TM

Installation

N O V E L L ®
NetWare®
N E T W O R K C O M P U T I N G P R O D U C T S
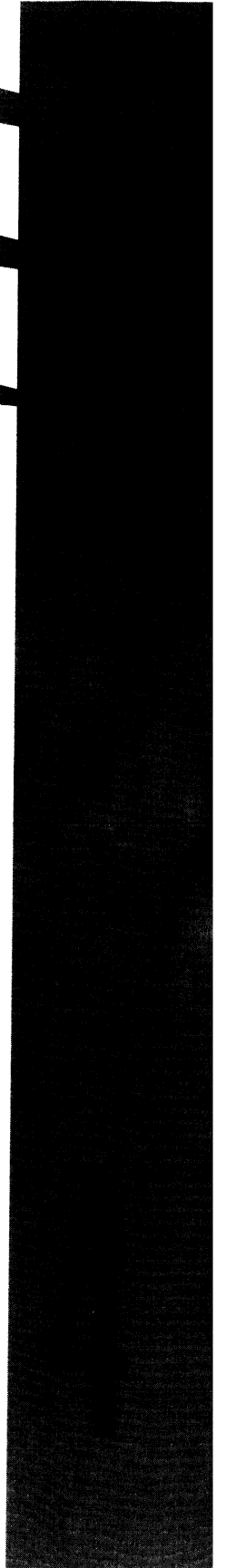
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Your NetWare 4.1 Documentation

NetWare® 4.1 includes a complete set of DynaText* manuals, which are accessible from a NetWare client or standalone computer.

Figure 1
NetWare 4.1 Manuals Online
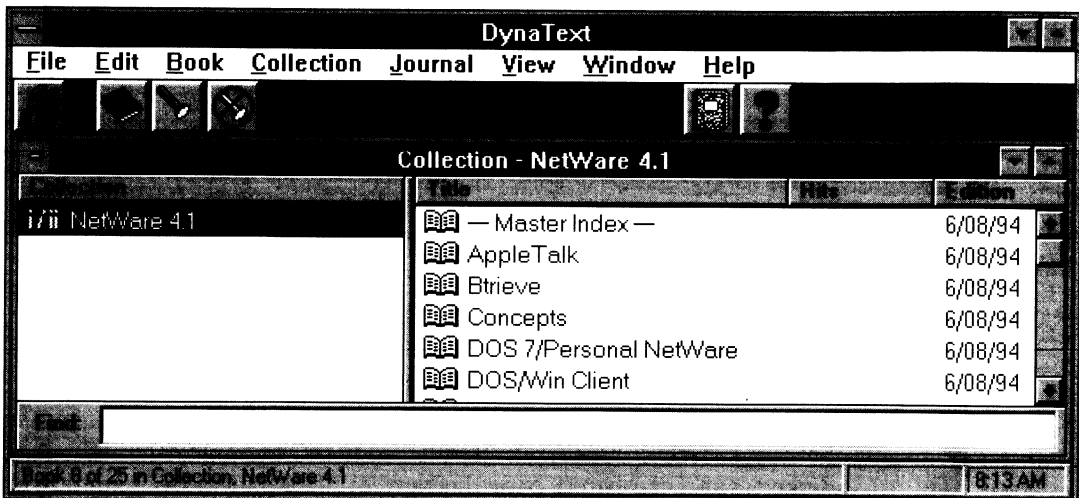
> **Note** Your hard-copy manuals include *Introduction to NetWare Directory Services, Installation, Upgrade,* and *Installing and Using Novell Online Documentation for NetWare 4.1.*

This manual includes complete documentation for installing your NetWare 4.1 server. Procedures for installing client software are also included.
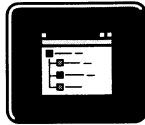
Plan Directory Tree

Read *Introduction to NetWare Directory Services* and plan your Directory tree.
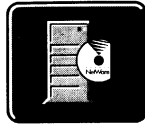
Install New Server

Install a new NetWare 4.1 server. *(Optional)* Install NetWare 4.1 SFT III™ for mirrored servers.

Perform Other Installation Options

From the "Other Installation Items/Products" menu, create client diskettes and, if desired, copy the NetWare 4.1 online documentation to the server.
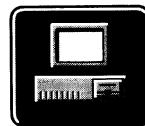
Install NetWare Clients

Install the NetWare client software on each computer.

Set Up Documentation Viewer

Set up or install the NetWare 4.1 online documentation by reading *Installing and Using Novell Online Documentation for NetWare 4.1.*

Administer Network

Administer the network using the NetWare administration utilities.

How to Use This Manual

There are many steps to getting your NetWare® 4.1 server installed and operating with client workstations on a network. A diagram outlining the process is shown on page viii.

Begin by reading *Introduction to NetWare Directory Services* to plan your NetWare 4.1 Directory tree.

Next, install a new NetWare 4.1 server by following the installation procedures in Chapter 2, "Simple Installation," on page 15, or Chapter 3, "Custom Installation," on page 67.

If you desire, perform other installation options such as copying online documentation to the NetWare 4.1 server and creating client diskettes. Procedures for performing other installation options are included at the end of the "Simple Installation" and "Custom Installation" chapters.

Next, install the NetWare client software on each workstation in your network.

Next, set up the documentation viewers to view the NetWare 4.1 online documentation. Procedures for doing so are included in *Installing and Using Novell Online Documentation for NetWare 4.1*.

Finally, administer the NetWare 4.1 network by reading *Supervising the Network*, which is available online.

Installation Options

You can install a NetWare 4.1 server using either the "Simple Installation" or "Custom Installation" option.

The "Simple Installation" option makes a number of assumptions, and therefore requires less interaction from the installer. This makes the server both easier and quicker to install.

The "Custom Installation" option makes no assumptions and lets you customize your server installation. Additional options, such as spanning volumes across multiple drives and loading and binding TCP/IP and AppleTalk, are available only in the "Custom Installation" option.

Procedures for installing using the "Simple Installation" method are found in Chapter 2, "Simple Installation," on page 15.

Procedures for installing using the "Custom Installation" option are found in Chapter 3, "Custom Installation," on page 67.

Technical Support Included

◆ **Context-sensitive help.** If you are using a NetWare menu utility and want more information about how to complete a task, press <F1>.

◆ **DynaText* Online Documentation**. The DynaText viewer allows you to read online manuals from your MS Windows, Macintosh*, UNIX, or OS/2* workstation.

All NetWare 4.1 manuals are available on the *NetWare 4.1 Online Documentation* CD-ROM.

Other Technical Support

◆ **Novell Authorized Service Centers™ (NASCs™)** are local support providers authorized and supported by Novell®. NASCs provide both telephone and on-site assistance, and should be your first source for technical support.

For the Novell Authorized Service Center nearest you, call 1-800-338-NASC.

◆ **Hardware manuals**. Many network problems occur because of malfunctioning hardware.

If you can isolate a problem to a certain computer component or cable segment, check the manuals that came with the hardware involved.

◆ **NetWare Management System™ (NMS™)** helps you manage the cabling system, computers, software, and other components of the network.

For more information about using NMS on your network, contact your Novell Authorized Reseller™.

◆ **Other Novell publications.** *NetWare Applications Notes™* and *Novell Research Reports™* cover technical aspects of NetWare-based system design, implementation, and management.

NetWare Application Notes is a collection of technical articles published monthly. *Novell Research Reports* is published as the research becomes available.

To purchase subscriptions and back issues of these publications call the Novell Research Order Desk at 1-800-UPDATE1. From outside the United States or Canada, call 1-800-429-5380.

◆ **Third-party books and periodicals.** Many books on NetWare topics, including books published by Novell Press®, are available at most bookstores.

In addition, numerous networking periodicals give advice on configuring, managing, and troubleshooting your network.

◆ **NetWire^SM on CompuServe*.** A fairly inexpensive way to get up-to-date advice and patches is through the NetWire service on the CompuServe bulletin board.

To open a CompuServe account, call one of the following numbers:

◆ In the United States or Canada: 1-800-524-3388.

◆ In the United Kingdom: 0800-289-378.

◆ In Germany: 0130-37-32.

◆ In other European countries: 44-272-255-111.

◆ In all other locations, use the appropriate country code for the U.S. and call 1-614-457-0802.

Ask for "Representative 200." This phrase identifies you as a Novell customer.

◆ **Network Support Encyclopedia^SM.** This encyclopedia gives customers access to regularly-updated information from Novell and other vendors on products and services.

In addition the Network Support Encyclopedia Professional Volume^SM provides customers with additional information such as patches, fixes, etc.

Both are distributed on CD-ROM on a subscription basis. Updates are sent out several times each year. (For more information, contact your Novell Authorized Reseller.)

◆ **Troubleshooting hardware and software.** Specialized hardware and software packages, such as Novell's LANalyzer®, are available to help you isolate network problems.

◆ **Customer service.** You may want to contact your Novell Authorized Reseller for technical assistance.

Most Novell Authorized Resellers have Certified NetWare Engineers^SM on their staffs ready to assist users with their networking problems.

User Comments

We are continually looking for ways to make our products and our manuals as easy to use as possible.

You can help us by sharing your comments and suggestions about how our manuals could be made more useful to you and about inaccuracies or information gaps they may contain.

Submit your comments either by filling out the "User Comments" form at the end of this manual or by writing to us directly at the following address:

Novell, Inc.
Technical Publications MS C-23-1
122 East 1700 South
Provo, UT 84606 USA

We appreciate your comments.

chapter **1** *Prepare Your Site and Equipment*

Note ▼ If your network hardware is already installed and meets site and power conditioning requirements, go to Chapter 2, "Simple Installation," on page 15 and determine if that method of installation is right for you.

If you determine that the "Simple Installation" option is not right for you, go to Chapter 3, "Custom Installation," on page 67.

What You Need

To prepare your network location, you must

Checklist ▼ ❑ Meet the hardware requirements

❑ Ensure proper power and power conditions

❑ Set up computer and networking hardware

Hardware Requirements

You need the following hardware for installing a NetWare® 4.1 server.

Checklist ❏ A PC (or PC compatible) with a 386 or 486 (SX or DX) or higher processor.

❏ If you plan to install your server from CD-ROM or from floppy diskettes, you will need a *minimum* of 8 MB of RAM.

If you plan to install your server from a remote network installation area, you will need a *minimum* of 10 MB of RAM.

Note The additional 2 MB of RAM is needed when installing from a remote network installation area, because the new server will need to load the CLIB and STREAMS NLM programs.

❏ A hard disk with sufficient storage space for your network. The minimum amount of storage space required is 90 MB: 15 MB for a DOS partition plus 75 MB for a NetWare disk partition containing volume SYS:.

However, if all file NetWare file groups are copied to the server, (see "Select Optional NetWare File Groups" on page 127) you will need a minimum of 100 MB for volume SYS: We therefore recommend a larger volume SYS:.

Suggestion In some cases, it is easier to troubleshoot server problems by increasing the DOS partition 1 MB for every 1 MB of server RAM. For example, if your server had 12 MB of RAM, you might want to increase the DOS partition from 15 MB to 27 MB (15 MB + 12 MB = 27 MB).

❏ If you plan to install the DynaText* viewer and the NetWare 4.1 documentation on the server, add another 60 MB of disk space.

Note If desired, you can read the NetWare 4.1 online manuals directly from CD-ROM without having to install the files to the server.

❏ At least one network board.

❏ Network cabling (Ethernet, token ring, FDDI, ARCnet*, baseband, etc.).

❏ (If installing from CD-ROM) A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

Site and Equipment Preparation

Procedure

Procedure

1. **Check the operating environment and power requirements for your equipment.**

   Consult the documentation provided with your computer for specific requirements in the following areas:

   Temperature/humidity
   Power frequency
   Power consumption
   Heat dissipation

2. **Use dedicated power lines and grounded outlets.**

   Use dedicated power lines for all hardware components (NetWare servers, workstations, printers, etc.) on your NetWare network. Connect only network components to these lines.

   Electrical outlets should be standard three-wire grounded outlets, with the ground wire connected to an earth ground. (If you connect the ground wire to a conduit ground, make sure the conduit ground is an earth ground.)

3. **Install power conditioning equipment.**

   Protect NetWare servers from power fluctuations with a regulating uninterruptible power supply (UPS). In addition to protecting hardware from damage caused by power surges and voltage spikes, a UPS protects data held in RAM during a power failure.

   In addition, we strongly recommend that you use UPS protection for network workstations and other peripherals.

   If this is not feasible, connect all network hardware to protective devices such as line-surge suppressors (also called power conditioners or line filters) and ferro-resonant isolation transformers.

   These devices are inexpensive and can protect equipment from various power irregularities such as electric noise and minor voltage spikes.

However, these devices cannot protect equipment from large power surges or preserve any data in RAM during power outages.

4. Protect network equipment from static electricity.

Make sure that, for all NetWare hardware, the operating environment does not subject equipment to static electricity. We strongly recommend the following protective measures:

◆ Treat carpets with anti-static chemicals (available in spray form from most computer stores).

◆ Use anti-static protective covers for carpets, or conductive covers connected to an earth ground.

Warning

Do not use plastic or other synthetic carpet protectors near network equipment. Such protectors generate large amounts of static electricity.

◆ Ground equipment through a one-megohm resistor to bleed off the static slowly and thus avoid a static discharge from conductive surfaces.

◆ Make sure personnel working on open computer equipment take precautionary measures, such as wearing grounded wrist straps. Work on open computer equipment should be done only with the computer turned off.

5. Back up files located on your hard drives.

During the installation process, existing files located on any hard disk area other than the bootable DOS partition are erased.

In addition, the installation utility finds any existing nonbootable partitions and asks whether you want to delete them, which would give you more hard disk space for the NetWare partition.

Backing up desired files before installation ensures that files on your hard disks will be saved.

Set Up Hardware

NetWare 4.1 servers can operate on many kinds of hardware. To ensure that there are no conflicts, use unique interrupt request (IRQ) settings on NetWare server boards.

Novell's Yes Program

To be certain of hardware compatibility with NetWare, look for one of the following symbols:

yes
It runs with
NetWare

yes
NetWare
Tested and
Approved

NetWare
Ready

◆ Products that receive the Yes, It Runs with NetWare™ designation have been verified by the vendor to work with NetWare.

These products are developer-tested only; Novell makes no warranties with respect to these products.

◆ Products that receive the Yes, NetWare Tested and Approved™ certification have passed rigorous testing by Novell Labs™.

Novell engineers have worked closely with the vendor to ensure that these products meet Novell's strict quality standards.

Novell publishes bulletins containing test results on each NetWare Tested and Approved product.

◆ Products that receive the NetWare Ready™ mark have been certified by Novell Labs and are bundled with NetWare.

This is designed to simplify and reduce the time spent on the network installation process by allowing participating OEM partners to offer products that are bundled or pre-installed with the NetWare operating system, Personal NetWare™, or other client software.

Calculate Necessary Server RAM

This section contains a simple procedure for determining an approximate amount of RAM necessary for your NetWare 4.1 server.

For more detailed information on calculating RAM requirements, see Appendix A "Calculate RAM Requirements" on page 273.

Procedure

To calculate your server's total RAM requirements, perform the following steps. (NetWare 4.1 can support up to 4 GB of RAM and up to 32 TB of disk storage space.)

Procedure
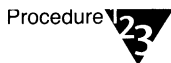
1. **If you are installing your server from CD-ROM or from floppy diskettes, make sure that you have a *minimum* of 8 MB of RAM. If you are installing your server from a remote installation area, make sure you have a *minimum* of 10 MB or RAM.**

Note

The additional 2 MB of RAM is needed when installing from a remote network installation area, because the new server will need to load the CLIB and STREAMS NLM programs.

2. **Add 2 MB to install one or more of the following:**

◆ Additional NetWare products (such as NetWare for Macintosh*, NetWare for NFS*, etc.).

◆ A print server (PSERVER.NLM) on this server.

◆ Any of the following NetWare Loadable Modules™: MONITOR.NLM, INSTALL.NLM, SERVMAN.NLM. (Many systems require these NLMs™.)

3. **Multiply the amount of your system's disk space (in megabytes) by 0.008 and add this number to the total from Steps 1 and 2.**

   For example, 200 MB multiplied by 0.008 equals 1.6 MB.

4. **Add 1 to 4 MB for additional cache buffer RAM to optimize performance.**

   The more RAM you provide for cache buffers, the better your system's performance will be.

   If you have a server that contains more than 16 MB of RAM, do *not* use anything less than 32-bit AT busmastering or DMA boards in the server, unless the driver supports going above 16 MB of RAM. For more information, contact the computer manufacturer.

Important ▼

   If you have a 386 computer manufactured in 1987, it may not carry out some 32-bit instructions. This could adversely affect the functioning of NetWare.

   If a problem exists, NetWare displays a message. You may be able to correct the problem by replacing a ROM chip on the board. For more information, contact your computer manufacturer.

Install and Configure Your Hardware

Procedure
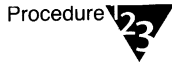
Procedure ▼ **1. Record the following hardware information on the NetWare 4.1 Server Worksheet on page 179.**

◆ NetWare server: name, make, and model.

◆ Memory amount.

◆ Non-network boards: type and settings (optional).

◆ Network boards: associated LAN drivers, IPX external network number, I/O address, memory address, interrupt, and node address.

Note ▼ When installing two or more network boards of the same type, check your network board documentation to avoid address conflicts.

Some LAN drivers and their default settings are listed in Table 1-1.

For more information about settings, see the documentation that came with your network board.

Table 1-1
Default LAN Driver Settings for ISA Network Boards

LAN driver	I/O Address	Memory Address	Interrupt
TRXNET	2E0	D000	2
NE1000	300		3
NE2000	300		3
PCN2 (primary)	620	CC00 (RAM)	2
PCN2 (alternate)	628	CC00 (RAM)	2
TOKEN	A20	D800 (RAM)	
3C503	300	C8000	3
3C505	300	5 (DMA)	3

Defaults for the following microchannel network boards are set by the *Reference* diskette. You may be prompted to enter the slot number.

TOKENDMA
NE/2™
TOKEN
NE/2-32™
3C523

Options for the NE3200™ EISA network board are set by the computer's configuration utility. NetWare needs the slot number.

For details, see the documentation that came with your network board.

