NetWare 6 Installation

Overview

Terms you’ll need to understand:
✓ New server installation
✓ In-place migration
✓ Across-the-wire migration
✓ Deployment Manager
✓ Certificate Authority (CA)
✓ Secure Sockets Layer (SSL) encryption
✓ Clear text
✓ Directory schema
✓ Express installation
✓ Custom installation
✓ Platform Support Module (PSM)
✓ HotPlug Support Module

Techniques you’ll need to master:
✓ Identifying NetWare 6 prerequisite requirements
✓ Preparing your existing network for NetWare 6
✓ Preparing your designated computer for NetWare 6
✓ Installing NetWare 6
This chapter addresses the prerequisites, steps, and options involved in installing NetWare 6. To simplify that process, Novell includes Deployment Manager, which you use to prepare the network for NetWare 6 installation, review the installation/upgrade options, install other NetWare 6 products, and validate the installation.

Reviewing NetWare 6 Prerequisites

Before you install NetWare 6, the network and computer hardware must meet certain requirements. To make sure that the system is prepared for the installation, you must complete three tasks:

➤ Ensure that the server system meets the hardware requirements.

➤ Ensure that the required software and settings are available.

➤ Ensure that the existing network configuration is sufficient for the installation.

It is imperative that the prerequisite tasks be completed to ensure a successful installation. As you’ll learn later in this chapter, NetWare 6 is more demanding than previous versions of NetWare and offers many new features. The new features require significant hardware and software resources, which is why you must ensure that the server meets the minimum requirements for NetWare 6. If the server does not meet the requirements, the operating system will not run. If you are installing a new network and beginning with NetWare 6 servers, some of the preparation steps are not necessary. However, the new NetWare features require that existing servers be updated to accommodate new network objects and object settings. If they are not updated, the existing servers will not be able to work with the NetWare 6 server.

Ensuring the Minimum Requirements and Configurations for NetWare 6 Server Hardware

In addition to discussing the minimum hardware configuration requirements for NetWare 6, this section covers the recommended and maximum supported hardware configurations. For the purpose of Test 050-676, “Upgrading to NetWare 6,” and the very rare circumstances in which additional hardware is not available, the following list defines the minimum hardware requirements for NetWare 6:
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➤ **Processor**—Intel Pentium II or AMD K7
➤ **Memory**—256MB
➤ **Video**—Super Video Graphics Adapter (SVGA)
➤ **DOS partition**—400MB total (200MB for system files and 200MB free space)
➤ **Available for non-DOS partition**—2GB for the sv$ system file
➤ **Network cards**— 1
➤ **CD-ROM drive**— 1
➤ **Mouse**—Recommended

There is some disagreement as to the amount of free space required for the DOS partition. The online documentation indicates that a total of 400MB is required, whereas the courseware indicates that only 200MB is required. For the exam, you should use 200MB as the required minimum.

Although a server that just meets the minimum hardware requirements is sure to function, it will by no means be an efficient services provider. In fact, if additional features such as iPrint or NetStorage will be installed, the minimum configuration is not sufficient. The following list defines the least powerful hardware configuration recommended by Novell:

➤ **Processor**—Intel Pentium III, 700MHz or higher
➤ **Memory**—512MB
➤ **DOS partition**—1GB (this will more than cover the recommended 200MB + 512MB for a core memory dump)
➤ **Non-DOS partition**—4GB
➤ **Network cards**— 2
➤ **CD-ROM**—1 bootable that uses the El Torito standard
➤ **Mouse**—1

For those with unlimited budgets and those who like to dream, the following list outlines the maximum supported hardware configuration for a single NetWare 6 server:

➤ **Processors**—Up to 32 per server
➤ **Memory**—Up to 64GB
➤ Disk space—A single volume of up to 8TB (terabytes; 1TB is 1,099,511,627,776 bytes, or $2^{40}$)

Table 3.1 summarizes the minimum, recommended, and maximum server hardware configurations for NetWare 6.

<table>
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<th>Table 3.1 NetWare 6 Server Hardware Configurations</th>
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**Meeting Software Requirements for Installing NetWare 6**

The software requirements for installing NetWare 6 are not limited to the NetWare 6 CD-ROM but also include the License/Cryptography disk. A specific system installation might have additional software requirements, depending on the type of installation being performed:

➤ If the installation is to be performed over a network, the NetWare Client software is required.

➤ If the installation is performed directly on the server but the server cannot be booted from a CD-ROM, DOS drivers are required to access the installation CD.
Introducing NetWare 6 Deployment Manager

Novell has simplified the NetWare installation process by including Deployment Manager (see Figure 3.1). Deployment Manager is used to prepare the network for NetWare 6 installation and review the installation/upgrade options. In addition, Deployment Manager includes tools that are used after the installation to install other NetWare 6 products and validate the installation.

![Figure 3.1](image)

**Figure 3.1** You can use Deployment Manager to prepare for and manage installation and post-installation tasks.

Deployment Manager is included on the NetWare 6 software installation CD-ROM. When it is inserted into a drive on a Windows-based client that has AutoPlay enabled, Deployment Manager launches automatically. As shown in Figure 3.1, the left panel of Deployment Manager includes three primary installation categories: Network Preparation, Installation/Upgrade Options, and Post-Installation Tasks. Any item that is listed with a document icon provides information about the task. For example, Step 4 under Network Preparation describes how NetWare uses a Certificate Authority (CA) and the steps used to determine which server is acting as the CA and how to update that server. Clicking a step that has a red arrow icon next to it starts the Installation Wizard that performs the specified task. The Network Preparation section of Deployment Manager is covered in the next section of
Preparing for NetWare 6 Installation

In addition to the computer and network preparation steps described in the following sections, there are a few personnel-type preparation steps you must take to successfully install NetWare 6 on an existing network. To start with, the User object you use to perform the installation must have the Supervisor right to \[\text{Root}\] in the eDirectory or Novell Directory Services (NDS) tree, as well as to the container in which the Server object will reside. The user must also have Read access to the Security container object for the tree.

