the GUI Server Console Page

- 1 Insert *NetWare 6.5 SP3 CD 2 (Products)* into the CD drive of the server.
- 2 (Conditional) If necessary, start the GUI server console page by entering `startx` at the server console.
- 3 Click Novell > Install.
- 4 Click Add.

- 5 Specify the root directory of the CD and click OK.
- 6 Select the postinst.ni file.
- 7 Follow the on-screen instructions for installing the product.

Installing or Updating Novell Client Software

If you are running Novell Client software, you should now upgrade your existing workstations. You can also choose to run workstations without additional software using Novell Native File Access Protocols.

For more information, see the [Novell Client documentation \(http://www.novell.com/documentation/noclienu/index.html\)](http://www.novell.com/documentation/noclienu/index.html).

Installing Product Updates

For best performance, you should download and install the latest updates available at [Novell Support and Downloads \(http://support.novell.com\)](http://support.novell.com).

Other Post-Installation Tasks

After completing the NetWare installation, you can run the Deployment Manager again and click the links under the Post-Install Tasks heading for information on:

- ◆ Creating additional volumes
- ◆ Migrating to new hardware using the NetWare Migration Wizard Utility
- ◆ Consolidating servers with the Novell Server Consolidation Utility
- ◆ Using DSREPAIR
- ◆ Upgrading a cluster after the NetWare installation

A

Keyboard Commands

Although a mouse is recommended, you can use the keyboard commands in the table below to navigate through the installation program. Use the arrow keys on the numeric keypad for cursor movements.

NumLock (number lock) must be on in order for cursor movements to be enabled on the keypad.

Keystroke	Action
Tab	Move to the next element
Shift+Tab	Move to the previous element
Enter	Select
Ctrl+Tab	Move to the next text area
Up-arrow (keypad 8)	Move cursor up
Down-arrow (keypad 2)	Move cursor down
Right-arrow (keypad 6)	Move cursor right
Left-arrow (keypad 4)	Move cursor left
Hold Shift while pressing the key	Accelerate cursor movement
Keypad 5	Select or click an object
Keypad 0	Lock a selected object (for dragging)
Keypad . (period)	Unlock a selected object (to drop)
Keypad + (plus)	Double-click an object
Alt+F7	Move to the next window
Alt+F8	Move to the previous window