◆ Floppy disk drives: diskette size and storage size.

◆ Internal hard disks: make, model, and storage size.

For microchannel machines, make sure you record the type of disk controller. You will need this information later when you load disk drivers.

◆ Disk coprocessor boards (DCBs): DCB drivers and I/O address.

For microchannel servers, use the *Reference* diskette to set the disk coprocessor boards.

Default DCB settings for standard architecture servers are based on the type of PAL chip installed at position U3.11 and U4.11 on the board.

Jumper settings must also match the PAL, which controls the interrupt I/O address. The default settings are listed in Table 1-2, on page 10. (For alternate settings, see the DCB documentation.)

Table 1-2
Default Settings for DCBs

Part number of PAL at position U3.11	Part Number of PAL at position U4.11	I/O Address	Interrupt
814-198-001	814-197-001	340	B
814-198-001	814-197-002	348	C
814-198-002	814-197-001	320	A
814-198-002	814-197-002	328	F

◆ Disk subsystems: number of drives, drive types, and storage sizes.

◆ Mirrored disks: which drives will be mirrored.

2. **Install hard disks and network boards.**

   2a. **If necessary, set switches or jumpers on hard disks and network boards.**

   Set each address and interrupt according to the worksheet you completed in Step 1.

   2b. **Install internal hard disks and check for proper jumper settings and termination.**

   See your hard disk documentation. See also "SCSI bus" in *Concepts*.

2c. Place each board in a slot in the server.

Important ▼

If you install token ring network boards, cable the boards in the server to the MAU before installing the operating system. Otherwise, the TOKEN LAN driver will not load.

2d. Connect peripheral equipment to the server and check jumper settings and termination.

See the documentation for each peripheral. See also "SCSI bus" in *Concepts*.

2e. (Optional) Install optical disks.

For instructions, see Chapter 6, "Migrating Data Using the High Capacity Storage System," in *Supervising the Network*.

3. Configure the hardware by using the hardware's setup (reference or configuration) program.

For details on the setup program, see the documentation that came with your computer.

Important ▼
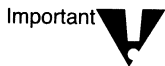
Do *not* select "Set network server mode" if your setup program lists this option. This mode disables keyboard input after DOS executes an AUTOEXEC.BAT file. As a result, you wouldn't be able to use the keyboard after the server booted.

Instead, use the keyboard protection feature in MONITOR. See "MONITOR" in *Utilities Reference*.

If your hardware supports a power-on password, use it to secure the server from unauthorized use.

Do not change the arbitration level of the MFM or ESDI fixed-disk driver from the factory default setting. NetWare requires the default setting.

4. (Conditional) If you plan to install NetWare 4.1 from CD-ROM, install the CD-ROM drive as a DOS device, according to the manufacturer's instructions.

Make Working Copies of the Diskettes (Conditional)

If you plan to install NetWare 4.1 from floppy diskettes rather than from CD-ROM or from a remote network installation area, use only working copies of diskettes. This way, should your working copies get corrupted, you can use the original NetWare 4.1 diskettes to make other working copies.

To make working copies of the NetWare diskettes, complete the following steps.

Procedure

Procedure
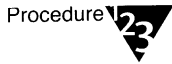
1. **Boot a personal computer with DOS or OS/2.**

2. **Use the DISKCOPY command to format and copy each NetWare diskette to a high-capacity diskette.**

3. **Label each copied diskette with the same name that appears on the original diskette.**

4. **After making the working copies, store the original NetWare diskettes in a secure place.**

   Throughout the installation, whenever you are instructed to insert a specific diskette, use the working copy.

Where to Go from Here

With the initial hardware preparation completed and (if applicable) working copies of the NetWare diskettes made, you are ready to install the NetWare server.

If you want to	Go to
Install a new NetWare 4.1 server using the "Simple Installation" method	Chapter 2, "Simple Installation," on page 15.
Install a new NetWare 4.1 server using the "Custom Installation" method	Chapter 3, "Custom Installation," on page 67.
Install a new NetWare Server for OS/2	Chapter 4, "Install NetWare Server for OS/2," on page 181.
Install NetWare SFT III	Chapter 5, "Install NetWare 4.1 SFT III," on page 241.

2 *Simple Installation*

The "Simple Installation" option allows you to easily install a
NetWare® 4.1 server using a streamlined user interface.

The "Simple Installation" assumes

Checklist ▼ ❏ An existing DOS partition of at least 15 MB on the hard disk.

A 15 MB DOS partition should be sufficient for storing the files used
to boot your server. If you need to store additional files on the DOS
partition, you may want to make the partition larger.

❏ DOS is installed on the DOS partition.

❏ The server will boot from a DOS partition on the hard disk, rather
than from floppy boot diskettes.

❏ Hard disks (including hard disk subsystems, if any), won't be
mirrored or duplexed.

❏ All hard disk space not allocated to the DOS partition will be
allocated to NetWare.

❏ Each disk will contain one NetWare volume.

❏ A randomly generated IPX internal network number.

❏ No changes will be made to the AUTOEXEC.NCF and
STARTUP.NCF files.

❏ A default NetWare Directory Services™ hierarchy with a single container for all objects.

❏ The IPX protocol as the only installed communications protocol, without the option to install TCP/IP or AppleTalk*.

Note ▼ TCP/IP and AppleTalk can be added after installation.

If the "Simple Installation" option isn't possible in your environment, follow the procedures in Chapter 3, "Custom Installation," on page 67.

Prerequisite Tasks

Checklist ▼
❏ Plan your Directory tree. See *Introduction to NetWare Directory Services* for guidelines and suggestions.

❏ If your computer has never been a server before, complete the tasks explained in Chapter 1, "Prepare Your Site and Equipment," on page 1.

❏ Run the computer's Setup program and set the computer's time to the exact local time. (The time synchronization feature in NetWare Directory Services uses the computer's time setting.)

❏ If you install from another server, make sure the new server is cabled to the network and has the NetWare client software installed.

❏ If necessary, partition and format your hard disk. Boot from the NetWare *License* diskette; type FDISK and follow the screen prompts to repartition the hard disk. Reboot the machine and type FORMAT to format the partition.

Warning ▼ Reformatting your hard disk erases all stored files. Be sure to back up your hard disk prior to partitioning and formatting.

Suggested Resources

Checklist ▼✓

❏ The NetWare Server Installation quick path card for an overview of the installation process.

❏ A copy of the NetWare 4.1 Server Worksheet (located on page 179).

❏ The NetWare *License* diskette.

❏ *One* of the following:

 ◆ NetWare 4.1 CD-ROMs.

 ◆ Working copies of NetWare 4.1 diskettes.

 ◆ Access to NetWare 4.1 installation files on a remote network installation area (the *NetWare 4.1 Operating System* CD-ROM mounted as a NetWare volume, or an image of the CD-ROM on another server).

File Sets Copied During Installation

The Simple Installation option does not copy all NetWare 4.1 file sets during installation. File sets that are copied, and those that are not copied, are listed below:

File Sets Copied	File Sets Not Copied
System files	UNIX utilities
DOS utilities	Client upgrade files
OS/2 utilities	Upgrade and migration files
MS Windows utilities	NetWare for Macintosh files

Note ▼ File sets that are not copied to the server may be copied later through the "Copy Files" option of INSTALL.NLM. For more information, see "Copying NetWare Files" in Chapter 7 of *Supervising the Network*.

Install Server Software

Install your NetWare 4.1 server software by following the procedures in the sections that follow.

Choose an Installation Medium

You can install a NetWare 4.1 server from CD-ROM, from floppy diskettes (available only through the NetWare Fulfillment Center), or from a remote network installation area.

If you are installing the first in a series of NetWare 4.1 servers on a new network, you must install from CD-ROM or from floppy diskettes.

Figure 2-1 lists factors to consider before choosing an installation medium.

Figure 2-1
Installation Media

	CD-ROM	Remote network installation area	Floppy diskettes
Speed of Installation	Slower than from a network, but faster than from floppy diskettes.	Fastest installation option.	Slowest installation option.
Hardware Configuration Requirements	Requires a CD-ROM player installed as a DOS device on the designated server.	Requires an existing network with either a server with sufficient disk space to store the NetWare 4.1 files, or the NetWare 4.1 CD-ROM mounted as a NetWare volume.	Requires a 3.5-inch floppy disk drive.
Ease of Installation	Much simpler than from floppy diskettes, but requires setup of CD-ROM drive and drivers.	Simple. Must install as a NetWare client first.	Cumbersome.

To install from	See
CD-ROM	"Install from CD-ROM" on page 21.
A network volume	"Installing from a Remote Network Installation Area" on page 23.
Floppy diskettes	"Install from Floppy Diskettes" on page 30.

Install from CD-ROM

Procedure

1. **If you have not done so already, install the CD-ROM drive and drivers according to the manufacturer's instructions.**

   Usually, the installation program for your CD-ROM will automatically update the CONFIG.SYS and AUTOEXEC.BAT files to add the CD-ROM device driver.

   If not, follow the manufacturer's instructions to create or update these files.

2. **Insert the *NetWare 4.1 Operating System* CD-ROM into the CD-ROM drive.**

3. **Reboot the computer.**

   Rebooting executes the CONFIG.SYS and AUTOEXEC.BAT files and recognizes the CD-ROM drive as a DOS device.

4. **Change to the drive letter corresponding to the CD-ROM.**

   This is generally drive D:.

5. **Type**

   INSTALL <Enter>

   A menu similar to the one below appears.

```
+----------------------------------------------------------------+
|                        NetWare Install                         |
+----------------------------------------------------------------+
| Diese Zeile wählen, um auf Deutsch zu installieren             |
| Select this line to install in English                         |
| Seleccione esta línea para instalar en español                 |
| Sélectionnez cette ligne pour installer en français            |
| Seleziona questa riga per installare in Italiano               |
+----------------------------------------------------------------+
```

6. **Choose the language in which you want the server installed
   and press** <Enter>**.**

   The "Select the Type of Installation Desired" menu appears.

7. **Choose "NetWare Server Installation" and press** <Enter>**.**

8. **Go to "Name Your Server and Copy Boot Files" on page 31.**

Installing from a Remote Network Installation Area

A NetWare 4.1 server may be installed over the network from a mounted CD-ROM NetWare volume, or from CD-ROM or floppy diskette files copied to another server.

In either scenario, a user logs in to a server with a remote network installation area and installs the workstation as a NetWare 4 server through the Installation utility.

Requirements and recommendations for a remote installation are outlined below.

Requirements for a Network Installation Area

◆ The server with the CD-ROM image should not be RIP-filtered from the server being installed.

Note   To find out if your network is utilizing RIP filtering, load FILTCFG.NLM at the server and view IPX protocol filters.

◆ The server being installed should use an IPX internal network number that is not RIP-filtered from the server with the CD-ROM image.

Note   When installing using the "Simple Installation" option, a randomly generated IPX internal network number is chosen for you. If you need to enter a specific IPX internal network number, you should install using the "Custom Installation" option.

Recommendations for a Network Installation Area

◆ For better performance, the server with the CD-ROM image should have Packet Burst™ support. NetWare 3.12 and NetWare 4™ servers have Packet Burst support built in. NetWare 3.11 requires PBURST.NLM for Packet Burst support.

◆ For better performance, the server with the CD-ROM image should have LIP (Large Internet Packet) support enabled. NetWare 3.12 and NetWare 4 servers have LIP support enabled by default (SET "ALLOW LIP = ON"). NetWare 3.11 requires LIPX.NLM for LIP support.

Remote Installation Areas

The remote installation area can consist of one of the following:

◆ A NetWare 4.1 CD-ROM mounted as a NetWare volume

◆ The NetWare 4.1 CD-ROM or floppy diskette files copied to a volume on a NetWare 4 server

If you want to	Go to
Install from a NetWare 4.1 CD-ROM mounted as a NetWare volume	"Install from a CD-ROM Mounted as a NetWare Volume" on page 25.
Install from a NetWare server volume containing copied NetWare 4.1 CD-ROM files	"Install from a NetWare Volume with Files Copied on a Server" on page 28.

Install from a CD-ROM Mounted as a NetWare Volume

Necessary Resources

Checklist

❑ A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

❑ An existing NetWare server. (This will be the host server.)

❑ An existing NetWare workstation. (This will be the new server you install.)

Procedure

Procedure

1. **Cable the CD-ROM drive to the NetWare 4.1 server (the host server).**

   Since you are installing the CD-ROM as a NetWare volume, you do not need to install any drivers at this time.

2. **Insert the *NetWare 4.1 Operating System* CD-ROM into the CD-ROM drive.**

3. **At the C:\NWSERVER directory, type**

   `SERVER` <Enter>

4. **At the server console type**

   `LOAD INSTALL` <Enter>
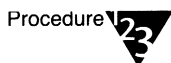
   The menu shown on the next page appears.

Figure 2-3
The "Installation
Options" Menu

```
╔══════════════════════════════════════════════════════════════╗
║                    Installation Options                      ║
╟──────────────────────────────────────────────────────────────╢
║ Driver options      (load/unload disk and network drivers)   ║
║ Disk options        (configure/mirror/test disk partitions)  ║
║ Volume options      (configure/mount/dismount volumes)       ║
║ License option      (install the server license)            ║
║ Copy files option  (install NetWare system files)          ║
║ Directory options  (install NetWare Directory Services)    ║
║ NCF files options  (create/edit server startup files)      ║
║ Product options     (other optional installation items)     ║
║ Server options      (install/upgrade/this server)           ║
║ Exit                                                         ║
╚══════════════════════════════════════════════════════════════╝
```

5. **Choose "Driver Options."**

   The "Driver Options" menu appears.

6. **Choose "Configure Disk and Storage Device Drivers."**

   The "Additional Driver Actions" menu appears.

7. **Choose "Select an Additional Driver."**

   You are prompted to enter the path to the source directory where the NetWare 4.1 files are located.

8. **Verify or change the source path and press <Enter>.**

   The "Select a Driver" list appears.

9. **Choose the necessary CD-ROM drivers according to the documentation that accompanied your CD-ROM drive.**

   Note

   If the device drivers you need are not listed, press <Ins> and follow the prompts to access a new list of drivers.

   For information on the CD-ROM drivers that are shipped in the Red Box™ (NetWare 4.1 product package), along with their proper load order, see Appendix F, "Red Box CD-ROM Drivers," on page 305.

10. **Once you have loaded all necessary drivers, from the "Additional Driver Actions" menu choose "Return to Previous Menu."**

11. **Press <Alt>+<F10> and choose "Yes" to exit INSTALL.NLM.**

    You are returned to the server console.

12. **At the console prompt, type the following commands:**

    LOAD NWPA <Enter>
    LOAD CDROM <Enter>
    CD MOUNT NW410 <Enter>

    This mounts the CD-ROM as a NetWare volume.

13. **Go to the workstation that is to become a server and log in to the host server with the mounted CD-ROM NetWare volume.**

14. **Map a drive to the mounted CD-ROM volume.**

    For example:

    MAP N NW410: <Enter>

15. **At the mapped drive letter, type**

    INSTALL <Enter>

    A menu similar to the one below appears.

Figure 2-4
Choose the Desired Server Language

```
┌────────────────────────────────────────────────────┐
│                 NetWare Install                    │
├────────────────────────────────────────────────────┤
│ Diese Zeile wählen, um auf Deutsch zu installieren │
│ Select this line to install in English             │
│ Seleccione esta línea para instalar en español     │
│ Sélectionnez cette ligne pour installer en français│
│ Seleziona questa riga per installare in Italiano   │
└────────────────────────────────────────────────────┘
```

16. **Choose the language in which you want the server installed and press <Enter>.**

    The "Select the Type of Installation Desired" menu appears.

17. **Choose "NetWare Server Installation" and press <Enter>.**

18. **Go to "Name Your Server and Copy Boot Files" on page 31.**

Install from a NetWare Volume with Files Copied on a Server

Necessary Resources

Checklist ❖ ❏ An existing NetWare server with sufficient disk space (at least 170 MB) to store the NetWare 4.1 operating system files. (This will be the host server.)

❏ An existing NetWare workstation. (This will be the server you install.)

❏ (Conditional) A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

This is used to copy the NetWare 4.1 files from the CD-ROM to the host server.

Procedure

Procedure ❖ **1. Create a NETWARE directory on an existing server and copy the files from the installation medium to that directory.**

For example, to copy from CD-ROM drive D: to network drive K:, type

```
K:  <Enter>
MD NETWARE  <Enter>
CD NETWARE  <Enter>
NCOPY D:  /S  /E  /V  <Enter>
```

To copy from floppy diskettes, perform the NCOPY command shown above for each diskette.

2. On every computer you want to make a NetWare 4.1 server, create a DOS partition of at least 15 MB.

3. On every computer you want to make a NetWare 4.1 server, install NetWare DOS client software.

For instructions on installing workstation software, refer to Chapter 6, "Install NetWare Clients," on page 265.

4. **On every computer you want to make a NetWare 4.1 server, map a drive to the network server directory that contains the NetWare 4.1 files.**

5. **At the mapped drive letter, type**

   INSTALL <Enter>

   A menu similar to the one below appears.

Figure 2-5
Choose the Desired Server Language

```
┌─────────────────────────────────────────────────────────────┐
│                      NetWare Install                          │
├─────────────────────────────────────────────────────────────┤
│ Diese Zeile wählen, um auf Deutsch zu installieren            │
│ Select this line to install in English                        │
│ Seleccione esta línea para instalar en español                │
│ Sélectionnez cette ligne pour installer en français           │
│ Seleziona questa riga per installare in Italiano              │
└─────────────────────────────────────────────────────────────┘
```

6. **Choose the language in which you want the server installed and press** <Enter>.

   The "Select the Type of Installation Desired" menu appears.

7. **Choose "NetWare Server Installation" and press** <Enter>.

8. **Go to "Name Your Server and Copy Boot Files" on page 31.**

Install from Floppy Diskettes

Procedure

Procedure ▼ 2 3 ▼
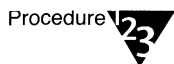
1. **Make working copies of all NetWare 4.1 diskettes.**

   For instructions, see "Make Working Copies of the Diskettes (Conditional)" on page 12.

2. **Insert the *Install* diskette into drive A:.**

3. **Turn on or reboot your computer.**

   The "Select the Type of Installation Desired" menu appears.