You need to gather information regarding the configuration of the server hardware and protocols. You should have network interface and storage hardware configuration information such as interrupt request (IRQ) and port addresses. Pertinent protocol information for the server is required as well. For example, to install a server that will use Transmission Control Protocol/Internet Protocol (TCP/IP), you need the IP address for the server, the subnet mask, the IP address of a domain name server, the IP address of an Internet gateway, and the domain name.

Armed with this information, you can begin the network preparation by using Deployment Manager. When the network is ready to accept the NetWare 6 server, you can proceed to verifying that the client and server computers are sufficiently configured to support NetWare 6.

Preparing the Existing Network with Deployment Manager

As shown in Figure 3.1, the Network Preparation section of Deployment Manager consists of the following:

- Overview
- Step 1: Back Up Data
- Step 2: View and Update NDS Version
NetWare 6 Installation Overview

➤ Step 3: Prepare for NDS eDirectory 8.6
➤ Prepare a Novell Cluster for Upgrade
➤ Prepare a Server with NDS7 & NSS
➤ Step 4: Update the Certificate Authority

Clicking Overview in the left pane of Deployment Manager displays a description of each of the steps in the network preparation process in the right pane. Clicking Step 1: Back Up Data displays information on the process for using Storage Management Services (SMS) and SBACKUP to back up and restore server data for NetWare 3, NetWare 4, and NetWare 5 servers as part of the installation process (see Figure 3.2). Deployment Manager does not perform the backup for you. Rather, the procedures outlined in Step 1 are intended to help you ensure that your data is safe before you proceed with the installation.

![Deployment Manager](image)

**Figure 3.2** Step 1 of Network Preparation in Deployment Manager outlines the steps for backing up and restoring server data.

Two sections of the Installation Wizard address preparing the network. The first part of the process, which occurs in step 2, updates the version of NDS on the existing servers so that those servers can accept eDirectory 8.6. The second part of the process, which occurs in step 3, updates the NDS structures on the servers to include eDirectory objects and object settings. eDirectory 8.6 requires that the existing servers be updated to the following NDS version levels:
Existing servers with NetWare 4.11 and 4.2 should be updated to NDS 6.09

Existing servers with NetWare 5 should be updated to NDS 7.47 or NDS 8.51

Clicking Step 2: View and Update NDS Version launches the Installation Wizard in Update NDS mode, as shown in Figure 3.3. The Installation Wizard searches the specified tree or container to determine whether the NDS installations on the existing servers require updates. If you know what NDS tree and container will contain the new server, you should enter the information by typing `netware://Trees/treename/containername`, as explained in the Description area of the utility. If you prefer, you can click the Browse button to launch the NDS Tree Browser and then select the tree and topmost container and click OK. When the tree information is defined, you should indicate whether the Installation Wizard should search for NDS servers only in the selected container or in subordinate containers as well. If there are NDS servers in subcontainers in the tree, it is important that they are included in the search. If they are not updated, they will not be able to interact with the NetWare 6 server. Click Next to proceed with the installation.

![Figure 3.3](image)

**Figure 3.3** The first screen of the Update NDS utility identifies the NDS tree to search for existing NDS servers.

A list of the servers in the container is displayed. If any of the servers’ NDS versions must be updated, they are listed, and the Update NDS? box can be selected. If there are servers in the tree that are already at the correct NDS level, they are displayed in the list but appear dimmed and cannot be selected for update. You need to select the Update NDS? option for the servers to be updated. When you click Next, the new NDS files are copied to the...
servers. After the files are copied, NDS needs to be restarted on the servers. You should select the servers that have been updated and click Next to continue. After NDS has been restarted on all servers, you should click Exit to return to Deployment Manager.

To update the NDS structure on the servers, you click Step 3: Prepare for NDS eDirectory 8.6. Again, you can enter the NDS tree information manually, or you can click Browse and select the information. As in step 2, when the tree and container are specified, you click Next to display a list of servers containing Master or Read/Write replicas of the [Root] partition of the NDS tree (see Figure 3.4). When you update the configuration on one of those servers, the structure for the replicas on all servers is updated. For this reason, it is necessary to perform this update only once. You should select any of the servers listed and click Next. When the NDS tree has been updated to accept eDirectory 8.6, you click Exit to return to Deployment Manager.

![Figure 3.4](image)

**Figure 3.4** You need to select a server that contains a Master or Read/Write replica of the [Root] partition.

The next two options in the Network Preparation section are used only in special circumstances. If NetWare 6 is being installed on a system with a previous version of Novell Cluster Services (NCS), you can click Prepare a Novell Cluster for Upgrade. Along the same lines, if the existing server is running NDS 7 and includes Novell Storage Services (NSS) volumes, you can click Prepare a Server with NDS7 & NSS. If, however, the existing server includes neither of these options, you should click Step 4: Update the Certificate Authority to review the steps that are necessary for modifying the CA object in an existing NDS tree. After you review the steps, you should click Cancel to close Deployment Manager.
If the organizational CA object does not already exist, the NetWare 6 installation creates an organizational CA object. If the network does contain an organizational CA, it must be running Novell Certificate Server version 2.0 or later. If the current organizational CA is not running the correct version of Certificate Server, it must be upgraded from files that can be downloaded from the Novell Web site (www.novell.com/download). In addition to having the correct version installed, the user performing the NetWare 6 installation must have Supervisory rights to the Security container before performing the installation. During the installation, the organizational CA server must be online and accessible to the servers in the tree.