4. **Choose "NetWare Server Installation" and press <Enter>.**

5. **Continue with "Name Your Server and Copy Boot Files" on page 31.**

Name Your Server and Copy Boot Files

Once you've selected the language in which the server will be installed, the following menu appears.

Figure 2-6
Installation Options

```
NetWare 4.1
NetWare 4.1 SFT III
Display Information (README) File
```

Procedure

Procedure
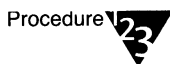
1. **Select "NetWare 4.1" and press** <Enter>.

    A menu appears displaying additional installation options.

2. **Select "Simple Installation of NetWare 4.1" and press** <Enter>.

    A screen appears requesting a server name.

3. **Type the server name in the field provided and press** <Enter>.

    For help on rules for naming servers, press <F1>.

    The server boot files are copied to the server.

4. **(Conditional) If you are installing from floppy diskettes, during the copy process, insert the NetWare diskettes into drive A: as prompted and press** <Enter>.

    Once the boot files have been copied to the server, if your CONFIG.SYS file does not set a country code, or if the country code is not set at 001 (U.S.), the following screen appears.

Figure 2-7
Language
Configuration
Screen

```
Country Code:         001   (United States)

Code Page:            437   (United States English)

Keyboard Mapping:     None

            Press <Enter> here, to continue
```

5. (Conditional) Specify the country code, code page, and keyboard mapping.

Note ▼▼▼ For information on any of the settings in this screen, press <F1> or refer to your DOS manual.

Use the Up- and Down-arrow keys to maneuver through the screen.

5a. Press <Enter> **to view options and select an applicable country code.**

The "Code Page" filed is highlighted.

5b. Press <Enter> **and select an applicable code page.**

The "Keyboard Mapping" field is highlighted.

5c. Press <Enter> **and select an applicable keyboard type.**

6. Press <Enter> **to save and continue.**

A number of boot files are then copied to the DOS partition of the hard disk.

7. Continue with "Load the Disk and CD-ROM Drivers" on page 33.

Load the Disk and CD-ROM Drivers

The following screen appears.

Figure 2-8
Select Your Disk Driver

```
┌─┬─────────────┬───────────────────────────────────────────────────────────┐
│▲│ISADISK.DSK  │Novell ISADISK (AT Compatible Driver)                      │
│ │MNS16S.DSK   │Mountain Network Solution, Inc - SCSI Controller Driver    │
│ │MNS8MM.DSK   │Mountain Network Solution, Inc - 8MM Device Driver         │
│ │MNSDAT.DSK   │Mountain Network Solution, Inc - SCSI DDS DAT Device Driver│
│ │NWPA.DSK     │Novell NPA (NetWare Peripheral Architecture) Support Module│
│▼│PM11NW40.DSK │DPT PM2011 HBA Driver                                      │
└─┴─────────────┴───────────────────────────────────────────────────────────┘
```

Warning ▼ If you are installing from CD-ROM and the CD-ROM drive is connected to a SCSI adapter shared by another internal or external device (hard disk, tape device, etc.), you may experience a keyboard lockup problem while loading drivers or copying files.

If this occurs, contact your SCSI adapter manufacturer for updated drivers.

A disk driver enables communication between the disk controller and the server's CPU. Similarly, a CD-ROM driver enables communication between the CD-ROM and the server's CPU.

In some cases, you will need to select a CD-ROM driver as well as a disk driver.

Disk drivers have a description that appears as you highlight the driver. A list of standard Novell® drivers is shown below

Table 2-1
Standard Novell Disk Drivers

Computer architecture	Controller	Disk driver you must load
Industry Standard Architecture (ISA)	AT	ISADISK
	IDE (ATA)	IDE
Microchannel	ESDI	PS2ESDI
	IBM SCSI	PS2SCSI
Extended Industry Standard Architecture (EISA)	AT class	ISADISK
	IDE (ATA)	IDE
	EISA vendor proprietary	See vendor

For example, if you have an ISA computer, you need to load the IDE disk driver.

Besides Novell drivers, additional third-party drivers are also included with NetWare 4.1.

Important ▼ If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

Procedure

If more than one hard disk of the same type is installed in your computer, and if the disks are both connected to the same disk controller, load only one disk driver.

If the disks are connected to different controllers, load the driver multiple times or load additional disk drivers.

1. Choose your disk driver.

If	Then
The driver is listed	Choose the appropriate disk driver and continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts. Then skip to Step 3.

The selected disk driver is then copied to the server boot directory before it is loaded.

2. View the displayed parameter settings and verify that they are correct.

If you want to	Then
Accept the default values	Choose "Save Parameters and Continue."
Change the defaults because they do not match the installed hardware	Choose "Select/Modify Driver Parameters and Continue."

A prompt appears asking if you want to load any additional disk drivers.

If you want to	Then
Load additional disk drivers, or load separate CD-ROM drivers	Select "Yes" and press <Enter>. Then repeat Steps 1 and 2.
Proceed without loading additional disk drivers	Continue with Step 3.

3. **Continue with "Load the LAN Drivers" on page 37.**

Load the LAN Drivers

After you load your disk and CD-ROM drivers, the following screen appears.

Figure 2-9
Select Your LAN Drivers

```
┌────────────────────────────────────────────────────────────────────┐
│ ▲ NE2000.LAN    Novell Ethernet NE2000                             │
│   NE2100.LAN    Ansel M2100 All-In-One-Networking                  │
│   NE2100.LAN    EXOS 105                                            │
│   NE2100.LAN    Novell Ethernet NE2100                             │
│   NE2100.LAN    Wearnes 2110T or Wearnes 2107C                     │
│ ▼ NE2_32.LAN    Novell Ethernet NE/2-32                            │
└────────────────────────────────────────────────────────────────────┘
```

Loading a LAN driver establishes a network connection (if the server is physically connected to the network cabling). Your choice of LAN drivers depends on the cabling system and the network board you are using.

Most NetWare 4.1 LAN drivers have an individual description that appears on the screen when you choose the driver. Refer to Table 2-2, on page 38 and to the on-screen descriptions to determine which LAN driver to load.

Important ▼ If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

Table 2-2
Novell LAN Drivers

Cabling system	Network board	LAN driver you must load
ARCnet*	RX-Net	TRXNET.LAN
	RX-Net II	
	RX-Net/2	
Ethernet	NE/2 NE/2T	NE2.LAN
	NE/2-32	NE2_32.LAN
	NE1000 - ASSY 950-054401 NE1000 - ASSY 810-160-001	NE1000.LAN
	NE2000 - ASSY 810-149 NE2000T - ASSY 810-000220	NE2000.LAN
	NE2100 - ASSY 810-000209	NE2100.LAN
	NE1500T - ASSY 810-000214 (twisted-pair version of NE2100)	NE1500T.LAN
	NE3200	NE3200.LAN
	NE32HUB	NE32HUB.LAN
Token Ring	NTR2000	NTR2000.LAN

For example, if you have a Novell NE2100™ network board installed in your computer, you must load the NE2100.LAN driver.

Procedure

1. Choose your LAN driver.

If	Then
The driver is listed	Choose the appropriate LAN driver and continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts. Then continue with Step 2.

The selected LAN driver is then copied and stored temporarily in the C: drive before it is loaded.

2. View the displayed LAN driver parameter settings and verify that they are correct.

If you want to	Then
Accept the default values	Choose "Save Parameters and Continue."
Change the defaults because they are incomplete or they conflict with other hardware settings	Choose "Select/Modify Driver Parameters" and enter the settings. Exit the screen by pressing <Esc>. Continue with Step 3.

A prompt appears asking if you want to select additional network drivers.

If you want to	Then
Load additional LAN drivers	Select "Yes" and press <Enter>. Then repeat Steps 1 and 2.
Proceed without loading additional LAN drivers	Continue with Step 3.

The "Load Server Drivers" screen appears with the selected disk and LAN drivers displayed.

Figure 2-10
Selected Drivers Are Displayed Prior to
Being Loaded

```
┌─────────────────────────────────────────── Driver Names ──────┐
│                                                                │
│  Disk and CD-ROM Drives:                        > IDE          │
│                                                                │
│  Network (LAN) Drives:                          > NE2000       │
│                                                                │
└────────────────────────────────────────────────────────────────┘
```

If you want to modify the settings of any previously selected disk or LAN drivers, or load additional disk or LAN drivers, you may do so through the "Select Additional or Modify Selected Disk/LAN Drivers" option.

3. **From the "Driver Actions" menu, choose "Continue Installation."**

At this time, NetWare 4.1 loads the Ethernet 802.2, Ethernet 802.3, Ethernet SNAP, and Ethernet II frame types. The installation utility will later bind the IPX protocol to *only* the frame types found on the network.

If you are installing from CD-ROM, the following screen may appear.

Figure 2-11
You Can Try to
Mount the CD-ROM
as a NetWare
Volume

```
╔═══════════════════════════════════════════════════╗
║               Select an action:                   ║
╠═══════════════════════════════════════════════════╣
║ Continue accessing the CD-ROM via DOS             ║
║ Try to mount the CD-ROM as a NetWare volume       ║
╚═══════════════════════════════════════════════════╝
```

4. **(Conditional) If you are installing from CD-ROM and the menu in Figure 2-11 appears, choose one of the menu options.**

   If a disk or CD-ROM driver you selected earlier conflicts with the DOS CD-ROM driver, your keyboard may lock up during installation. To avoid this, you can attempt to mount the CD-ROM as a NetWare volume. In doing so, you may be prompted to install new disk or CD-ROM drivers.

5. **Continue with "Install the License and Create NetWare Disk Partitions" on page 42.**

Install the License and Create NetWare Disk Partitions

Once all drivers have been loaded, the following screen appears prompting you to insert your *License* diskette.

Figure 2-12
License **Diskette Prompt**

```
The license file will be installed from drive A:. Insert disk "MAIN
SERUER LICENSE" (which contains the file "SERUER.MLS") into the drive.

Warning:  Do not try to install this same license on any
other server.
Doing so will cause a copyright violation warning to be issued.

    Press <F3> to specify a different path;
    Press <Enter> to continue.
```

Note   If your server's hard disk contains existing nonbootable disk partitions, a message appears telling you so.

Decide whether you want to delete existing nonbootable disk partitions and make them part of the NetWare partition, or save them and exclude them from being part of the NetWare partition.

Warning   Selecting "Yes" will delete any extended DOS partitions you may have.

NetWare Partition Overview

Every NetWare 4.1 server needs a disk partition for NetWare files and shared data. You can have only one NetWare 4.1 disk partition per disk, but you can have up to eight volume segments on the NetWare disk partition.

If your server's primary hard disk has a DOS partition, use the rest of the disk space as a NetWare disk partition.

Figure 2-13
Disk Partitions and Volumes on an Internal Hard Disk

☐ NetWare disk partition

■ DOS partition

Volumes

Internal hard disk
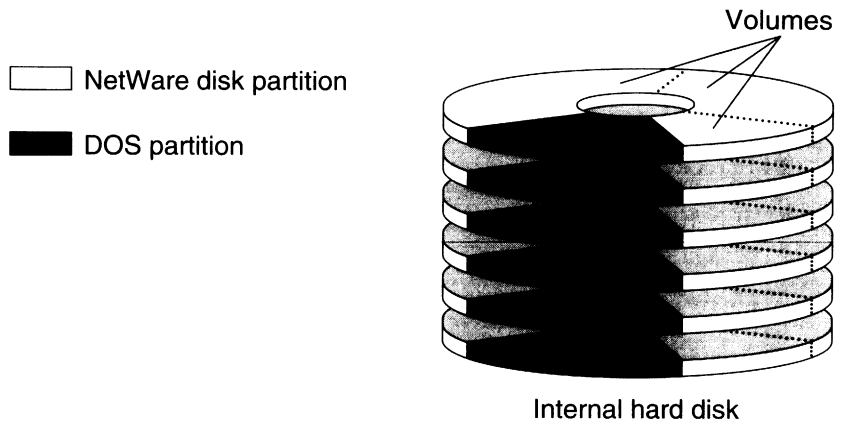
Procedure

Procedure
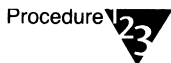
1. **(Conditional) If prompted whether to delete existing nonbootable partitions, choose "Yes" or "No" and press <Enter>.**

Suggestion

To maximize your NetWare disk partition space, delete all nonbootable disk partitions. Press <Alt>+<F10> to exit the installation, then back up any files you wish to keep and start the installation again.

2. **When prompted, insert the *License* diskette and press <Enter>.**

3. **When prompted that the license is installed successfully, press <Enter>.**

4. **Remove the *License* diskette and store it in a safe place.**

   If you are installing from CD-ROM (not from a remote installation area) or from floppy diskettes, NetWare begins copying the files needed for the installation utility to continue.

Figure 2-14
The Files Needed to Continue are Copied

```
              File Copy Status (Preliminary Copy)

    ████████████████████████
                           37%


Filegroup: NetWare System Files
Source path: D:NW410\INSTALL\ENGLISH
Destination path: SYS:\PUBLIC\NLS\ENGLISH

 →Copying file "DSI.NLM"
 →Copying file "FILTSRV.NLM"
 →Copying file "ICMD.NLM"
 →Copying file "INETLIB.NLM"
 →Copying file "INSTALL.NLM"
 →Copying file "IPTUNNEL.LAN"
 →Copying file "IPTUNNEL.LDI"
```
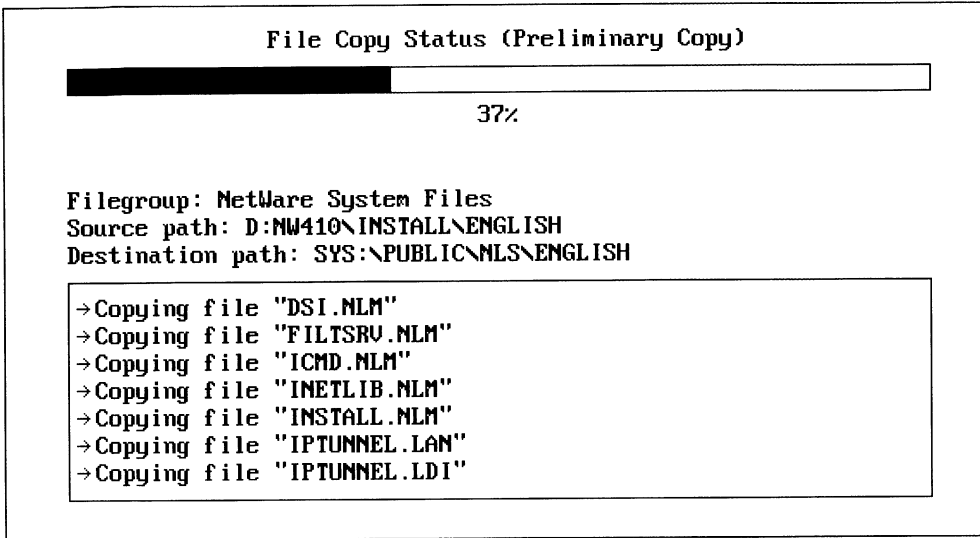
5. **If you are installing from a network volume, continue with "Establish the Server-to-Server Session (Conditional)" on page 45; otherwise, continue with "Install NetWare Directory Services" on page 47.**

Establish the Server-to-Server Session (Conditional)

If you are installing from a remote network installation area, the following screen appears.

Figure 2-15
Enter Your
Password to
Reconnect to the
Source Server

```
┌──────────────────────────────────────────────────────────────┐
│ User Name: FSMITH                                            . │
│                                                                │
│ Password:██████████████████████████████████████████████████   │
│                                                                │
│            Press <Enter> to continue and log in               │
└──────────────────────────────────────────────────────────────┘
```

Procedure

Procedure

1. **Reenter your password to reconnect to the source server, and press** <Enter>.

   When installing from a remote network installation area, a client connection to the source server is disrupted once the LAN driver is loaded.

   The path to the source server is saved in memory, but the password must be reentered.

2. **Press** <Enter> **again.**

   The copying process begins.

Figure 2-16
The Files Needed to
Continue are
Copied

```
              File Copy Status (Preliminary Copy)

    ████████████████████████

                         37%


Filegroup: NetWare System Files
Source path: D:\NW410\INSTALL\ENGLISH
Destination path: SYS:\PUBLIC\NLS\ENGLISH

 ─────────────────────────────────────────────────────
 →Copying file "DSI.NLM"
 →Copying file "FILTSRV.NLM"
 →Copying file "ICMD.NLM"
 →Copying file "INETLIB.NLM"
 →Copying file "INSTALL.NLM"
 →Copying file "IPTUNNEL.LAN"
 →Copying file "IPTUNNEL.LDI"
 ─────────────────────────────────────────────────────
```
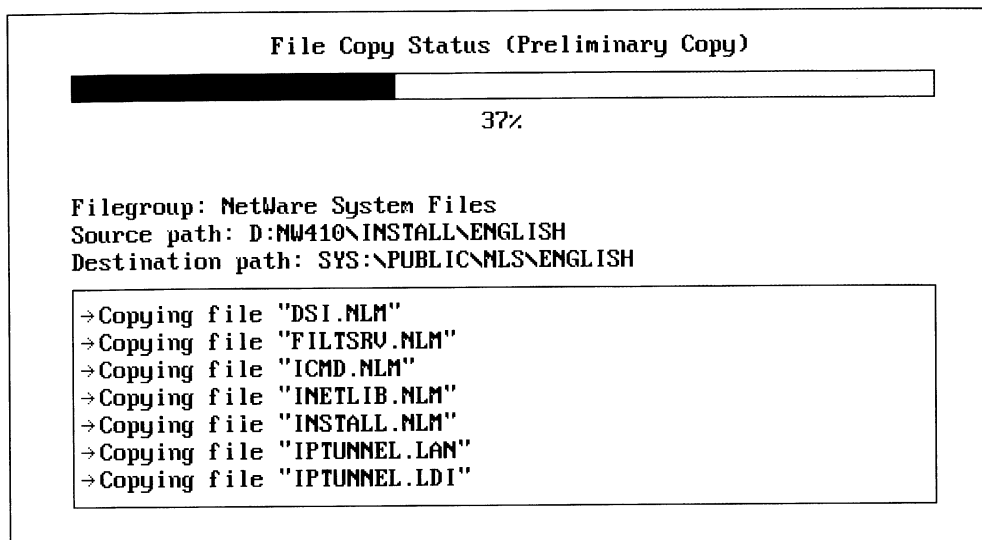
3. Continue with "Install NetWare Directory Services" on
    page 47.

Install NetWare Directory Services

Once the appropriate files have been copied to the server, the network is scanned for Directory trees. Unless you are installing the first NetWare 4 server in the network, you will most likely want to install the server into an existing Directory tree.

Based on your network configuration, one of the following screens appears.

```
┌─────────────────────────────────────────────┐
│     Is this the first NetWare 4 server?      │
│ ┌─────────────────────────────────────────┐ │
│ │Yes, this is the first NetWare 4 server  │ │
│ │No, connect to existing NetWare 4 network│ │
│ └─────────────────────────────────────────┘ │
└─────────────────────────────────────────────┘
```
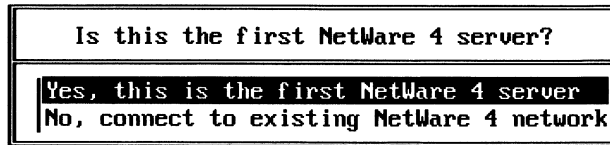
If no NetWare 4 server (and accompanying Directory tree) can be located on the network, the menu shown above appears.

If	Go to
The menu in Figure 2-17 appears	"Nonlocatable Directory Tree, or First Server" on page 49.

Figure 2-18
When a Single
Directory Tree Is
Located
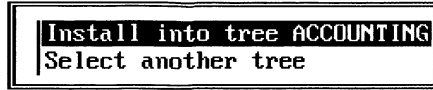
```
┌──────────────────────────────────┐
║ ┌──────────────────────────────┐ ║
║ │Install into tree ACCOUNTING│ ║
║ │Select another tree           │ ║
║ └──────────────────────────────┘ ║
└──────────────────────────────────┘
```

If a single Directory tree is located, the Directory tree name is displayed as in the menu above.

If	Go to
The menu in Figure 2-18 appears	"A Single Directory Tree Is Located" on page 53.

Figure 2-19
When Multiple
Directory Trees are
Located
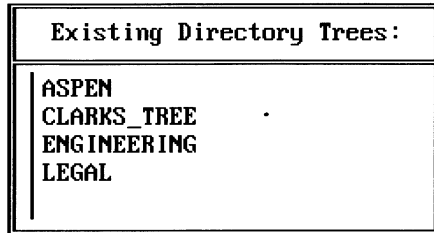
```
┌──────────────────────────────────┐
║ ┌──────────────────────────────┐ ║
║ │   Existing Directory Trees:  │ ║
║ ├──────────────────────────────┤ ║
║ │ASPEN                         │ ║
║ │CLARKS_TREE        .          │ ║
║ │ENGINEERING                   │ ║
║ │LEGAL                         │ ║
║ │                              │ ║
║ └──────────────────────────────┘ ║
└──────────────────────────────────┘
```

If multiple Directory trees are located, the menu shown above appears.

If	Go to
The menu in Figure 2-19 appears	"Multiple Directory Trees are Found" on page 147. (Located in Chapter 3, "Custom Installation.")

Nonlocatable Directory Tree, or First Server

The menu below appears if there is no previously installed NetWare 4 server, or if the server you are installing cannot see the previously installed NetWare 4 server(s).

Figure 2-20
When No Directory
Tree Is Located

```
┌────────────────────────────────────────────────┐
│      Is this the first NetWare 4 server?       │
├────────────────────────────────────────────────┤
│ Yes, this is the first NetWare 4 server        │
│ No, connect to existing NetWare 4 network      │
└────────────────────────────────────────────────┘
```

If the Server Cannot Locate a Previously Installed Directory Tree

Procedure
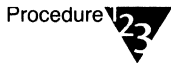
Procedure

1. **From the "Is This the First NetWare 4 Server?" menu, choose "No, Connect to Existing NetWare 4 Network" and press <Enter>.**

   The following menu appears.

Figure 2-21
Select NetWare 4
Network Menu

```
┌────────────────────────────────────────────────────┐
│            Select NetWare 4 Network                │
├────────────────────────────────────────────────────┤
│ Recheck for NetWare 4 network                      │
│ Specify NetWare 4 network name and server address  │
└────────────────────────────────────────────────────┘
```

Note

You can find out the network name by loading MONITOR.NLM on an existing server on the network. The network name is the same as the Directory tree name.

2. Select one of the menu options.

If	Then
You have verified that an existing NetWare 4 server is up and physically connected to the network, and that both servers are bound to IPX with the proper LAN driver, frame type, and IPX external network number	Choose "Recheck for NetWare 4 Network" and press <Enter>. If a single Directory tree is located, go to "A Single Directory Tree Is Located" on page 53. If multiple Directory trees are located, go to "Multiple Directory Trees are Found" on page 147. (Located in Chapter 3, "Custom Installation.")
Your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server	Choose "Specify Address of NetWare 4 Server" and press <Enter>. Enter the name of the Directory tree and press <Enter>. Enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press <Enter>. If a single Directory tree is located, go to "A Single Directory Tree Is Located" on page 53. If multiple trees are located, go to "Multiple Directory Trees are Found" on page 147. (Located in Chapter 3, "Custom Installation.")

If This Is the First NetWare 4 Server in the Directory Tree

Procedure

Procedure ▼2▼

1. **Choose "Yes, This Is the First NetWare 4 Server" and press** <Enter>.

    A list of time zones appear.

2. **Choose the time zone where the server will be installed and press** <Enter>.

If	Then
The time zone is listed	Move the cursor to the time zone and press <Enter>.
The time zone is not listed	Press <Ins> and fill out the "Verify/Enter Time Configuration Information for This Server" screen.
	Note: An explanation of this screen can be found in Chapter 3, "Custom Installation." beginning with Step 3b on page 136.
	Once entered, continue with Step 3 below.

The following screen appears, requesting your NetWare Directory Services (NDS) Organization name.

**Figure 2-22
Enter Your
Organization Name**

```
┌────────────────────────────────────────┐
║  Organization Name:                     ║
└────────────────────────────────────────┘
```

3. **Enter the name of your organi{zation and press** <Enter>.

Your NDS Organization name can be your company, division or department name. It will also be the name of your Directory tree.

Once you have entered the NDS Organization name and pressed <Enter>, a screen appears requesting your administrator password.

4. **Enter the administrator password and press** <Enter>.

You will need this password later to log in and administer the network.
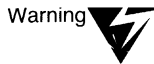
Warning▼ If you forget the administrator password, you will have to reinstall.

Note▼ This password is also the password for the bindery user SUPERVISOR. If you change the administrator password later, the SUPERVISOR password will *not* change until you change it using the SYSCON utility.

5. **At the prompt, retype the password and press** <Enter> **to continue.**

6. **Go to "Copy Remaining NetWare Files" on page 56.**

A Single Directory Tree Is Located

If, after scanning the network, a single Directory tree is located, the tree name is displayed along with the following menu.

```
┌──────────────────────────────────┐
│ Install into tree ACCOUNTING     │
│ Select another tree              │
└──────────────────────────────────┘
```

Important ▼ Depending on its structure, the displayed Directory tree can be either a "simple" tree (only one level) or a "custom" tree (multilevel).

Procedure

Procedure ▼ **1. Choose an option from the menu.**

If	Then
You want to install into the displayed Directory tree	Go to "Install into a Displayed Directory Tree" on page 54.
You want to install into a Directory tree that is not displayed	Go to "If the Server Cannot Locate a Previously Installed Directory Tree" on page 49.
You want to create a new Directory tree	Choose "Select Another Tree" and press <Enter>.
	Press <Ins>.
	At the confirmation prompt, press <Enter>.
	Follow the procedures under "If This Is the First NetWare 4 Server" on page 134. (Located in Chapter 3, "Custom Installation.")

Install into a Displayed Directory Tree

Install the new NetWare 4.1 server into the Directory tree displayed in the menu below, by following the procedures that follow.

```
┌─────────────────────────────────────┐
│║Install into tree ACCOUNTING║        │
│ Select another tree                  │
└─────────────────────────────────────┘
```

Procedure

Procedure

1. **Choose "Install into Tree** *tree name*" **and press** <Enter>.

   A list of time zones appear.

2. **Choose the time zone where the server will be installed and press** <Enter>.

If	Then
The time zone is listed	Move the cursor to the time zone and press <Enter>.
The time zone is not listed	Press <Ins> and fill out the "Verify/Enter Time Configuration Information for This Server" screen.
	Note: An explanation of this screen can be found in Chapter 3, "Custom Installation." beginning with Step 3b on page 136.
	Once entered, continue with the procedures below.

One of the following screens appears.

Figure 2-25
When a Simple
Directory Tree Is
Located

```
┌────────────────────────────────────────────────────────────┐
│ Admin Password:                                            │
└────────────────────────────────────────────────────────────┘
```
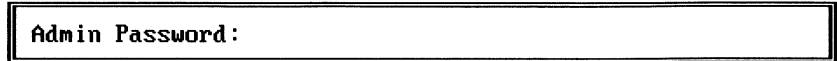
Figure 2-26
When a Custom Directory Tree Is Located

```
┌────────────────────────────────────────────────────────────┐
│           Directory Services Login/Authentication          │
├────────────────────────────────────────────────────────────┤
│ Administrator Name: CN=Admin.O=Novell                      │
│ Password:                                                  │
└────────────────────────────────────────────────────────────┘
```

If	Then
The screen in Figure 2-25 appears	Type the administrator password and press <Enter>.
	Continue with "Copy Remaining NetWare Files" on page 56.
The screen in Figure 2-26 appears	If necessary, type the administrator name and press <Enter>.
	Type the administrator password and press <Enter>.
	Go to page 141 in Chapter 3, "Custom Installation," and complete Steps 4a through 4e.
	Then continue with "Copy Remaining NetWare Files" on page 56.
The screen in Figure 2-25 appears and you wish to make the simple Directory tree a custom (multilevel) tree	Press <F4>.
	If necessary, type the administrator name and press <Enter>.
	Type the administrator password and press <Enter>.
	Go to page 141 in Chapter 3, "Custom Installation," and complete Steps 4a through 4e.
	Then continue with "Copy Remaining NetWare Files" on page 56.

Copy Remaining NetWare Files

Once NetWare Directory Services has been installed, NetWare begins copying the remaining NetWare files to volume SYS:. This could take a few minutes.

Figure 2-27
The Remaining NetWare Files Are Copied

```
                        File Copy Status (Main Copy)

  ██████
                                  7%


  Filegroup: NetWare System Files
  Source path: D:NW410\INSTALL\ENGLISH
  Destination path: SYS:\PUBLIC\NLS\ENGLISH

  →Copying file "FDDITSM.NLM"
  →Copying file "FILTCFG.NLM"
  →Copying file "FILTCONU.NLM"
  →Copying file "GENCFG.NLM"
  →Copying file "HCSS.NLM"
  →Copying file "HCSS_IR.NLM"
  →Copying file "HCSS_SM.NLM"
```
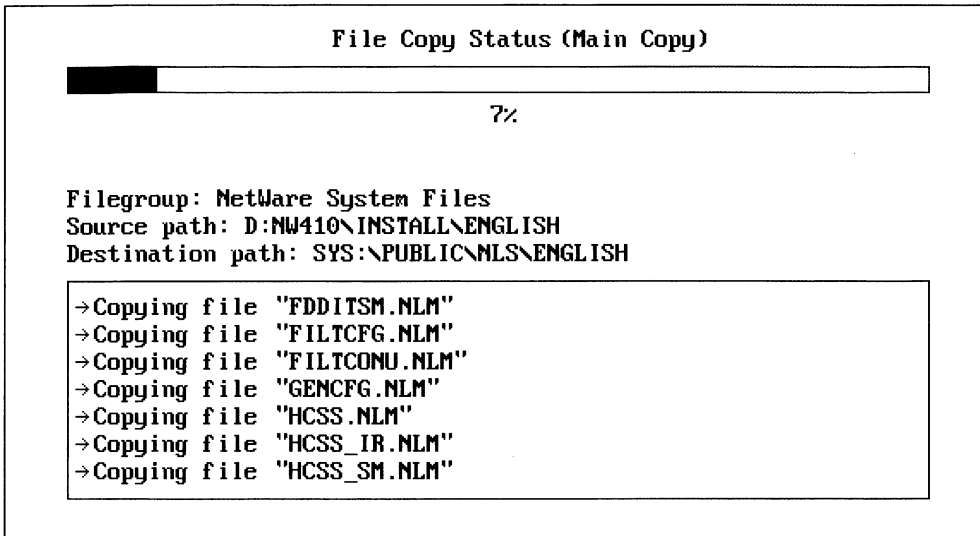
Procedure

Procedure
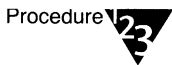
1. **(Optional) Review "What Does the Directory Tree Look Like Now?" on page 57 and "What Trustee Assignments Were Created During this Installation?" on page 58.**

2. **Continue with "Other Installation Options (Optional)" on page 59, or skip to "Exit the Installation Utility" on page 65.**

What Does the Directory Tree Look Like Now?

The following objects were created in the Directory tree:

◆ Server object.

◆ Volume objects *(servername_SYS* and other volumes you specified).

◆ User object ADMIN (the administrator who has Supervisor object rights to this context). This object is placed directly under the Organization level.

Note ▼ User object ADMIN is created only once, and only on the first server in the tree.

◆ User object Supervisor (for bindery services purposes only). This object is recognized only by pre-NetWare 4.1 utilities. User object Supervisor takes on User object ADMIN's password.

These objects are placed in the same context you defined for your server. The following illustration shows what your Directory tree might look like after you installed your first NetWare 4.1 server.

```
● [Root]
  └ ♣ Novell ·················(Organization)
      ├ ▤ SERVER1 ············(Server object)
      ├ ▣ SERVER1_SYS·····(Volume object)
      └ ♟ Admin················(User object)
```

What Trustee Assignments Were Created During this Installation?

◆ User object ADMIN has the Supervisor object right on the [Root] object. By inheritance, ADMIN also has the Supervisor right on all Volume objects in the Directory.

◆ [Public] has the Browse right on the [Root] object.

Note ▼ [Public] is equal to the group EVERYONE in the NetWare 3 environment.

◆ Any container object has Read and File Scan rights to the PUBLIC directories of all system volumes in that container.

◆ The [Root] object (or security equivalent) of a tree has:

◆ The Browse right on all User objects in that tree. This can be blocked by an Inherited Rights Filter or removed from a container's Access Control List (ACL).

◆ The Read right to the Member property of any Group object.

◆ The Read right to the following properties of any Volume object: Host Server Name (the server that the physical volume resides on) and Host Resource (the physical volume).

◆ All User objects have the Read right to their own properties and to the properties of any profile they belong to. User objects also have Read and Write rights to their user login script.

For more information on rights and trustee assignments, see "Rights" and "Trustee" in *Concepts* and Chapter 2, "Managing Directories, Files, and Applications," and Chapter 3, "Creating Login Scripts," in *Supervising the Network*.

Other Installation Options (Optional)

Once all NetWare files have been copied to volume SYS:, the following screen appears listing other available installation options.

```
┌──────── Other Installation Items/Products ────────┐
│ Create a Registration Diskette                    │
│ Create DOS/MS Windows/OS2 Client Install Diskettes│
│ Create NetWare UPGRADE/MIGRATE Diskettes          │
│ Install Online Documentation and Viewers          │
│                                                   │
└───────────────────────────────────────────────────┘
```

```
╔═══════════════════════════════════════════════╗
║           Other Installation Actions          ║
╠═══════════════════════════════════════════════╣
║ Choose an item or product listed above        ║
║ Continue installation          .              ║
╚═══════════════════════════════════════════════╝
```
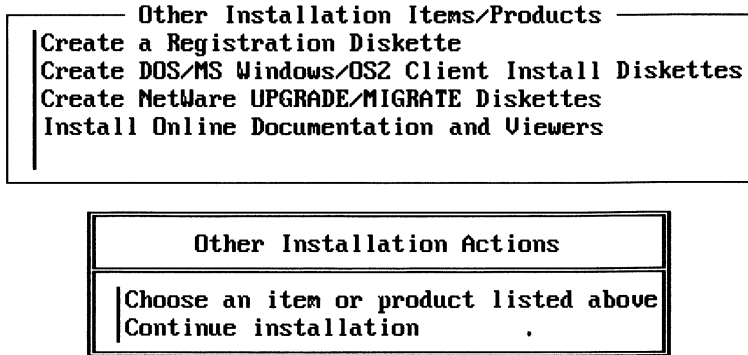
All of the options listed above may be done any time from the server by loading INSTALL.NLM at the server console.

If	Then
You want to perform any of the listed installation actions at this time	Follow the procedures under the headings that follow.
You do not want to perform any of the listed installation actions at this time	Choose "Continue Installation" from the "Other Installation Actions" menu and press <Enter>. After being prompted that the installation is complete, press <Enter> to access the server console. Go to "Where to Go from Here" on page 65.

Create a Registration Diskette

Having a *Registration* diskette is useful in case you experience system problems in the future and must call Novell Technical Support^{SM}.

The installation program can read information such as OS version, addresses, number of licensed connections, SFT level, amount of RAM installed, network board configuration, and disk drive configuration, and copy this information to the *Registration* diskette.

This might be useful in case you experience system problems in the future and need to call Novell Technical Support. Novell support technicians can access the above information, which greatly speeds up their ability to help you.

Procedure

Procedure

1. **From the "Other Installation Actions" menu, select "Choose an Item or Product Listed" and press** <Enter>.

2. **Choose "Create a Registration Diskette" and press** <Enter>.

   The screen that appears lists three prerequisites:

   ◆ The NetWare 4.1 *Registration* diskette

   ◆ The name and address of your Novell Authorized Reseller^{CLM}

   ◆ Your company's reseller contact (the person in your company in responsible for purchases).

3. **Press** <F10> **to continue.**

4. **In the "Reseller Information" form that appears, fill in the name and address of the Novell Authorized Reseller you purchased NetWare 4.1 from.**

   4a. **Press** <Enter> **after each entry.**

   4b. **Press** <F10> **to continue.**

5. In the "Customer Information" form, fill in the reseller contact's name and the name of your company (or organization).