**Preparing the Server Hardware**

Preparing the server hardware for the NetWare 6 installation is the last requirement before the actual installation process can begin. The scope of this step depends on the server’s current configuration. If the server already meets the minimum hardware requirements, as discussed earlier, the work involved with this step is minimal. If not, this is the time to update the server hardware to meet the NetWare 6 minimum requirements.

You should begin preparing the server hardware for the installation by reviewing the size of the DOS boot partition. Although NetWare 6 requires the boot partition be a minimum of 200MB, its optimal size includes free space equal to the amount of memory installed in the system. In the event of a core dump, the server writes the information currently in memory to the boot partition for debugging purposes. So if a server has 3096MB of memory, the optimal size for the boot partition would be 3296MB. If the existing partition is not sufficient, it should be deleted and re-created.

The simplest method for launching the installation utility is to boot the server from the NetWare 6 Operating System CD-ROM. This requires system hardware and a CD-ROM drive that support bootable CD-ROMs. When the system boots, \texttt{INSTALL.BAT} is run automatically, beginning the installation process. If you aren’t able to use a bootable CD-ROM to install the operating system, you can access the installation files across the network by using either the Novell Client for DOS and Windows 3.1x or the IP Server Connection utility, both of which are included on the Novell Client.
Installation CD-ROM. If the CD-ROM drive in the server does not support bootable CD-ROMs and you cannot use the Novell Client or IP Server Connection Utility, you must locate and load the DOS drivers to access the CD-ROM after the server is booted. If, like many users today, you’ve forgotten everything you ever knew about the AUTOEXEC.BAT and CONFIG.SYS files, it’s best if you start the installation from a bootable CD-ROM.

Preparing Client Computers

NetWare 6 has more stringent hardware requirements for server computers than any prior version of NetWare. On the other hand, its supported client configurations are much more comprehensive than earlier versions, providing easy integration with existing networks of all types.

You prepare Windows client computers for the NetWare 6 installation by installing the Novell Client for the Windows family. In other words, Windows 98 client computers require the Novell Client for Windows 95/98, and Windows 2000 clients use the Novell Client for Windows NT/2000. A client workstation must have at least 24MB of memory for this installation, and each of these operating systems has its own minimum memory requirements that are more than 24MB. Put simply, if the computer runs with the operating system installed, the Novell Client for Windows can also be installed.

As discussed in Chapter 2, “NetWare 6 Overview,” NetWare 6 includes native file access support for Apple Macintosh, Windows, and a variety of Unix computers. Unix support also means that Linux workstations are able to use NetWare file services. In fact, a NetWare 6 server configured to use the new Net features can be accessed by virtually any type of computer over the Internet.

Installation Types: Install, Migrate, and Upgrade

Like many aspects of NetWare 6, the installation process is flexible, allowing you to choose the type of installation that best suits your situation. Information on three installation types is accessible under the Installation/Upgrade Options in Deployment Manager: Install NetWare 6, Upgrade to NetWare 6, and Migrate Using Novell NetWare Migration Wizard 6. The type of installation you choose depends on the circumstances of the installation.
Before you make a decision between installing, migrating, and upgrading, you should review what each entails and which can be used for your existing environment. Installations and upgrades take place directly on the server computer and are launched from the Operating System CD. Whether you perform an installation or upgrade depends on the current state of the computer. If the system is new and has no operating system, an installation is required. If the server is already installed and it meets the minimum requirements for NetWare 6, you can choose to install or upgrade. The difference is in how the existing server settings and data are handled. Performing an installation on an existing server ignores any existing settings and may reconfigure the server's volumes, meaning that data could be lost. An upgrade is performed when the installed server is running a previous NetWare version and you want to keep the data and settings intact.

Because an installation resets the computer's configuration, it is often called a new server installation. The upgrade form of the installation process is called an in-place upgrade.

Regardless of whether you are performing an upgrade or a migration, it is imperative that you back up the information on the existing server and validate that the backup can be used in the event of a failure.

The migration process takes the bindery or NDS information from an existing server and copies it over the network to the eDirectory tree on the new NetWare 6 server. In addition, a migration copies the existing files on the server to the volumes on the new server. This process allows the new server to replace the existing server but keeps the existing server intact in case there are problems with the installation.

The migration form of the installation process is called an across-the-wire migration.

In many ways, upgrades and migrations are the same; the existing configuration is used to create the new server, and the data files remain intact. In addition to the two servers involved, a migration is managed through a workstation connected to the network. Because migrations require three systems, one of the primary considerations when choosing between upgrading and
migrating is availability of server and workstation hardware. If you do not have sufficient hardware resources to create a separate server for NetWare 6, you must perform an upgrade rather than a migration.

You should choose to do a new server installation in the following situations:

➤ You purchased a new system to act as the NetWare server.
➤ The existing servers will be maintained rather than replaced by the new server.
➤ An existing server meets the NetWare 6 requirements, and the information on the SYS: volume can be lost.

You should choose to upgrade a server in the following situations:

➤ You are limited in the amount of hardware available for the server installation.
➤ You want the new NetWare 6 server to replace the existing server.
➤ Your existing server's operating system is NetWare 4.x or 5.x.

You should choose an across-the-wire migration in the following situations:

➤ You purchased a new system to act as the NetWare server, and existing hardware is not needed for the installation.
➤ You want the new NetWare 6 server to replace the existing server.
➤ Your existing server's operating system is NetWare 3.x, 4.x, 5.x, or 6 or Windows NT.
➤ A workstation is available that can be configured to manage the migration.

NetWare 6 Installation Options

When performing even the most basic NetWare installation, you can choose from among many options. The default selections work well for most installations, and you should concentrate on knowing and understanding the defaults when preparing for Test 050-676. However, a real-world installation can take advantage of many of the available options. During the installation process, you are asked whether the installation should be run as an express installation or a custom installation and whether it is a new server, an upgrade, or a premigration.
An express installation performs a hardware detection and installs NetWare with default settings and components. This installation option assumes that the bootable DOS partition meets the minimum configuration requirements. Because it uses a set of default settings, an express installation runs with very little interaction from the administrator. On the other hand, a custom installation steps you through the configuration process and requires (at the very least) confirmation of the default selection.

The following are the default settings used for express installations:

- 4GB sy: volume (with free space on the primary disk drive beyond this size left unassigned)
- Country Code 1 (US)
- Codepage 437 (US English)
- US Keyboard
- VGA Plug and Play Video
- Auto-Detect and Configure Mouse
- Install Novell Distributed Print Services, NetWare Administration Server, and Novell Advanced Audit Services

The installation process and user interaction requirements vary, depending on whether you indicate that you are installing on a new server, upgrading an existing server, or performing a preinstallation migration. A new server installation removes existing sy: partitions if they are found and asks whether to delete other NetWare partitions during the installation. However, it does not change other partitions, such as the boot partition. If you select Express Install with this option, the process initiates, and the first user interaction is the request to name the server. Because the New Server option deletes NetWare partitions, if you choose this option when installing NetWare 6 on an existing server, you need to be certain to have a backup of any data you want to retain.

An upgrade installation retains server configuration information as well as data files on the NetWare partitions. This means that a good portion of the configuration steps are handled automatically. A premigration installation prepares a new system to be used as the destination server in a migration, as discussed in detail in Chapter 4. Of the combinations, selecting Express Install and Upgrade (express upgrade) is the least time-consuming option, and choosing Custom Install and New Server requires the most interaction and therefore the most time.
The express upgrade uses the following default selections:

- The existing startup directory will be renamed .OLD. For example, if the default setting was used to install the existing server, the startup directory will be named C:\NWSERVER.OLD after the upgrade.
- Drivers for network adapters and disks will be autodiscovered.
- Any products that are currently installed will be upgraded.
- If they are not already installed, Native File Access, iManager, and Novell Advanced Audit Service will be installed by default.

**Basic Installation Steps**

Regardless of whether you are performing a new server installation, an upgrade, or a premigration server installation, in either express or custom mode, the installation is started the same way. As mentioned earlier, booting from the Operating System CD runs INSTALL.BAT to launch the installation process.

As mentioned earlier in this chapter, the prompts and requirements for installation depend on the type of installation selected. This section assumes that a new computer is being installed as the first NetWare 6 server in an existing tree. To fully cover the installation process, this section describes the custom installation/new server combination:

1. The first prompt presented after bootup asks you to select whether to load support for IDE CD-ROMs, SCSI CD-ROMs, or both. Press I, S, or B, as appropriate for your server configuration. If you do not select an option in 10 seconds, both drivers are loaded automatically. On the next screen, select the appropriate language for the installation and press Enter. By default, you can install NetWare in either U.S. English or another language (Spanish, French, or Portuguese are standard options). Make the appropriate selection and press Enter.

2. The next screen gives you the opportunity to review the terms and conditions of the NetWare 6 license agreement. Press Enter to read the agreement, or select Accept License Agreement and press Enter to continue.

3. Because the server has not yet been configured with an operating system, no bootable partitions were found on the system's hard drive. Select Create a New Boot Partition and press Enter. By default, the boot partition size is set to 200MB. However, based on the information
developed in the planning stages of the installation, it is likely that you will want to change this option. Select Modify, change the new DOS partition size to the appropriate setting, and press Enter. Note that the amount of free space left on the disk has changed. Select Continue and press Enter. When you are asked to confirm the creation of the new partition, select Continue and press Enter again. Before you can use the new partition, the system must be rebooted. Press any key to reboot. The new partition is formatted, and a basic set of operating files is copied to it; these files are used to start the server in installation mode.

4. When the installation starts, you are presented with the JReport Runtime license agreement, as shown in Figure 3.5. Use the arrow, Page Up, and Page Down keys to navigate through the license agreement. After you review the agreement, if you accept the agreement, press F10.

5. The Welcome to the NetWare server installation screen is next. This is where you specify the installation type. To change from express to custom, press Enter. Also specify New Server, Upgrade, or Pre-Migration system. After you make the desired selections, select Continue and press Enter.

6. Next, you are given the opportunity to specify the first set of a series of server settings. In this set, you can specify the server ID number, whether to load the server at reboot, and whether to add lines to the STARTUP.NCF file when it is created. The server ID is used on Internet Packet Exchange (IPX) networks with legacy applications to
uniquely identify the server on the network. It is a hexadecimal ID of up to eight characters that is automatically generated during a new installation. You can change this number, as long as the new number does not conflict with the number of another server on the network. There may be instances in which you would not want to load SERVER.EXE each time the machine starts. For example, you might have a test server on which several different configurations are loaded. If you choose not to load SERVER.EXE automatically, you can choose the configuration you want to start. But generally you’ll want to load SERVER.EXE each time the system starts. If the server hardware documentation indicates that specialized set parameters are required, select Edit to produce a configuration window. Include the lines to be added to the STARTUP.NCF file, and then press Esc and then Enter to save changes. Select Continue in the Options box and press Enter.

When you perform an upgrade, you are not given the opportunity to change the server ID number. However, there is an option that is not presented during a new server installation: the location for the backup startup directory. This option allows you to retain the configuration settings from the previous NetWare installation, so that you can use them as a reference if necessary. When you are confident that the configuration is stable, you can delete the backup startup directory from the partition.