5a. Press <Enter> after each entry.

5b. Press <F10> to continue.

6. Insert the *Registration* diskette into drive A: and press <Enter>.

The installation program now copies the registration information to this diskette.

7. (Optional) Copy configuration information to the *Registration* diskette.

7a. Press <F2> to view configuration information.

7b. Press <Esc> to exit the screen.

7c. When asked "Copy This Information to the Diskette?" choose "Yes" or "No."

7d. Insert the *Registration* diskette into the mailer labeled "Product Registration" and send it to Novell.

8. Continue performing any additional installation options listed on pages 62 through 64, or go to "Exit the Installation Utility" on page 65.

Create DOS/MS Windows/OS2 Client Install Diskettes

If you don't want to make client diskettes at this time, you can make them later from the server by loading INSTALL.NLM or from a workstation by running MAKEDISK.BAT. (See Appendix D, "Creating Client Diskettes," on page 287.)

Prerequisites

Format the appropriate number of high-density diskettes using the table below.

For	Format
DOS/MS Windows workstations	Five 3.5-inch or 5.25-inch diskettes
OS/2 workstations	Six 3.5-inch diskettes

Procedure

Procedure

1. **From the "Other Installation Actions" menu, select "Choose an Item or Product Listed Above" and press** <Enter>.

2. **Choose "Create DOS/MS Windows/OS2 Client Install Diskettes" and press** <Enter>.

   The following menu appears.

Figure 2-29
Select the Client Files You Want to Copy to Diskette

```
[X] 3.5 inch    DOS/MS Windows Client Install        (5 diskettes)
[X] 3.5 inch    OS/2 Client Install                  (6 diskettes)
[ ] 5.25 inch   DOS/MS Windows Client Install        (5 diskettes)
```

3. **Select or deselect the file groups you want copied by pressing <Enter>.**

4. **Press <F10> to accept the marked groups and continue.**

5. **Specify the destination that the client files will be copied to.**

   By default, the client files are copied to drive A:. To specify a new path, press <F3> and type the new path.

6. **Press <Enter> to accept the path.**

7. **Insert the labeled diskettes as prompted.**

8. **Continue performing any additional installation options listed below, or go to "Exit the Installation Utility" on page 65.**

Create NetWare *Upgrade/Migrate* Diskettes

This option allows system administrators to create the diskettes necessary to upgrade an existing NetWare 2.*x*, 3.*x*, or 4.*x* server to NetWare 4.1.

For procedures on using this option, see *Upgrade*.

Install Online Documentation and Viewers

This option installs the NetWare 4.1 online manual set and DynaText* viewers on the NetWare 4.1 server.

Entire NetWare 4.1 online manual sets are available in English, French, Italian, German, and Spanish.

Be aware that a single language manual set requires 60 MB of free server disk space.

For complete instructions on installing the online documentation and viewers, see *Installing and Using Novell Online Documentation for NetWare 4.1.*

Exit the Installation Utility

The installation of the NetWare 4.1 server is now complete.

Procedure

Procedure
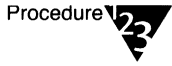
1. **To exit the installation utility and return to the server console, press <Enter>.**

2. **Continue with "Where to Go from Here."**

Where to Go from Here

If you want to	Go to
Install additional NetWare 4.1 servers	"Install Server Software" on page 19.
Install NetWare clients	Chapter 6 "Install NetWare Clients" on page 265.
Install NetWare SFT III	Chapter 5, "Install NetWare 4.1 SFT III," on page 241.

3 *Custom Installation*

The "Custom Installation" option allows you to customize your installation of NetWare® 4.1 by allowing you to change the defaults for any of the following configuration options.

Checklist ▼

❏ Booting the server from boot diskettes or a DOS partition on the hard disk

❏ Assigning a specific IPX internal network number yourself

❏ Partitioning hard disks

❏ Mirroring hard disks

❏ Specifying volume names

❏ Spanning volumes across multiple drives

❏ Modifying time zone parameters in NetWare Directory Services™

❏ Editing the AUTOEXEC.NCF and STARTUP.NCF files

❏ Selecting nonrouting TCP/IP or AppleTalk* protocols in addition to IPX

If you determine that you don't need any of the options listed above, install NetWare 4.1 by following the "Simple Installation" procedures in Chapter 2, "Simple Installation," on page 15.

Prerequisite Tasks

❑ Plan your Directory tree. See *Introduction to NetWare Directory Services* for guidelines and suggestions.

❑ If your computer has never been a server before, complete the tasks explained in Chapter 1, "Prepare Your Site and Equipment," on page 1.

❑ Run the computer's Setup program and set the computer's time to the exact local time. (The time synchronization feature in NetWare Directory Services™ uses the computer's time setting.)

❑ If you install from another server, make sure the new server is cabled to the network and has the NetWare client software installed.

❑ If you intend to boot the server from a DOS partition, create a DOS partition of at least 15 MB on your hard disk.

If you need to partition and format your hard disk, boot from the NetWare *License* diskette and type FDISK to repartition the hard disk. After rebooting, type FORMAT to format the partition.

A 15MB DOS partition should be sufficient for storing the files needed to boot your server. If you need to store additional files on the DOS partition, you may want to make the partition larger.

Installation is much easier when you install with the intention of booting the server from a DOS partition on the server's hard disk. However, If you want to boot the server from floppy diskettes, you do not need a DOS partition.

For procedures on installing the server to boot from floppy diskette, see Appendix C, "Install To Boot From Floppy Diskette," on page 283.

Warning Reformatting your hard disk erases all stored files. Be sure to back up your hard disk prior to partitioning and formatting.

Suggested Resources

Checklist ▼

❏ The NetWare Server Installation quick path card for an overview of the process.

❏ A copy of the NetWare Server Worksheet (located on page 179).

❏ The NetWare *License* diskette.

❏ *One* of the following:
   - NetWare 4.1 CD-ROMs.
   - Working copies of NetWare 4.1 diskettes.
   - Access to NetWare 4.1 installation files on another server (the *NetWare 4.1 Operating System* CD-ROM mounted as a NetWare volume, or an image of the CD-ROM on another server).

Install the Server Software

Install your NetWare 4.1 server software by following the procedures in the sections that follow.

Choose an Installation Medium

You can install a NetWare 4.1 server from CD-ROM, from floppy diskettes (available only through the NetWare Fulfillment Center), or from a remote network installation area.

If you are installing the first in a series of NetWare 4.1 servers on a new network, you must install from CD-ROM or from floppy diskettes.

Figure 3-1 lists factors to consider before choosing an installation medium.

Figure 3-1
Installation Media

	CD-ROM	Remote network installation area	Floppy diskettes
Speed of Installation	Slower than from a network, but faster than from floppy diskettes.	Fastest installation option.	Slowest installation option.
Hardware Configuration Requirements	Requires a CD-ROM player installed as a DOS device on the designated server.	Requires an existing network with either a server with sufficient disk space to store the NetWare 4.1 files, or the NetWare 4.1 CD-ROM mounted as a NetWare volume.	Requires a 3.5-inch floppy disk drive.
Ease of Installation	Much simpler than from floppy diskettes, but requires setup of CD-ROM drive and drivers.	Simple. Must install as a NetWare client first.	Cumbersome.

Choose a Server Boot Method

In most cases, proper physical security measures, combined with the security features in NetWare 4.1, should be sufficient for your security needs.

Though not typically recommended, as a possible additional security measure, you can make the server bootable from a pair of diskettes, rather than from a DOS partition on the hard drive.

You can then store the boot diskettes in a secure place and be assured that no one but you can boot the server.

To boot your server from	Continue with
A DOS partition on the hard disk	"Installing from CD-ROM," on page 72 or "Installing from a Remote Network Installation Area," on page 74 or "Installing from Floppy Diskettes," on page 81.
Floppy diskettes	Appendix C, "Install To Boot From Floppy Diskette," on page 283.

Installing from CD-ROM

Procedure
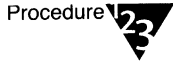
1. **If you have not done so already, install the CD-ROM drive and drivers according to the manufacturer's instructions.**

   Usually, the installation program for your CD-ROM will automatically update the CONFIG.SYS and AUTOEXEC.BAT files to add the CD-ROM device driver.

   If not, follow the manufacturer's instructions to create or update these files.

2. **Insert the *NetWare 4.1 Operating System* CD-ROM into the CD-ROM drive.**

3. **Reboot the computer.**

   Rebooting, the computer executes the CONFIG.SYS and AUTOEXEC.BAT files and recognizes the CD-ROM drive as a DOS device.

4. **Change to the drive letter corresponding to the CD-ROM.**

   This is generally drive D:.

5. **Type**

   INSTALL <Enter>

   A menu similar to the following appears.

```
╔══════════════════════════════════════════════════════════════╗
║                    NetWare Install                           ║
╠══════════════════════════════════════════════════════════════╣
║Diese Zeile wählen, um auf Deutsch zu installieren            ║
║Select this line to install in English                       ║
║Seleccione esta línea para instalar en español               ║
║Sélectionnez cette ligne pour installer en français          ║
║Seleziona questa riga per installare in Italiano             ║
╚══════════════════════════════════════════════════════════════╝
```

6. **Choose the language in which you want to server installed and press** <Enter>.

   The "Select the Type of Installation Desired" menu appears.

7. **Choose "NetWare Server Installation" and press** <Enter>.

8. **Go to "Name Your Server and Assign an IPX Network Number" on page 82.**

Installing from a Remote Network Installation Area

A NetWare 4.1 server can be installed over the network from a mounted CD-ROM NetWare volume, or from CD-ROM or floppy diskette files copied to another server.

In either scenario, a user logs in to a server with a remote network installation area and installs the workstation as a NetWare 4 server through the Installation utility.

Requirements and recommendations for a remote installation are outlined below.

Requirements for a NetWork Installation Area

◆ The server with the CD-ROM image should not be RIP-filtered from the server being installed.

Note▼ To find out if your network is utilizing RIP filtering, load FILTCFG.NLM at the server and view IPX protocol filters.

◆ The server being installed should use an IPX internal network number that is not RIP-filtered from the server with the CD-ROM image.

Recommendations for a Network Installation Area

◆ For better performance, the server with the CD-ROM image should have Packet Burst™ support. NetWare 3.12 and NetWare 4™ servers have Packet Burst support. NetWare 3.11 requires PBURST.NLM for Packet Burst support.

◆ For better performance, the server with the CD-ROM image should have LIP (Large Internet Packet) support enabled. NetWare 3.12 and NetWare 4 servers have LIP support enabled by default (set command, NCP, "Allow LIP = On"). NetWare 3.11 requires LIPX.NLM for LIP support.

Remote Installation Areas

The remote installation area can consist of one of the following:

◆ A NetWare 4.1 CD-ROM mounted as a NetWare volume

◆ The NetWare 4.1 CD-ROM files copied to a volume on a NetWare 4 server

If you want to	Go to
Install from a NetWare 4.1 CD-ROM mounted as a NetWare volume	"Installing from a CD-ROM Mounted as a NetWare Volume" on page 76.
Install from a NetWare server volume containing copied NetWare 4.1 CD-ROM files	"Installing from a NetWare Volume with Files Copied on a Server" on page 79.

Installing from a CD-ROM Mounted as a NetWare Volume

Necessary Resources

Checklist

❏ A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

❏ An existing NetWare server. (This will be the host server.)

❏ An existing NetWare workstation. (This will be the new server you install.)

Procedure

Procedure

1. **Cable the CD-ROM drive to the NetWare 4.1 server (the host server).**

   Since you are installing the CD-ROM as a NetWare volume, you do not need to install any drivers at this time.

2. **Insert the *NetWare 4.1 Operating System* CD-ROM into the CD-ROM drive.**

3. **At the C:\NWSERVER directory, type**

   `SERVER` <Enter>

4. **At the server console type**

   `LOAD INSTALL` <Enter>
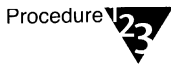
   The menu shown on the next page appears.

Figure 3-3
The "Installation
Options" Menu

```
╔══════════════════════════════════════════════════════════════╗
║                    Installation Options                      ║
╠══════════════════════════════════════════════════════════════╣
║ Driver options      (load/unload disk and network drivers)  ║
║ Disk options        (configure/mirror/test disk partitions) ║
║ Volume options      (configure/mount/dismount volumes)      ║
║ License option      (install the server license)            ║
║ Copy files option (install NetWare system files)            ║
║ Directory options (install NetWare Directory Services)      ║
║ NCF files options (create/edit server startup files)        ║
║ Product options     (other optional installation items)     ║
║ Server options      (install/upgrade/this server)           ║
║ Exit                                                         ║
╚══════════════════════════════════════════════════════════════╝
```

5. **Choose "Driver Options."**

   The "Driver Options" menu appears.

6. **Choose "Configure Disk and Storage Device Drivers."**

   The "Additional Driver Actions" menu appears.

7. **Choose "Select an Additional Driver."**

   You are prompted to enter the path to the source directory where the NetWare 4.1 files are located.

8. **Verify or change the source path and press <Enter>.**

   The "Select a Driver" list appears.

9. **Choose the necessary CD-ROM drivers according to the documentation that accompanied your CD-ROM drive.**

   Note ▼▼

   If the device drivers you need are not listed, press <Ins> and follow the prompts to access a new list of drivers.

   For information on the CD-ROM drivers that are shipped in the Red Box™ (NetWare 4.1 product package), along with their proper load order, see Appendix F, "Red Box CD-ROM Drivers," on page 305.

10. **Once you have loaded all necessary drivers, from the "Additional Driver Actions" menu choose "Return to Previous Menu."**

11. **Press <Alt>+<F10> and choose "Yes" to exit INSTALL.NLM.**

   You are returned to the server console.

12. **At the console prompt, type the following commands:**

   ```
   LOAD NWPA <Enter>
   LOAD CDROM <Enter>
   CD MOUNT NW410 <Enter>
   ```

   This mounts the CD-ROM as a NetWare volume.

13. **Go to the workstation that is to become a server and log in to the host server with the mounted CD-ROM NetWare volume.**

14. **Map a drive to the mounted CD-ROM volume.**

   For example:

   ```
   MAP N NW410: <Enter>
   ```

15. **At the mapped drive letter, type**

   ```
   INSTALL <Enter>
   ```

   A menu similar to the one below appears.

Figure 3-4
Choose the Desired
Server Language

```
╔════════════════════════════════════════════════╗
║                 NetWare Install                  ║
╠════════════════════════════════════════════════╣
║ Diese Zeile wählen, um auf Deutsch zu installieren ║
║ Select this line to install in English           ║
║ Seleccione esta línea para instalar en español   ║
║ Sélectionnez cette ligne pour installer en français ║
║ Seleziona questa riga per installare in Italiano ║
╚════════════════════════════════════════════════╝
```

16. **Choose the language in which you want the server installed and press <Enter>.**

   The "Select the Type of Installation Desired" menu appears.

17. **Choose "NetWare Server Installation" and press <Enter>.**

18. **Go to "Name Your Server and Assign an IPX Network Number," on page 82.**

Installing from a NetWare Volume with Files Copied on a Server

Necessary Resources

Checklist

❏ An existing NetWare server with sufficient disk space (at least 170 MB) to store the NetWare 4.1 operating system files. (This will be the host server.)

❏ An existing NetWare workstation. (This will be the server you install.)

❏ (Conditional) A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

This is used to copy the NetWare 4.1 files from the CD-ROM to the host server.

Procedure

Procedure

1. **Create a NETWARE directory on an existing server and copy the files from the installation medium to that directory.**

   For example, to copy from CD-ROM drive D: to network drive K:, type

   ```
   K: <Enter>
   MD NETWARE <Enter>
   CD NETWARE <Enter>
   NCOPY D: /S /E /V <Enter>
   ```

   To copy from floppy diskettes, perform the NCOPY command shown above for each diskette.

2. **On every computer you want to make a NetWare 4.1 server, create a DOS partition of at least 15 MB.**

3. **On every computer you want to make a NetWare 4.1 server, install NetWare DOS client software.**

   For instructions on installing workstation software, refer to Chapter 6, "Install NetWare Clients," on page 265.

4. **On every computer you want to make a NetWare 4.1 server, map a drive to the network host server directory that contains the NetWare 4.1 files.**

5. **At the mapped drive letter, type**

   `INSTALL` <Enter>

   A menu similar to the one below appears.

Figure 3-5
Choose the Desired Server Language

```
╔═══════════════════════════════════════════════════════════╗
║                      NetWare Install                      ║
╠═══════════════════════════════════════════════════════════╣
║ Diese Zeile wählen, um auf Deutsch zu installieren        ║
║ Select this line to install in English                    ║
║ Seleccione esta línea para instalar en español            ║
║ Sélectionnez cette ligne pour installer en français       ║
║ Seleziona questa riga per installare in Italiano          ║
╚═══════════════════════════════════════════════════════════╝
```

6. **Choose the language in which you want the server installed and press** <Enter>.

   The "Select the Type of Installation Desired" menu appears.

7. **Choose "NetWare Server Installation" and press** <Enter>.

8. **Go to "Name Your Server and Assign an IPX Network Number," on page 82.**

Installing from Floppy Diskettes

Procedure
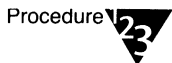
Procedure ▼ **1. Make working copies of all NetWare 4.1 diskettes.**

For instructions, refer to "Make Working Copies of the Diskettes (Conditional)" on page 12.

2. Insert the *Install* diskette into drive A:.

3. Turn on or reboot your computer.

The "Select the Type of Installation Desired" menu appears.

4. Choose "NetWare Server Installation" and press <Enter>.

5. Continue with "Name Your Server and Assign an IPX Network Number" on page 82.

Name Your Server and Assign an IPX Network Number

Once you've selected the language in which the server will be installed, the following menu appears.

Figure 3-6
Installation Options
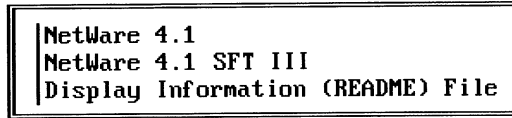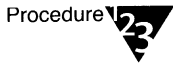
```
NetWare 4.1
NetWare 4.1 SFT III
Display Information (README) File
```

Procedure

Procedure

1. **Select "NetWare 4.1" and press** <Enter>.