7. Regional settings are used to specify the server’s configuration for things such as keyboard layout. The defaults are loaded based on the language specified at the beginning of the installation. Accept the default regional settings (shown in Figure 3.6) and press Enter to continue. Next, specify the mouse type and video mode for the server. By default, the mouse selection is set to Auto and the video mode to Super VGA Plug N Play. Although a mouse is not required, it is recommended for the server. NetWare 6 supports universal serial bus (USB), PS/2, and serial mice. If the mouse selection is set to Auto, the server attempts to locate a mouse during the graphical interface load. It cannot, however, detect the video mode, so it is important that you choose the correct configuration for your hardware. Aside from the default, the installation program supports Super VGA at 800×600 and Super VGA at 640×480. To adjust either of these settings, highlight it and press Enter. After the server is installed, these settings can be changed, but an incorrect setting at this point could make the remainder of the installation more difficult. Select Continue and press Enter. The system begins copying files to the DOS partition.
8. When the file copy is complete, the NetWare installation process scans for system devices, after which it displays a list of three device categories (Platform Support Module, HotPlug Support Module, and Storage Adapters) and the devices discovered. Every server must include at least one storage adapter module listing, most often IDE-DATA. If multiple controllers are installed in the server, the storage adapter driver may be listed more than once. For example, most computers today have two IDE controllers on the motherboard, which means that the IDEDATA driver should be listed twice on these systems. Verify that the device listing is correct for your hardware configuration. If the system scan did not discover a storage adapter, select Modify and follow the steps to add an adapter. Otherwise, select Continue and press Enter.

The results of the system device scan might be different for every NetWare installation; not all systems, for example, require Platform Support Modules (PSMs) or HotPlug Support Modules. A multiprocessor system, for example, uses the MPS14 PSM. When you install NetWare 6 on multiprocessor systems, the PSM list should display the MPS14 module.

9. The installation program loads the drivers for the devices listed and then performs another scan to identify specific devices, such as hard drives, CD-ROMs, and network boards. Verify that all installed storage devices were correctly discovered by the installation program. Also verify that the network board installed in your server was identified correctly. If the answer is no in either of these cases, select Modify, highlight the device category, and press Enter. Press Ins to add a device to the list displayed. It might be necessary for you to provide the driver if the system did not discover the device automatically. When the driver list is
configured correctly, select Return to Driver Summary and then click Continue. The system loads the storage drivers that are specified and scans the hardware for partitions and available space.

10. The default sys: volume configuration is presented (4GB size, NSS file system, and file compression turned off), as shown in Figure 3.7. You can change the size of the partition or change its compression setting before you create the volume from this screen. To put the sys: volume on a partition on a different drive, select the device at the top of the screen and change its partition settings as necessary. Save any changes by pressing F10 and then select Continue. sys: is created, and the installation process copies installation and system files to the server. This might take a while, depending on the speed of the server and its components. When this phase is complete, the graphical user interface (GUI) launches automatically.

![Figure 3.7](image)

**Figure 3.7** You need to identify the partition for the SYS: volume.

11. The first configuration option in GUI mode is specifying the name for the server. Enter the desired name and click Next. When prompted, insert the License/Cryptography disk and click Next to continue. Cryptography is an essential component of NetWare 6, and you must provide a valid License/Cryptography disk at this point in the installation. If the files are located somewhere other than A:\License, click the Browse button to locate them on the server. When their path is correctly identified, click Next to continue.

12. The next screen displays the server’s file system configuration, as shown in Figure 3.8. From this screen you are able to modify the sys: volume configuration and create new volumes by using available free space. These settings are also available through ConsoleOne after the server has been installed. Make any changes desired and click Next to continue.
13. The next step in the configuration process is to establish the protocol settings for the network adapters identified in step 9. Unlike many earlier versions of NetWare, NetWare 6 does not require IPX for communication. By default, IP is used as the transport protocol on NetWare 6 networks. Select IP and enter the server’s IP address, subnet mask, and router address. If IPX is in use, select the check box next to the protocol. The configurations that are established on this screen can be changed after the server installation has completed. Click Next to continue with the installation process.

14. Although Domain Name System (DNS) is not required for server operation, you are able to set the server’s DNS configuration on the next screen presented. If desired, enter the host for the server and your network’s domain name. Also identify the name servers that the new server should use to resolve its DNS queries. Selecting Verify the DNS information means that the server will query the specified DNS servers to validate that the IP address and hostname specified are correct. When the configuration is complete, click Next to specify the time zone settings for the server. Select the correct time zone from the list, indicate whether the system should be adjusted for Daylight Saving Time, and click Next.

15. The next step installs NDS on the new server. You need to specify whether the server will be installed in a new tree or in existing NDS tree. If you select New NDS Tree and click Next, you are asked to provide a username for a user who will be assigned the Supervisor right to the tree (the default is Admin), the context for the new server, and a password for the user. If you choose to add the server to an existing
NDS tree, you are asked to log in to the tree and provide the context, username, and password for the user with Supervisor rights to the server container. Because the server license files are identified along with the cryptography information, you might not have to provide any additional information on the screen shown in Figure 3.9. However, if you have additional license files to install on the server, identify the path to the files here. When you are done, click Next to continue.

There are two types of license files: server and user. The installation process only takes into consideration server licenses, to ensure the server itself can operate legally. User license files are added after the installation to allow connections to the server.

**NOTE**

Figure 3.9 You need to verify the current configuration and install any additional license files that are needed.

16. The next screen allows you to choose which NetWare 6 components to install. As indicated earlier in this chapter, if an upgrade is being performed, the installation process automatically upgrades the currently installed components. If it is a new server installation, the Novell Native File Access Pack (NFAP) and Novell Advanced Audit Service components are selected. If you want to install additional components, select them at this time. When all desired components are selected, click Next to continue. Depending on the components chosen and the current network configuration, additional setting options may be required for the networking components chosen. After you choose any needed options, you are asked to identify the organizational CA object. Verify that the information is correct and click Next.
17. On the LDAP Configuration screen, shown in Figure 3.10, you can configure the server to allow clear-text passwords between clients and the eDirectory server. Selecting this setting is not recommended. Make sure the Allow Clear Text Passwords option is not selected and click Next.

![Figure 3.10](image)

**Figure 3.10** It is not recommended that clear-text passwords be allowed to be used on the network.

In a secure environment, NetWare components use Secure Sockets Layer (SSL) encryption to prevent passwords that are sent over the network from being read by other systems. Clear-text passwords, on the other hand, are transmitted across the network exactly as the user enters them—as readable text. Anyone capturing network traffic would be able to see the password as it is sent across the network. Because the security risk in this situation is so high, it is not recommended that you allow clear-text passwords on a network.

18. The next few configuration screens displayed depend on the selected components to be installed. If NFAP was selected, for example, you are asked for the settings for the NFAP components. After the NetWare 6 components are configured, you are presented with the final list of products to be installed. Click Finish to begin copying files and perform the installation. When all files have been copied and the server is ready to run, you are prompted to restart the computer. Click Yes to proceed.

**Post-installation Tasks**

After the new server has been restarted, it is nearly ready for production. As mentioned earlier in this chapter, the last section of Deployment Manager
defines post-installation tasks to be performed to ensure that the installation is complete and went smoothly. The options under Post-Installation Tasks are Install NetWare 6 Products, Use DSREPAIR to check NDS and Schema Status, and Install or Upgrade a Novell Cluster. The DSREPAIR option is very important to a successful installation, so we discuss it first.

Any time significant work is done involving the eDirectory database, it is a good idea to ensure that the directory is still in good working order. Recall that one of the preinstallation steps is also to run DSREPAIR; this ensures that any problems experienced after the installation were caused by the installation itself. The most common and most complete DSREPAIR selection is Unattended Full Repair. This selection performs all possible repair options that do not require user intervention and records the results in the DSREPAIR.LOG file in the SYS:SYSTEM directory. One of the beauties of DSREPAIR’s design is that it can be run multiple times to correct errors that were found. For example, the first time you run DSREPAIR after an installation, it might find 14 errors that it needs to repair. If you run another repair right after the first, it might find only two errors, and running a third repair might clear all errors entirely. It is also recommended that you run Time Synchronization in DSREPAIR to ensure that the new server is in sync with the other servers on the network. Because replica synchronization relies heavily on accurate time-stamps, it’s essential that all servers participating in the tree be synchronized.

**Installing NetWare 6 Products**

Clicking Install NetWare 6 Products under Post-Installation Tasks in Deployment Manager launches the Installation Wizard, which displays a list of available servers. Select the server from the list and click Next. The Installation Wizard queries the server for installed components and displays a component list similar to the list presented during the installation. Change the selections for the NetWare 6 components as desired and click Next. To finalize and install your selection of NetWare 6 products, perform the following steps:

1. After the Installation Wizard validates the component request and you respond to any configuration requirements, the list of components to be installed is displayed (see Figure 3.11). The Installation Wizard allows you to customize the component installations before you execute the process. To access this feature, click Customize.
Figure 3.11  You can select individual components for installation.

2. The next screen displays a tree of the selected components. Selecting a specific component in the left pane displays its configuration options in the right pane. Although many components have specific settings that can be configured, some do not. For example, SMS has settings for how SMS is handled in the eDirectory tree. NetWare Remote Manager, on the other hand, cannot be configured. For the most part, the options available on the objects that support configuration are rather limited and generally should not be changed from the defaults. After you change the configuration options for the components, click Finish. The component files and settings are copied to the server and configured based on the information provided.

Launching the Installation Wizard from a workstation is not the only method for adding components to a NetWare server installation. In fact, because the installation process launched through Deployment Manager is designed primarily for facilitating the initial server setup, it has been known to inaccurately report what components are currently installed when you’re adding or removing items. The other options are handled at the file server console, which means that the installation CD-ROM must be mounted as a volume or copied to a directory on one of the server’s existing volumes. In the GUI console interface, click the Novell icon to display the menu and select Install. This launches a server-based version of the Installation Wizard. You are still required to log in to the server and select the applications to manage. The interface is slightly different than the Windows implementation. To remove a product from the server, select it in the list and click Remove. Unlike with the Windows interface, you cannot change component settings in the server-based Installation Wizard. The other alternative is to
use NWCONFIG to manage the NetWare components. After you launch NWCONFIG, select product options, and then select View/Configure/Remove Installed Products. The list of installed components is displayed, allowing you to make adjustments as desired.

**Installing or Upgrading a Novell Cluster**

Clicking the last option in the Installation Wizard launches the Novell Cluster Services for NetWare 6 Installation Wizard. Clusters are covered in great detail in Chapter 10, “High-Availability NetWare,” so they are just touched on here to complete the discussion of Deployment Manager.

A *cluster* is a group of two or more interconnected computers that share resources to provide redundant, high-availability network services. Servers in a cluster share their processing power and storage to ensure that client requests are filled as quickly and as securely as possible. The standard NetWare 6 package includes a two-server license of NCS, which you can expand to a maximum of 32 servers in a cluster by purchasing additional licenses from Novell. The Novell Cluster Services Installation Wizard begins by asking whether you are installing a new cluster or upgrading an existing cluster. From there, the first options are similar to those in other installations: You can provide the name of the cluster and its location in the eDirectory tree and then identify the servers that will make up the cluster. Because a cluster acts as a single unit, it has its own IP address. This address is separate from and must be unique from the IP addresses of the servers in the cluster. The last few steps of the wizard allow you to select the partitions on each cluster member that will be shared with the cluster, provide the license for the cluster, and start the service.
Practice Questions

Question 1

Which combination of NetWare 6 installation options requires the least user input and takes the least amount of time?