   A menu appears displaying additional installation options

2. **Select "Custom Installation of NetWare 4.1" and press** <Enter>.

   A screen appears requesting a server name.

3. **Type the server name in the field provided and press** <Enter>.

   For help on rules for naming servers, press <F1>.

   A new screen appears displaying a randomly generated IPX internal network number, an ID number that identifies and advertises this server on the network.

4. **Either accept the randomly generated IPX internal network number or enter a new one, and press** <Enter>.

   You can't assign an IPX internal network number of "0" or "FFFFFFFF."

   For more information on the IPX internal network number, see "IPX internal network number" in the *Concepts* manual, which is available online.
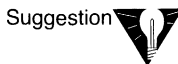
   Suggestion For future reference, record your IPX internal network number on the NetWare 4.1 Server Worksheet on page 179.

5. **Continue with "Copy Server Boot Files to the DOS Partition," on page 83.**

Copy Server Boot Files to the DOS Partition

A screen similar to the one below shows the default path and destination directory that the server boot files will be copied to.

Figure 3-7
**The Source and
Destination Paths**

```
Source path:   D:\NW410\INSTALL\ENGLISH
```

```
Destination path:  C:\NWSERVER
```

Procedure

Procedure

1. **Accept or change the default destination path and copy the files.**

If you want to	Then
Copy the boot files to the default destination directory created for you	Press <Enter>.
Copy the boot files to a destination directory of your own choice	Press <F4>, type a directory path and name, press <Enter>, choose "Yes," and press <Enter> again.

2. **(Conditional) If you are installing from floppy diskettes, insert the NetWare diskettes into drive A: as prompted and press <Enter>.**

3. **Continue with "Specify Language and Filename Format Information," on page 84.**

Specify Language and Filename Format Information

Once all files are copied, the "Language Configuration" screen appears with the "Country Code" field highlighted.

```
Country Code:          001   (United States)

Code Page:             437   (United States English)

Keyboard Mapping:      None

              Press <Enter> here, to continue
```

Note ▼ For information on any of the settings in this screen, press <F1> or refer to your DOS manual.

Procedure
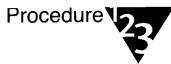
Procedure ▼ 1. **Specify the country code, code page, and keyboard mapping.**

Use the Up- and Down-arrow keys to maneuver through the screen.

1a. **(Conditional) If the country code setting is *not* correct, press <Enter> to view options and select an applicable country code.**

The "Code Page" field is highlighted.

1b. **(Conditional) If the code page setting is *not* correct, press <Enter> and select an applicable code page.**

The "Keyboard Mapping" field is highlighted.

1c. **(Conditional) If you do *not* have a standard U.S. English keyboard, press <Enter> and select an applicable keyboard type.**

2. Press <F10> to continue.

The following screen appears.

```
┌──────────────────────────────────────────────────────┐
│ ▌DOS Filename Format (recommended)                     │
│  NetWare Filename Format                               │
└──────────────────────────────────────────────────────┘
```
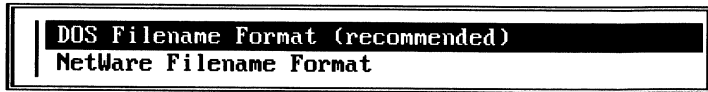
This screen allows you to indicate acceptable naming conventions for all files stored in the DOS name space on the server.

Selecting "DOS Filename Format" limits you to using valid DOS filename characters according to the country code and code page selections in Step 1a and Step 1b, respectively.

Limiting the server to valid DOS filename characters prevents workstations using NETX shells (rather than VLMs) from creating files using nonstandard DOS filename characters.

Selecting "NetWare Filename Format" allows you to use NetWare-acceptable characters that may or may not be valid DOS filename characters.

3. Select the filename format you need and press <Enter>.

You are asked if you want to specify startup SET commands.

4. **Select "Yes" or "No."**

   Selecting "Yes" brings up an edit box for entering the startup commands.

   If you have disk, CD-ROM, or other devices that use ASPI, you should add the following line to your STARTUP.NCF file:

   SET RESERVED BUFFERS BELOW 16MB = 200

   Note ▼ To see if your device uses ASPI, refer to the device documentation.

5. **(Conditional) If you specified any startup SET commands in Step 4, save them by pressing <F10>.**

6. **(Optional) Add SERVER.EXE to your AUTOEXEC.BAT file.**

If you choose	Then
Yes	SERVER.EXE runs automatically when you reboot the computer.
No	The DOS prompt appears whenever you reboot and you must type SERVER in the directory containing SERVER.EXE.

   The installation program now executes SERVER.EXE and INSTALL.NLM.

7. **Continue with "Load the Disk Drivers and CD-ROM Drivers" on page 87.**

Load the Disk Drivers and CD-ROM Drivers

The following screen appears.

Figure 3-10
Select Your Disk
Driver

```
┌─┬─────────────┬──────────────────────────────────────────────────────────┐
│▲│ISADISK.DSK  │Novell ISADISK (AT Compatible Driver)                     │
│ │MNS16S.DSK   │Mountain Network Solution, Inc - SCSI Controller Driver   │
│ │MNS8MM.DSK   │Mountain Network Solution, Inc - 8MM Device Driver        │
│ │MNSDAT.DSK   │Mountain Network Solution, Inc - SCSI DDS DAT Device Driver│
│ │NWPA.DSK     │Novell NPA (NetWare Peripheral Architecture) Support Module│
│▼│PM11NW40.DSK │DPT PM2011 HBA Driver                                     │
└─┴─────────────┴──────────────────────────────────────────────────────────┘
```

Warning ▼ If you are installing from CD-ROM and the CD-ROM drive is connected to a SCSI adapter shared by another internal or external device (hard disk, tape device, etc.), you may experience a keyboard lockup problem while loading drivers or copying files.

If this occurs, contact your SCSI adapter manufacturer for updated drivers.

A disk driver enables communication between the disk controller and the server's CPU. Similarly, a CD-ROM driver enables communication between the CD-ROM and the server's CPU.

In some cases, you will need to select a CD-ROM driver as well as a disk driver.

Determine Your Driver Architecture

In earlier versions of NetWare 4, a single disk driver (a .DSK file) served as the single interface between the NetWare operating system and all devices on the interface adapter. This is known as *monolithic architecture*.

NetWare 4.1 introduces NetWare Peripheral Architecture™ (NPA), which diverts the disk driver interface responsibilities to two new modules: a Host Adapter Module (HAM) and a Custom Device Module (CDM).

You can install your NetWare 4.1 server using either the traditional monolithic architecture (which uses the .DSK drivers) or the NPA. For a quick overview of the advantages and disadvantages of using monolithic architecture and NPA, see the table below.

Table 3-1
Disk Driver Architecture Overview

Architecture Type	Advantages	Disadvantages
Monolithic (.DSK)	Has been around much longer. Individual drivers have been tested for compatibility by both Novell and third-party manufacturers.	Requires a compliant driver to run all hardware devices connected to the adapter.
NetWare Peripheral Architecture (NPA)	Each hardware device connected to the adapter uses an individual CDM, which makes it better designed for scalability. Will be the principle disk driver architecture in future releases of NetWare.	New architecture. Has not gone through extensive third-party testing.

For a detailed discussion of each architecture type, read the following sections and determine the driver architecture you want before following the procedures on page 92.

Monolithic Architecture

As stated earlier, monolithic architecture uses a single disk driver (a .DSK file) as the single interface between the NetWare operating system and all devices on the interface adapter.

You may use this architecture, provided that the disk driver supports all connected hardware devices.

Each NetWare 4.1 monolithic disk driver has an individual description that appears on the screen as you highlight the driver. Refer to these descriptions or to Table 3-2 to determine which driver to load.

Table 3-2
Novell Monolithic Disk Drivers

Computer architecture	Controller	Disk driver you must load
Industry Standard Architecture (ISA)	AT	ISADISK
	IDE (ATA)	IDE
Microchannel	ESDI	PS2ESDI
	IBM SCSI	PS2SCSI
Extended Industry Standard Architecture (EISA)	AT class	ISADISK
	IDE (ATA)	IDE
	EISA vendor proprietary	See vendor

For example, if you have an ISA computer, you need to load the IDE disk driver.

Besides Novell® drivers, additional third-party drivers are also included with NetWare 4.1.

Important ▼ If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

NetWare Peripheral Architecture (NPA)

NPA allows for broader driver support for host bus adapters and connected hardware devices.

NPA separates NetWare driver support into two components: a Host Adapter Module (HAM) and a Custom Device Module (CDM). The HAM is the component used to drive the host bus adapter hardware. The CDM is the component used to drive hardware devices attached to a host adapter bus.

The main advantage of using NPA over monolithic architecture is that NPA is better designed for scalability.

When you want to connect a new hardware device to the host bus adapter, you need to load only the appropriate CDM for that hardware device (in addition to the HAMs and CDMs already loaded), not a compatible disk driver to run *all* hardware devices connected to the adapter.

HAMs and CDMs are loaded the same way you load other disk drivers. The difference is that you load a HAM for the adapter in your server, and a CDM for each device type attached to the adapter.

When the first HAM is loaded, the NWPA.NLM is loaded automatically. NWPA.NLM is an interface between the NPA and the Media Manager. The Media Manager provides a storage management interface between applications and storage device drivers.

Once the HAM and NWPA.NLM are loaded, the server is scanned for new devices. Based on what new devices are found, the appropriate Novell CDMs are then loaded. Standard Novell CDMs are listed in Table 3-3 on page 91.

If you are using a third-party CDM, rather than one of the Novell standard CDMs, it must be loaded manually.

A description of NetWare 4.1 HAMs and CDMs appears on the screen as you highlight the driver.

Table 3-3

Novell NPA Disk Drivers, HAMs, and CDMs

Computer architecture	Controller	HAM you must load	Novell CDM that is loaded
Industry Standard Architecture (ISA)	AT class IDE (ATA)	IDEATA.HAM	IDEHD.CDM (For a hard disk)
	Adaptec 154X	SCSI154X.HAM	SCSIHD.CDM (For a hard disk) SCSICD.CDM (For a CD-ROM drive) SCSIMO.CDM (For a magneto-optical drive) SCSI2TP.CDM (For a tape device)
Microchannel	IBM SCSI	SCSIPS2.HAM	SCSIHD.CDM (For a hard disk) SCSICD.CDM (For a CD-ROM drive) SCSIMO.CDM (For a magneto-optical drive) SCSI2TP.CDM (For a tape device)
Extended Industry Standard Architecture (EISA)	AT class IDE (ATA)	IDEATA.HAM	IDEHD.CDM (For a hard disk)
	Adaptec 154X	SCSI154X.HAM	SCSIHD.CDM (For a hard disk) SCSICD.CDM (For a CD-ROM drive) SCSIMO.CDM (For a magneto-optical drive) SCSI2TP.CDM (For a tape device)
	EISA vendor proprietary	See vendor	See vendor

For more information about the NPA, refer to "NetWare Peripheral Architecture" in *Concepts*.

Procedure

If more than one hard disk of the same type is installed in your computer, and if the disks are both connected to the same disk controller, load only one disk driver. If the disks are connected to different controllers, load the driver multiple times or load additional disk drivers.

Procedure **1. Choose your disk driver.**

If	Then
The driver is listed	Choose the appropriate disk driver and continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts. Then skip to Step 3.

The selected disk driver is then copied to the server boot directory before it is loaded.

2. View the displayed parameter settings and verify that they are correct.

If you want to	Then
Accept the default values	Select "Save Parameters and Continue."
Change the defaults because they do not match the installed hardware	Choose "Select/Modify Driver Parameters and Continue."

A prompt appears asking if you want to load any additional disk drivers.

If you want to	Then
Load additional disk drivers, or load separate CD-ROM drivers	Select "Yes" and press <Enter>. Then repeat Steps 1 and 2. Once all appropriate disk drivers have been selected, continue with Step 3.
Proceed without loading additional disk drivers	Continue with Step 3.

3. **Continue with "Load the LAN Drivers and Protocols," on page 94.**

Load the LAN Drivers and Protocols

After you load your disk drivers, the following screen appears, ready for you to choose your LAN drivers.

Figure 3-11
Select Your LAN Drivers

▲ **NE2000.LAN**	**Novell Ethernet NE2000**
NE2100.LAN	Ansel M2100 All-In-One-Networking
NE2100.LAN	EXOS 105
NE2100.LAN	Novell Ethernet NE2100
NE2100.LAN	Wearnes 2110T or Wearnes 2107C
▼ NE2_32.LAN	Novell Ethernet NE/2-32

Your choice of LAN drivers depends on the cabling system and the network board you are using. Loading a LAN driver establishes a network connection (if the server is physically connected to the network cabling.)

Most NetWare 4.1 LAN drivers have an individual description that appears on the screen after you choose the driver. Refer to Table 3-4 on page 95 and to the on-screen descriptions to determine which LAN driver to load.

Important ▼ If you experience problems with third-party drivers, contact the manufacturer listed in the driver description that appears as you highlight the driver.

Table 3-4
Novell LAN Drivers

Cabling system	Network board	LAN driver you must load
ARCnet	RX-Net	TRXNET.LAN
	RX-Net II	
	RX-Net/2	
Ethernet	NE/2 NE/2T	NE2.LAN
	NE/2-32	NE2_32.LAN
	NE1000 - ASSY 950-054401 NE1000 - ASSY 810-160-001	NE1000.LAN
	NE2000 - ASSY 810-149 NE2000T - ASSY 810-000220	NE2000.LAN
	NE2100 - ASSY 810-000209	NE2100.LAN
	NE1500T - ASSY 810-000214 (twisted-pair version of NE2100)	NE1500T.LAN
	NE3200	NE3200.LAN
	NE32HUB	NE32HUB.LAN
Token Ring	NTR2000	NTR2000.LAN

For example, if you have a Novell NE2100™ network board installed in your computer, you must load the NE2100.LAN driver.

Procedure

Procedure ▼

1. **Choose your LAN driver.**

If	Then
The driver is listed.	Choose the appropriate LAN driver and continue with Step 2.
The driver is not listed.	Press <Ins> and follow the prompts.
	Then continue with Step 2.

The selected LAN driver is then copied and stored temporarily in the C: drive before it is loaded. The following screen appears.

Figure 3-12
Available Protocols and LAN Driver Parameters Are Displayed

```
┌──────────── NE2000_2 Protocols ────────────┐
│ ───   IPX (always selected)                 │
│ [ ]   TCP/IP                                │
│ [ ]   AppleTalk                             │
└─────────────────────────────────────────────┘

┌──────────── NE2000_2 Parameters ───────────┐
│                                           ▲ │
│ Interrupt number:     3                   ▌ │
│ Port value:           300                   │
│ Node Address:                               │
│ Retries:              5                    ▼ │
└─────────────────────────────────────────────┘
```

2. **(Conditional) If you want your server to load additional network protocols, in addition to IPX, choose "Select/Modify Driver Parameters and Protocols" from the "Parameter Actions" menu.**

Note ▼

Protocols selected here will be nonrouting. If you want to configure routing protocols, you will need to do so through the "Configure Network Protocols" option, which is available after the server is installed. See "Configure Network Protocols," on page 173.

The cursor is placed in the protocol form displayed at the top of the screen.

2a. Press <Enter> **to select or deselect protocols.**

2b. If you selected TCP/IP in Step 2a, enter the IP address and IP mask numbers and press <F10>.

3. (Optional) If you want to choose specific IPX frame types for the server, press <F3>.

A list of frame types appear.

Note ▼ NetWare 4.1, by default, loads all applicable frame types, but will bind to only the frame types found on the network. Once the server is rebooted, only bound frame types are loaded.

By making selections in this list, you indicate specifically the frame types you want bound to IPX.

3a. Select the desired frame types by pressing <Enter>.

3b. Press <F10> **to save the frame type settings.**

4. View the displayed LAN driver parameters and verify that they are correct.

If you want to	Then
Accept the default values	From the "LAN Board Actions" menu, choose "Save Parameters and Continue."
Change the defaults because they are either incomplete, or they conflict with other hardware settings	From the "LAN Board Actions" menu, choose "Select/Modify Driver Parameters and Protocols."
	Use the Down-arrow key to advance to the "*Board* Parameters" screen.
	Enter the correct parameter settings in the appropriate fields.
	Choose "Save Parameters and Continue."

A prompt appears, asking if you want to load any additional network drivers.

5. Choose whether to load additional LAN drivers.

If you want to	Then
Load additional network drivers	Select "Yes" and press <Enter>. Then repeat Steps 1 through 4.
	Once all appropriate network drivers have been selected, continue with Step 6.
Proceed without loading additional network drivers	Continue with Step 6.

The "Choose the Server Drivers—Summary" screen appears with the selected disk and LAN drivers displayed.

Figure 3-13
Selected Drivers Are Displayed Prior to Being Loaded

```
                                              ────── Driver Names ──────
Disk and CD-ROM Drives:                           > IDE

Network (LAN) Drives:                             > NE2000
```

6. Choose "Continue installation" from the "Driver Actions" menu.

If you are installing from CD-ROM, the following screen may appear.

Figure 3-14
You Can Try to Mount the CD-ROM as a NetWare Volume

```
╔════════════════════════════════════════════════╗
║              Select an action:                   ║
╟──────────────────────────────────────────────────╢
║Continue accessing the CD-ROM via DOS             ║
║Try to mount the CD-ROM as a NetWare volume       ║
╚════════════════════════════════════════════════╝
```

7. (Conditional) If you are installing from CD-ROM and the menu in Figure 3-14 appears, choose one of the menu options.

If a disk or CD-ROM driver you selected earlier conflicts with the DOS CD-ROM driver, your keyboard may lock up during installation.

To avoid this, you can attempt to mount the CD-ROM as a NetWare volume. In doing so, you may be prompted to install new disk or CD-ROM drivers.

For each frame type found on the network, a screen appears informing you that the frame type will be bound to IPX.