- A. Express and Upgrade
- B. Express and New Server
- C. Custom and Premigration
- D. Custom and Upgrade

Answer A is correct. An express installation uses the default configuration settings with little user input. An upgrade installation reads the existing installation; if there are no changes to the configuration, this combination is fastest. All other combinations are slower in comparison; therefore, answers B, C, and D are incorrect.

Question 2

Which of the following Deployment Manager items provides information on the actions required? (Select all the correct answers.)

- A. Step 1: Back Up Data
- B. Prepare a Novell Cluster for Upgrade
- C. Install NetWare 6
- D. Step 3: Prepare for NDS eDirectory 8.6
- E. Install NetWare 6 Products
- F. Use `DSREPAIR` to Check NDS and Schema Status

Answers A, C, and F are correct. The items listed in each category of Deployment Manager are identified by two icons: a document and a red arrow. Clicking an item that is accompanied by a red arrow launches the Installation Wizard. Prepare a Novell Cluster for Upgrade, Step 3: Prepare for NDS eDirectory 8.6, and Install NetWare 6 Products fall into this category. Therefore, answers B, D, and E are incorrect. Clicking items with the document icon displays information on performing the step in the installation process. Step 1: Back Up Data, Install NetWare 6, and Use `DSREPAIR` to Check NDS and Schema Status are documented steps.
Question 3

Kim's network has a server group that she is preparing for NetWare 6 installation. All servers should have the same NetWare 5 version and configuration, but during network preparation, only four of the six servers have the Update NDS check box checked. Two of the servers are listed but are dimmed (unavailable) and cannot be selected. Which of the following could explain why Kim cannot update NDS on all servers?

- A. Deployment Manager could not successfully log in to the two unavailable servers.
- B. The hardware configuration of the two servers is not compatible with NetWare 6.
- C. Deployment Manager can update only four servers each time it is run.
- D. The two unavailable servers' NDS configurations have already been updated.

Answer D is correct. Deployment Manager allows only updates of servers that are not yet ready for eDirectory 8.6. Servers that do not have to be updated are dimmed in Deployment Manager. Although you must have access to the servers to update NDS, Deployment Manager would generate an error if it were unable to log in—it would not represent the servers as unavailable; therefore, answer A is incorrect. Hardware configuration is not a consideration during this phase of the installation; therefore, answer B is incorrect. There is no limit to the number of servers Deployment Manager can update; therefore, answer C is incorrect.

Question 4

Which of the following methods can be used to begin the NetWare 6 installation? (Select all the correct answers.)

- A. Boot from an MS-DOS disk that loads the CD-ROM drivers, switch to the CD-ROM drive, and run INSTALL.BAT.
- B. Boot from the NetWare 6 License/Cryptography disk with the CD-ROM drivers loaded, switch to the CD-ROM drive, and run INSTALL.BAT.
- C. Open a command prompt window, switch to the CD-ROM drive, and run INSTALL.BAT.
- D. Boot from the NetWare 6 CD-ROM.
- E. Take down the exiting server, switch to the CD-ROM drive, and run INSTALL.BAT.
Answers A, B, and D are correct. The installation program cannot run in a command prompt window on a system with Windows or Linux installed. Also, after the server is installed, the boot process does not load the CD-ROM drivers to limit the amount of memory used. Therefore, answers C and E are incorrect.

Question 5

Bob, a network administrator from the satellite office in Omaha, has just returned from a NetWare 6 Administration class and has decided to upgrade one of the servers. Although you are the NetWare expert, Bob doesn’t contact you about the upgrade until he runs into trouble. In the Update NDS screen, Bob selected Include Subordinate Containers and selected the top container in the NDS tree. However, when he attempts to update the NDS configuration on servers other than those in Omaha, he gets an error message and is unable to continue. Which of the following could be the reason the NDS update is failing?

- A. Bob has Supervisor access to his container but is only able to read the NDS tree at the [Root] level.
- B. Bob’s IP configuration does not allow access to other networks.
- C. Expecting that Bob would attempt something like this, you changed the password for the [Root] administrator.
- D. The servers in other containers have already been updated and are ready for NetWare 6.

Answer A is correct. The user performing the NDS update must have Supervisor access to NDS ([Root]) as well as to the server’s container. Although an IP configuration problem could cause problems during an installation, the inability to update other servers is a permissions problem; therefore, answer B is incorrect. Because Bob is attempting the installation as himself, the administrator password has no bearing on the upgrade, so answer C is incorrect. An error would not be generated if the other servers had already been upgraded, so answer D is incorrect.

Question 6

Carl is responsible for a network that supports a wide variety of client computers. He has just installed a new NetWare 6 server, using the Express Install option. Which of the following clients will be able to access files on the new NetWare server, with no additional configuration on Carl’s part? (Select all the correct answers.)
Questions and answers:

NetWare 6 Installation Overview

- A. A Windows 98 system with the NetWare Client software installed
- B. A Linux system with no client software installed
- C. A Macintosh computer with no client software installed
- D. A Windows XP system with no client software installed
- E. A Windows 2000 Professional system with the NetWare Client installed

Answers A and E are correct. Of course, any system that has the NetWare Client installed will be able to access the new NetWare 6 server. By selecting Express Install, only NDPS, Novell Administration Server, and Advanced Audit Services are installed. NFAP is not installed, and it is required for Unix/Linux, Macintosh, and Windows clients to access the server without client software; therefore, answers B, C, and D are incorrect.

Question 7

You've been hired as a consultant to upgrade the network for a company that has grown rapidly through recent acquisitions. There is no consistency in the configuration of the current servers because they were originally used by different companies. You are planning to implement NetWare 6 and eDirectory 8.6 to provide network services. Which of the following existing file servers have hardware that can support NetWare 6? (Select all the correct answers.)

- A. Pentium IV 2.2GHz, 20GB HDD, 512MB RAM
- B. Pentium III 550MHz, 2GB HDD, 256MB RAM
- C. Pentium II 350MHz, 10GB HDD, 512MB RAM
- D. AMD K6 350MHz, 6GB HDD, 256MB RAM
- E. Pentium III 667MHz, 10GB HDD, 256MB RAM

Answers A, C, and E are correct. The minimum requirements for NetWare 6 are a Pentium II/AMD K7, 200MB drive space for the DOS partition and 2GB for sys:, and at least 256MB of memory. Answer B is incorrect because a 2GB hard drive is not large enough to support a 200MB partition and a 2GB sys: volume. Answer D is incorrect because the processor in that case is only an AMD K6.
Question 8

Which of the following entries is not required at the outset of an upgrade?

- A. The location for the backup startup directory
- B. The server ID
- C. Video configuration
- D. Whether to load the server at reboot

Answer B is correct. An upgrade uses the existing server ID, so it is not required during the upgrade. All other settings can be set in the first parts of the upgrade; therefore, answers A, C, and D are incorrect.

Question 9

Which of the following NetWare products are installed by default during an Express Upgrade? (Select all the correct answers.)

- A. Native File Access
- B. iPrint
- C. Novell Advanced Audit Services
- D. SMS

Answers A and C are correct. The default Express Upgrade options include automatically installing Native File Access, Novell Distributed Print Services, and Novell Advanced Audit Services. iPrint and SMS can be added after the installation, but they are not included as part of the default options for express installation. Therefore, answers B and D are incorrect.

Question 10

Which of the following objects must be accessible when you install a NetWare 6 server into an existing NDS tree?

- A. The server with the Master replica
- B. The primary time synchronization server
- C. The server acting as the organizational CA
- D. The Deployment Manager server
Answer C is correct. The organizational CA must be running and accessible any time a server is added to the tree. Although the server with the Master replica is updated with the new eDirectory schema during the preparation process, it does not necessarily have to be available during the installation itself, so answer A is incorrect. When the server is added to the replication ring, it is synchronized with the other servers, but access to a time server is not critical to the installation process, so answer B is incorrect. There is no Deployment Manager server, so answer D is incorrect.
Need to Know More?

www.rfc-editor.org/rfcxx00.html hosts the Internet protocol standards.


The NetWare 6 documentation CD provides the following helpful information:

➤ “Installing Your NetWare 6 Network—Overview and Installation”

➤ “Optimizing and Maintaining Your Network—Server Operating System Guide”

➤ “Managing Network Storage”—all sections
Migration and Upgrading

Terms you’ll need to understand:
✓ Active Directory
✓ Backlink process
✓ Destination server
✓ DSREPAIR
✓ In-place upgrade
✓ NetWare Accelerated Upgrade
✓ NetWare Migration Wizard
✓ Novell International Cryptography Infrastructure (NICI)
✓ NREPAIR3
✓ NUWAGENT.NLM
✓ Across-the-wire migration
✓ Schema
✓ Source server
✓ Storage Management Data Requester (SMDR)
✓ Support pack

Techniques you’ll need to master:
✓ Using Deployment Manager to update a directory schema
✓ Upgrading or migrating to NetWare 6
✓ Troubleshooting a NetWare 6 migration
Novell recognizes that the majority of NetWare 6 installations will take the place of existing servers. To facilitate this, Novell includes tools for upgrading and migrating existing servers of various types. Although Test 050-676, “Upgrading to NetWare 6,” focuses primarily on the process of upgrading from NetWare 5 to NetWare 6, this chapter also looks at migrating servers with previous versions of NetWare and even other operating systems.

**NOTE**
Remember that an upgrade takes place directly on an existing server and is also referred to as an in-place upgrade. A migration is performed on two separate servers across the network; hence the term across-the-wire migration.

### Using Deployment Manager

As you learned in Chapter 3, “NetWare 6 Installation Overview,” you can use Deployment Manager to prepare a network for the installation or upgrading of NetWare 6 servers and manage the installation/upgrade process. The first step in this process, which is covered in Chapter 3, is preparing the network for eDirectory version 8.6. This step actually changes the Novell Directory Services (NDS) schema so that the new eDirectory features are supported. *Schema* refers to the rules that define the type of information supported by the directory service. If the directory service schema is not updated and a server with eDirectory 8.6 installed is connected to the network, the two directory services will be only partially compatible.

Few places in the NetWare documentation specifically mention upgrading the NDS schema, even though it is one of the objectives of Test 050-676. Remember that Deployment Manager step 3, Prepare for NDS eDirectory 8.6, updates the NDS schema.

Unlike the steps available under Network Preparation in Deployment Manager, the Installation/Upgrade Options section is purely informational. Shown in Figure 4.1, it provides documentation for several options: Install NetWare 6, Upgrade to NetWare 6, Migrate Using Novell NetWare Migration Wizard, Use NetWare Accelerated Upgrade, and Other Installation Options. You learned how to install NetWare 6 on a new server in Chapter 3. This chapter focuses on options for upgrading and migrating to NetWare 6. You’ll learn about the NetWare Accelerated Upgrade utility and the other installation options later in this chapter.