Figure 3-15
A Screen Appears for Each Frame Type
Found on the Network

```
IPX will be bound to driver NE2000, frame type Ethernet_802.2

For your information:
      IPX external network (this frame type):   00D0C200
      Server IPX internal network number:       2D4D3127
      Network interface board node address:     3C99E2007870

Press <Enter> to continue.
Press <F3> if you do NOT want to bind IPX.
      Note: You should always bind unless you plan to
      bind to a different protocol later.
```

Suggestion

You should record the displayed IPX external network address, server IPX internal network number, and network board node address in the NetWare 4.1 Server Worksheet on page 179.

8. **(Conditional) If you selected frame types using the <F3> key in Step 3, you may be prompted to enter the IPX external network number for each frame type.**

9. **Press <Enter> to bind IPX with the listed information.**

   If you do not want to bind IPX with the listed information, press <F3>.

10. **Continue with "Create NetWare Disk Partitions" on page 100.**

Create NetWare Disk Partitions

The following screen appears, ready for you to create NetWare disk partitions.
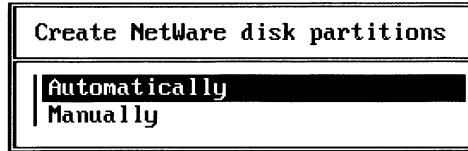
```
╔══════════════════════════════════════╗
║  Create NetWare disk partitions      ║
╠══════════════════════════════════════╣
║ ┃Automatically                     ┃ ║
║ ┃Manually                          ┃ ║
╚══════════════════════════════════════╝
```

Every NetWare 4.1 server needs a disk partition for NetWare files and shared data. You can have only one NetWare 4.1 disk partition per disk, but you can have up to eight volume segments on the NetWare disk partition.

If your server's boot hard disk has a DOS partition, use the rest of the disk space as a NetWare disk partition.

Figure 3-17
Disk Partitions and
Volumes on an
Internal Hard Disk

☐ NetWare disk partition

■ DOS partition

Volumes
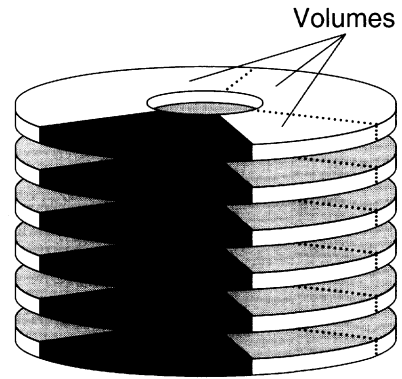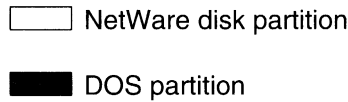
Internal hard disk

The Custom Installation option offers two ways of creating NetWare disk partitions, automatically and manually.

If	Choose
You want NetWare to create NetWare disk partitions in the available disk space without the option of mirroring or duplexing the disks	Automatically (see "Create NetWare Disk Partitions Automatically" on page 101).
◆ You want to specify the size of the NetWare partition ◆ You need room for other operating systems on the disk ◆ You want to mirror or duplex disk partitions (this is possible only if you have more than one disk and have more than one disk controller) ◆ You want to change the size of the Hot Fix Redirection Area ◆ You want to selectively delete current disk partitions	Manually (see "Create NetWare Disk Partitions Manually" on page 102).

Create NetWare Disk Partitions Automatically

This option automatically creates a NetWare disk partition in the available disk space on each disk.

◆ On the *boot* disk, a NetWare partition is created on the disk space not occupied by the DOS partition. If you indicate you want to delete existing partitions, any existing NetWare partitions (but not DOS partitions) will be destroyed.

◆ On *other* disks, all disk space is allocated to the NetWare partition.

Procedure
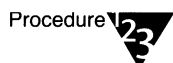
Procedure

1. **From the "Create NetWare Disk Partitions" menu, choose "Automatically."**

2. **Go to "Manage NetWare Volumes" on page 108.**

Create NetWare Disk Partitions Manually

Procedure

Procedure
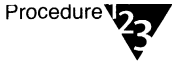
1. From the "Create NetWare Disk Partitions" menu, choose "Manually" and press <Enter>.

2. From the "Disk Partition and Mirroring Options" menu, choose "Create, Delete, and Modify Disk Partitions" and press <Enter>.

3. (Conditional) If you have more than one disk, from the "Available Disk Drives" menu, choose the disk you need to partition and press <Enter>.

4. Choose "Create NetWare Disk Partition" and press <Enter>.

   NetWare allows only one NetWare partition per disk.

5. In the "Disk Partition Information" screen, specify the size of the NetWare partition (in megabytes) and press <Enter>.

Figure 3-18
The "Disk Partition Information" Screen

```
┌─────────────────────────────────────────────────────────┐
│              Disk Partition Information                  │
├─────────────────────────────────────────────────────────┤
│  Partition Type:         NetWare partition              │
│                                                          │
│  Partition Size:         456 cylinder,      ▐69.5▌ MB   │
│                                                          │
│  Hot Fix Information:                                    │
│    Data Area:            17428 blocks,       68.1 MB    │
│    Redirection Area:     356   Blocks,        2.0 %     │
└─────────────────────────────────────────────────────────┘
```

The Hot Fix information is adjusted automatically. NetWare adjusts the percentage for Hot Fix according to the disk capacity.

For more information on Hot Fix, see "Data protection" or "Hot Fix" in *Concepts*.

Note ▼ Many disk drive manufacturers advertise drive sizes in millions of bytes (for megabytes) or billions of bytes (for gigabytes). However, NetWare reports the drive size in true megabytes (1,048,576 bytes).

If the drive size for a NetWare partition appears smaller than expected, this is most likely the reason.

In addition, NetWare disk space does not show the disk space allocated for Hot Fix (the Hot Fix Redirection Area).

6. **(Conditional) If necessary, change the size of either the data area (in megabytes) or the Hot Fix Redirection Area (in percentage of disk partition size) and press <Enter>.**

If you change one of the fields, the installation utility calculates the space remaining for the other field.

7. **To save and continue, press <Esc>.**

8. **When prompted to "Create NetWare Partition?" choose "Yes" and press <Enter>.**

9. **(Optional) If you want to create NetWare partitions on multiple drives, press <Esc> and then repeat Steps 3 through 8.**

10. **If you want to mirror or duplex disks, continue with "Mirror or Duplex NetWare Disk Partitions (Optional)," on page 104. If you don't want to mirror disk partitions, press <Esc>, select "Continue with Installation," and go to "Manage NetWare Volumes" on page 108.**

Mirror or Duplex NetWare Disk Partitions (Optional)

NetWare 4.1 protects data from hard disk failure by letting you duplicate (mirror) one hard disk's data on one or more other hard disks.

Then, if one of the disks fails and cannot be accessed by the server, you can continue to work from the functional disk.

You can safeguard your data in either of two ways.

◆ **Mirroring**. The operating system stores duplicate data on two disks using the *same* controller.

◆ **Duplexing**. The operating system stores duplicate data on two disks using *different* controllers.

Duplexing offers better protection because losing two disk controllers simultaneously is even less likely than losing two hard disks.

Note ▼ Mirroring and duplexing options are available only on systems having more than one hard disk.

Mirroring and duplexing are illustrated in the following figure.

Figure 3-19
Mirroring and
Duplexing

Mirroring   Duplexing
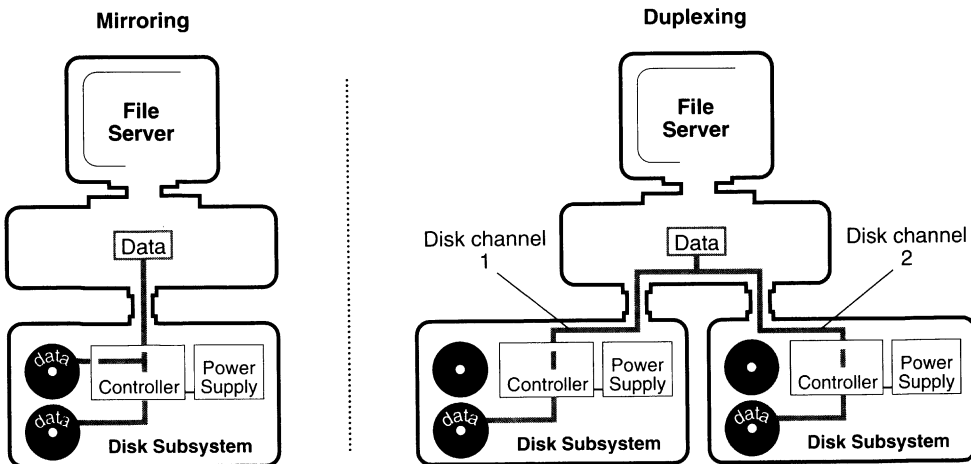
Consider the following as you mirror or duplex your hard disks:

◆ The installation processes for mirroring and duplexing are the same.

◆ Partition sizes of the mirrored or duplexed hard disks should be similar. Otherwise, any remaining space on the larger partition is wasted, since NetWare makes adjustments so that the mirrored partitions are exactly the same size.

◆ Two mirrored partitions are usually sufficient, but you can mirror as many as eight partitions.

◆ Which hard disks you mirror depends on how you decide to set up volumes on the server. See "Suggestions for Creating Volumes" on page 109

Important▼ Before mirroring or duplexing a hard disk, back up your data.

Procedure

Procedure▼ 1. **From the "Disk Partition and Mirroring Options" menu, choose "Mirror and Unmirror Disk Partition Sets" and press** <Enter>.

The "Disk Partition Mirroring Status" screen appears.

Figure 3-20
The "Disk Partition Mirroring Status" Screen

```
┌─────────────────────────────────────────┐
│   Disk Partition Mirroring Status       │
├─────────────────────────────────────────┤
│ Not Mirrored:            Device 0       │
│ Not Mirrored:            Device 1       │
│ Not Mirrored:            Device 2       │
│ Not Mirrored:            Device 3       │
└─────────────────────────────────────────┘
```

The "Disk Partition Mirroring Status" screen displays one of the following conditions for each disk partition.

Status	Explanation
Not Mirrored	The disk partition is not currently mirrored to another partition.
Mirrored	The disk partition is currently mirrored to another disk partition.
Out Of Sync	The disk partition was previously mirrored to another disk partition, but mirroring isn't currently active. The disk partition can't be accessed until mirroring is restored. Press <F3> to restore mirroring.
Remirroring	The partitions are being remirrored.

All disk partitions will initially appear as "Not Mirrored."

2. **Choose one of the disk devices (disk partitions) you want to mirror or duplex and press** <Enter>.

   The partition you choose becomes the primary partition of the mirrored set. (See "Device numbering" in *Concepts* for an explanation of how logical partitions relate to the installed hard disks.)

   A list of disk partitions on the selected disk device appears.

3. **Press** <Ins> **to access the "Available Disk Partitions" list.**

4. **Select the disk partition you want to mirror to the device (disk partition) you chose in Step 3, and press** <Enter>.

   If this disk partition is smaller or larger than the disk partition it will be mirrored to, the following message appears:

   ```
   The selected NetWare disk partition is larger/
   smaller than the original NetWare partition. These
   partitions must be the same size in order to be
   mirrored. Press <Enter> to continue.
   ```

4a. (Conditional) Press <Enter> **to continue.**

The "Change the Selected NetWare Disk Partition's Size?" prompt then appears.

4b. (Conditional) Choose "Yes" to make the partitions the same size and press <Enter>.

NetWare automatically adjusts the size of the larger disk partition to match that of the smaller partition.

The "Mirrored NetWare Disk Partitions" menu appears.

5. Press <F10> **to return to the "Disk Partition Mirroring Status" screen.**

The "Disk Partition Mirroring Status" screen displays those disk partitions that are mirrored to each other.

For example, if you mirrored disk (device) 0 to disk (device) 1, the "Disk Partition Mirroring Status" screen would appear similar to the one below.

Figure 3-21
The "Disk Partition Mirroring Status" Screen

```
╔════════════════════════════════════════════╗
║       Disk Partition Mirroring Status       ║
╟────────────────────────────────────────────╢
║ Not Mirrored:                    Device 2    ║
║ Mirrored:                        Device 0,1  ║
╚════════════════════════════════════════════╝
```

6. Press <F10> **to return to the "Disk Partition and Mirroring Options" menu.**

7. Select "Continue with Installation" and press <Enter>.

8. Continue with "Manage NetWare Volumes" on page 108.

Manage NetWare Volumes

The "Manage NetWare Volumes" screen lists the volumes the installation utility creates for you unless you change the defaults. The number of volumes listed depends on the hard disks.

**Figure 3-22
"Manage NetWare
Volumes" Screen**

```
┌─────────────────────────────────────────────────────┐
│ Volume Name              Size (MB)                    │
├─────────────────────────────────────────────────────┤
│ SYS                      160 (new system volume)      │
│ VOL1                     260 (new volume)             │
│                                                       │
└─────────────────────────────────────────────────────┘
```

For servers with single hard disks, the installation utility assigns all disk space (except for a DOS partition) to a single volume SYS:. In the "Volume Disk Segment List" (see Figure 3-23 on page 111), volume SYS: is displayed as "Device 0."

For servers utilizing several hard disks, the installation utility creates one volume for each hard disk. In the "Volume Disk Segment List," additional volumes appear as "Device 1," "Device 2," etc.

Modify Volume Parameters

You can rename any of the volumes, except for volume SYS:. Having a volume SYS: is mandatory since it stores system information needed by NetWare.

You can also change the number and sizes of the volumes by deleting one or more of them and reallocating the resulting free space.

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We recommend allocating at least 75 MB of disk space to volume SYS:. However, you may need to allocate additional space in the following situations:

◆ You plan to install several "optional" files (NetWare OS/2 utilities, for example). If not enough volume space is available when file copying begins (see "Copy NetWare Files," on page 126), you are prompted to resize the volume before continuing with the file copy.

◆ You plan to print large files. NetWare needs additional storage space to spool these files.

◆ You plan to install a single language set of NetWare 4.1 online documentation and a single DynaText* viewer. (This requires approximately 60 MB of free space on volume SYS:.)

NDS and Volume SYS:

After you've installed NetWare Directory Services (see "Installing NetWare Directory Services" on page 130), each server's volume SYS: appears as *servername*_SYS in the Directory tree. This logical name is the name of the Volume object in the Directory tree.

For example, if you named the server TECHSERVER, its volume SYS: would appear as Volume object TECHSERVER_SYS in the Directory tree. The name of the physical volume, as seen from the server, still remains SYS:.

Suggestions for Creating Volumes

◆ Reserve volume SYS: for the NetWare files and create one or more additional volumes for applications and data.

◆ If fault tolerance is more important than performance, create one volume per disk.

◆ If performance is more important than fault tolerance, span one NetWare volume over many hard disks with one segment of the volume on each hard disk.

If any disk on a spanned volume fails, the whole volume is lost. Make sure you back up spanned volumes regularly so you can restore the entire volume (all its segments) from backup once the disk(s) is repaired or replaced.

◆ If both performance and fault tolerance are important, you can both span and duplex, but we recommend that you duplex *every* hard disk partition of the spanned volume. See "Mirror or Duplex NetWare Disk Partitions (Optional)" on page 104.

For maximum fault tolerant protection, we recommend purchasing NetWare SFT III.

◆ If your network includes workstations using an operating system that allows long filenames (such as Macintosh*), it is a good idea to create a separate volume for each operating system.

Long filenames (filenames longer than those allowed by DOS) take up disk space that is not required for DOS files. Also, you can isolate network problems more easily.

For example, if your network includes both DOS and Macintosh file types, you may want to create two volumes for data, DOSVOL: and MACVOL:. This way, you add name space only to those volumes whose files need it.

◆ If you are using the NetWare auditing feature and one volume will contain data to be reviewed by two or more auditors, you can (for security reasons) create a separate volume for each auditor.

For example, assume you plan to audit a volume that contains accounting and sales data, but plan to have two auditors do the work.

In this situation, if you are concerned about these auditors accessing each other's audit reports, you should create two separate volumes, one for accounting data and one for sales data.

Auditing rights for the file system are assigned per volume (after server installation) using the AUDITCON utility.

For more information, refer to Chapter 8, "Auditing Network Events," in *Supervising the Network*.

Modify the Size of a Volume Segment (Optional)

If you do not want to modify the size of a volume segment, you can go to any of the optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes and License Software," on page 123.

You can modify the size of an existing volume (a volume that's been saved to disk) only by deleting and re-creating it.

To modify a volume segment size (for example, to decrease the size of volume SYS: in order to create another volume), follow these steps.

Procedure

Procedure
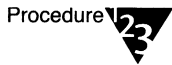
1. **In the "Manage NetWare Volumes" screen, press <Ins> or <F3>.**

   The "Volume Disk Segment List" screen appears.

Figure 3-23
The "Volume Disk Segment List" Screen

```
╔══════════════════════════════════════════════════════════════╗
║                  Volume Disk Segment List                     ║
╠══════════════════════════════════════════════════════════════╣
║  Device No.   Segment No.   Size (MB)   Volume Assignment   Status ║
║  0            0             477         SYS                 ES   ║
║  1, 2         0             146         GREEN               E M  ║
║  4, 3         0             146         HOOK                E M  ║
║                                                              ║
╚══════════════════════════════════════════════════════════════╝
```

2. **Choose the device number whose volume size you want to modify and press** <Enter>.

The "Disk segment parameters" list appears.

3. **In the "Disk Segment Size" field, type the new volume size in megabytes (or fraction thereof) and press** <Enter>.

4. **Press** <Esc> **to return to the "Volume Disk Segment List" screen.**

If you decrease the size of the volume, the remaining space appears as "free space." You can assign it to another volume by highlighting the "free space" listing and pressing <Enter>.

5. **Modify other volume parameters on pages 113 through 121, or press** <Esc> **and continue with "Save and Mount Volumes and License Software" on page 123.**

## Modify Volume Name (Optional)

If you do not want to modify the volume name, you can go to any of the optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes and License Software," on page 123.

Important Volume SYS: can't be renamed.

Procedure

Procedure
1. **In the "Manage NetWare Volumes" screen, choose the volume whose name you want to change and press <Enter>.**

   The "Volume Information" screen appears.

Figure 3-24
The "Volume Information" Screen

```
┌─────────────────────────────────────────────────┐
│                Volume Information                │
├─────────────────────────────────────────────────┤
│                                                  │
│   Volume Name:          EAGLE                    │
│                                                  │
│   Volume Block Size:    16 KB Blocks             │
│                                                  │
│   Status:               Not Mounted              │
│                                                  │
│   File Compression:     On                       │
│                                                  │
│   Block Suballocation:  On                       │
│                                                  │
│   Data Migration:       Off                      │
│                                                  │
└─────────────────────────────────────────────────┘
```

2. **Select the "Name" field in the "Volume Information" screen and press** <Enter>.

3. **Type in a new volume name and press** <Enter>.

   Press <F1> for naming rules.

4. **Either modify other volume parameters or press** <Esc> **to return to the list of volumes.**

   Unlike some parameter settings, which can be modified later, the following parameter settings can be modified *only* before volumes are saved and mounted:

   ◆ Enable/Disable File Compression (see page 115)

   ◆ Enable/Disable Block Suballocation (see page 119)

5. **Modify other volume parameters on pages 115 through 121, or press** <Esc> **and continue with "Save and Mount Volumes and License Software," on page 123.**

Modify Volume Block Size (Optional)

If you do not want to modify the volume block size, you can go to any of the optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes and License Software," on page 123.

The installation utility sets the following defaults for block size. These block sizes minimize RAM and disk space requirements for the volume sizes indicated.

Volume size	Block size
0 to 31 MB	4 KB or 8 KB
32 to 149 MB	16 KB
150 to 499 MB	32 KB
500+ MB	64 KB

Suggestion We recommend accepting these defaults, but there may be advantages to adjusting block sizes.

Small block sizes require more server memory to track the File Allocation Table (FAT) and Directory Entry Table (DET). Also, larger block sizes are best for large database records. Larger block sizes are preferred if block suballocation is enabled (see "Enable/Disable Block Suballocation (Optional)," on page 119).

Since you cannot change the block size once a volume is saved to disk, if you plan to eventually expand volumes, choose the block size according to the final predicted volume size.

Procedure
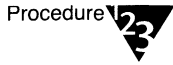
1. **In the "Manage NetWare Volumes" screen, choose the volume whose block size you want to change, and press** <Enter>.

   The "Volume Information" screen appears.

Figure 3-25
The "Volume Information" Screen

```
╔════════════════════════════════════════════════╗
║              Volume Information                  ║
╠════════════════════════════════════════════════╣
║                                                  ║
║   Volume Name:            EAGLE                   ║
║                                                  ║
║   Volume Block Size:      16 KB Blocks            ║
║                                                  ║
║   Status:                 Not Mounted            ║
║                                                  ║
║   File Compression:       On                     ║
║                                                  ║
║   Block Suballocation:    On                     ║
║                                                  ║
║   Data Migration:         Off                    ║
║                                                  ║
╚════════════════════════════════════════════════╝
```

2. **Use the arrow keys to highlight the "Volume Block Size" field and press** <Enter>.

3. **Choose a new block size and press** <Enter>.

   Note ▼

   Large block sizes (32 KB or 64 KB) can cause some DOS utilities to calculate the amount of free hard disk space incorrectly.

4. **Modify other volume parameters on pages 117 through 121, or press** <Esc> **and continue with "Save and Mount Volumes and License Software," on page 123.**

Enable/Disable File Compression (Optional)

If you do not want to enable or disable file compression, you can go to any of the optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes and License Software," on page 123.

If file compression is enabled, files in a volume that are not accessed for a specified amount of time are converted to a compressed state, thus saving disk space. A compressed file becomes uncompressed when it is accessed.

The default setting for file compression is "On."

File compression is enabled at the volume level. To set individual files in that volume either with or without compression, you must use the FLAG utility or the NetWare Administrator utility (after installation).

Warning ▼ Once file compression for a volume is enabled and volume information is saved to disk, you can't change the compression status of the volume. You must delete the volume and re-create it to change the file compression status.

Suggestion ▼ To maximize disk space, you should enable both file compression and block suballocation (see "Enable/Disable Block Suballocation (Optional)," on page 119).

For more information, see "File Compression" in *Concepts*, or "Using File Compression" in Chapter 7 of *Supervising the Network*.

Procedure

Procedure 23
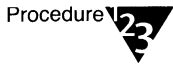
1. **At the "Manage NetWare Volumes" screen, choose the volume you want to change the file compression status for and press <Enter>.**

   The "Volume Information" screen appears.

Figure 3-26
The "Volume Information" Screen

```
╔════════════════════════════════════════════════╗
║              Volume Information                 ║
╠════════════════════════════════════════════════╣
║                                                 ║
║   Volume Name:            EAGLE                  ║
║                                                 ║
║   Volume Block Size:      16 KB Blocks           ║
║                                                 ║
║   Status:                 Not Mounted            ║
║                                                 ║
║   File Compression:       On                    ║
║                                                 ║
║   Block Suballocation:    On                    ║
║                                                 ║
║   Data Migration:         Off                   ║
║                                                 ║
╚════════════════════════════════════════════════╝
```

2. **Use the arrow keys to highlight the "File Compression" field and press <Enter>.**

   The "Select a Volume Compression Setting" screen appears.

3. **Toggle between "On" and "Off" by pressing <Enter>.**

4. **Modify other volume parameters on pages 119 through 121 or press <Esc> and continue with "Save and Mount Volumes and License Software," on page 123.**

Enable/Disable Block Suballocation (Optional)

If you do not want to enable or disable block suballocation, you can go to any of the optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes and License Software," on page 123.

Block suballocation allows the last part of several files to share one disk block, saving disk space.

Block suballocation divides any partially used disk block into 512-byte suballocation blocks. These suballocation blocks are used to share the remainder of the block with "leftover" fragments of other files.

For example, if block suballocation is not enabled, storing a 5KB file takes two 4KB blocks (on a volume with a 4KB block size); consequently, 3 KB of disk space is wasted.

With block suballocation enabled, the same 5KB file takes up only 5 KB of disk space: one 4KB block and two 512-byte suballocation blocks of another 4KB block. Subsequent files in need of suballocation blocks take them from this block as well, until the 4KB block is used up.

The default setting for block suballocation is "On."

Suggestion

To maximize disk space, you should enable *both* file compression and block suballocation.

If you are considering using High Capacity Storage System (HCSS) now or in the future, we recommend turning block suballocation and file compression off.

For more information, see "Block suballocation" in *Concepts*.

Procedure
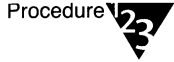
1. **In the "Manage NetWare Volumes" screen, choose the volume you want to change the block suballocation status for and press** <Enter>.

   The "Volume Information" screen appears.

Figure 3-27
The "Volume Information" Screen

```
╔══════════════════════════════════════════════╗
║              Volume Information                ║
╠══════════════════════════════════════════════╣
║                                                ║
║   Volume Name:          EAGLE                  ║
║                                                ║
║   Volume Block Size:    16 KB Blocks           ║
║                                                ║
║   Status:               Not Mounted            ║
║                                                ║
║   File Compression:     On                     ║
║                                                ║
║   Block Suballocation:  On                     ║
║                                                ║
║   Data Migration:       Off                    ║
║                                                ║
╚══════════════════════════════════════════════╝
```

2. **Use the arrow keys to highlight the "Block Suballocation" field and press** <Enter>.

   The "Select a Volume Compression Setting" screen appears.

3. **Toggle between "On" and "Off" by pressing** <Enter>.

4. **Continue with "Disable/Enable Data Migration (Optional)" on page 121, or press** <Esc> **and go to "Save and Mount Volumes and License Software," on page 123.**

Disable/Enable Data Migration (Optional)

If you do not want to enable or disable data migration, you can go to any of the optional procedures in this section, or you can continue the installation by going to "Save and Mount Volumes and License Software," on page 123.

Enabling data migration lets you migrate (move) data to an external storage device (disk, tape, optical disk), while the NetWare operating system still perceives the data as residing on the volume.

This frees up valuable hard disk space for frequently used files while still allowing access, though somewhat slower, to infrequently used files.

For example, a law firm might store case reports on a 500MB volume. They don't want to archive these files, because they might need any of them at any time. Any single case, however, has only a small chance of being used.

Enabling data migration allows this firm to call up to 256 GB of case data from their 500MB hard disk, when using Novell's High Capacity Storage System (HCSS). All cases are migrated and take only a few extra seconds to call up.

The default setting for data migration is "Off."

If you are planning to use an external storage system, this parameter must be set to "On."

Important If you are planning on moving files to an optical storage system (such as HCSS), set file compression and block suballocation to "Off" to allow HCSS to optimize disk storage.

For more information, see "Data migration" or "High Capacity Storage System" in *Concepts* and Chapter 6, "Migrating Data Using the High Capacity Storage System," in *Supervising the Network*.

Procedure
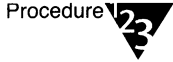
1. **In the "Manage NetWare Volumes" screen, choose the volume you want to change the data migration status for and press <Enter>.**

   The "Volume Information" screen appears.

**Figure 3-28
The "Volume
Information" Screen**

```
┌─────────────────────────────────────────────────┐
│              Volume Information                  │
├─────────────────────────────────────────────────┤
│                                                 │
│   Volume Name:              EAGLE               │
│                                                 │
│   Volume Block Size:        16 KB Blocks        │
│                                                 │
│   Status:                   Not Mounted         │
│                                                 │
│   File Compression:         On                  │
│                                                 │
│   Block Suballocation:      On                  │
│                                                 │
│   Data Migration:           Off                 │
│                                                 │
└─────────────────────────────────────────────────┘
```

2. **Use the arrow keys to highlight the "Data Migration" field and press <Enter>.**

   The "Select a Volume Compression Setting" screen appears.

3. **Toggle between "On" and "Off" by pressing <Enter>.**

4. **Continue with "Save and Mount Volumes and License Software," on page 123.**

Save and Mount Volumes and License Software

Prior to saving and mounting volumes and licensing the NetWare software, you should have made any desired modifications to the NetWare volumes settings.

Once a volume is saved and mounted, you cannot make modifications to the volume settings covered on pages 111 through 121 without deleting the volumes and re-creating them.

The "Manage NetWare Volumes" screen should be present on your screen.

Figure 3-29
Manage NetWare
Volumes Screen

```
Volume Name                 Size (MB)

  SYS                       160 (new system volume)
  VOL1                      260 (new volume)

```

Procedure

Procedure
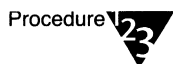
1. **While in the list of volumes, press <F10> to save all volume information.**

   A confirmation screen appears.

2. **Select "Yes" to save the volume changes.**

   After you have saved volume information to disk, the installation utility mounts all volumes to make them accessible to network users.

The following screen appears.

Figure 3-30
Insert the *License* Diskette When Prompted

```
The license file will be installed from drive A:. Insert disk "MAIN
SERVER LICENSE" (which contains the file "SERVER.MLS") into the drive.

Warning:  Do not try to install this same license on any
other server.
Doing so will cause a copyright violation warning to be issued.

    Press <F3> to specify a different path;
    Press <Enter> to continue.
```

3. **Insert your *License* diskette into drive A:.**

Important
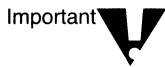
Be sure to keep your *License* diskette as a backup. You may need it in the future if your installed license should get corrupted.

A message appears that the server license was successfully installed.

4. **Remove the *License* diskette and store it in a safe place.**

5. **Continue by following the applicable path in the table below.**

| If you are installing from	Continue with
CD-ROM or diskettes	"Copy NetWare Files," on page 126.
A remote network installation area	"Establish Server-to-Server Session (Conditional)" on page 125.

Establish Server-to-Server Session (Conditional)

If you are installing from a remote network installation area, the following screen appears.

```
┌─────────────────────────────────────────────────────────────┐
│                                                              │
│  User Name: FSMITH                                           │
│                                                              │
│  Password: ███████████████████████████████████████████████  │
│                                                              │
│              Press <Enter> to continue and log in           │
│                                                              │
└─────────────────────────────────────────────────────────────┘
```

Procedure

Procedure

1. **Reenter your password to reconnect to the source server, and press** <Enter>

   When installing from a remote network installation area, a client connection to the source server is disrupted once the LAN driver is loaded.

   The path to the source server is recalled from memory, but the password must be reentered.

2. **Press** <Enter> **again.**

3. **Continue with "Copy NetWare Files," on page 126.**

Copy NetWare Files

This part of the installation automatically copies selected NetWare 4.1 system files and utilities to volume SYS:.

A screen appears prompting you to verify or change the source path.

```
NetWare files will be installed from path:

    D:\NW410\INSTALL\ENGLISH

If you are installing from CD-ROM or a network directory, make
sure the above path corresponds to the directory where the
NetWare server installation files are located. On CD-ROM this
will be path <drive_or_vol_name>:\NW410\INSTALL\<language_dir>.

    Press <F3> to specify a different path;
    Press <Enter> to continue
```

Procedure

Procedure
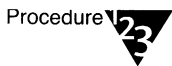
1. **Verify or change the source path and press** <Enter>.

2. **Continue with "Select Optional NetWare File Groups," on page 127.**

Select Optional NetWare File Groups

Once the selected system files and utilities have been copied, the following menu appears.

```
[X] NetWare DOS Utilities (12 MB)
[X] NetWare OS/2 Utilities (2 MB)
[X] NetWare MS Windows Utilities (4 MB)
[X] NetWare UNIX Utilities (1 MB)
[ ] Set up a Network Directory for Client Install (14 MB)
```
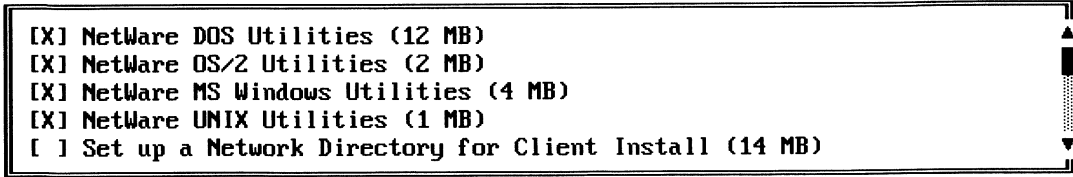
File groups such as those for NetWare workstation utilities can be copied to the SYSTEM, PUBLIC, LOGIN, and MAIL directories on volume SYS:. (These directories are created by NetWare.)

All file groups except for the language-specific files at the bottom of the menu are initially selected to be copied.

Procedure

Procedure
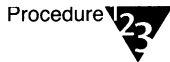
1. **Indicate which file groups you do *not* want to load by highlighting each group and pressing <Enter>.**

   For example, if you don't have any OS/2 client workstations in your internetwork, you probably do not want to take up disk space by copying OS/2 workstation utilities to the server. (You can selectively install OS/2 utilities, as well as all the other utilities, at a later date, if needed.)

To select a file group you previously deselected, press <Enter> again. An "*x*" appears next to the file group to indicate that it has been selected for copying to the server.

Note ▼ If you plan to access the server to make client diskettes, or to access the latest VLMs from the server, you should select "Set up a Network Directory for Client Install." This creates the CLIENT directory in SYS:PUBLIC where the client files are then stored.

2. **To start copying files, press** <F10>.

At this time, NetWare copies only the SYSTEM and LOGIN files necessary to continue the installation. Once NetWare Directory Services has been installed, the remaining files, including those selected in Step 1, are copied.

Figure 3-34
The Files Needed to Continue Are Copied

```
                    File Copy Status (Preliminary Copy)
   ██████████████████████████████
                              37%


   Filegroup: NetWare System Files
   Source path: D:NW410\INSTALL\ENGLISH
   Destination path: SYS:\PUBLIC\NLS\ENGLISH

   ┌──────────────────────────────────────────────────────┐
   │ →Copying file "DSI.NLM"                                │
   │ →Copying file "FILTSRV.NLM"                            │
   │ →Copying file "ICMD.NLM"                               │
   │ →Copying file "INETLIB.NLM"                            │
   │ →Copying file "INSTALL.NLM"                            │
   │ →Copying file "IPTUNNEL.LAN"                           │
   │ →Copying file "IPTUNNEL.LDI"                           │
   └──────────────────────────────────────────────────────┘
```
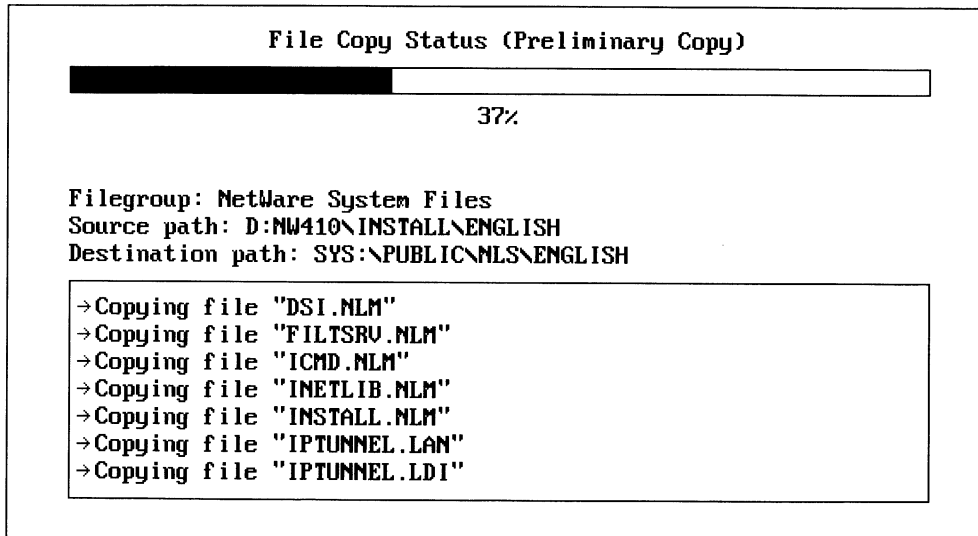
3. **(Conditional) If you are installing from diskettes, insert the NetWare diskettes you are prompted for into drive A: and press <Enter>.**

4. **(Conditional) If you selected the TCP/IP protocol in Step 2 on page 96, indicate whether you want to install NetWare IP™ from the menu below.**

Figure 3-35
You Are Given the Option to Install NetWare IP

```
┌─────────────────────────────────────┐
│ Do you want to install NetWare/IP?  │
├─────────────────────────────────────┤
│ No                                  │
│ Yes                                 │
└─────────────────────────────────────┘
```

You must have purchased NetWare/IP™ previously to install NetWare/IP at this time. NetWare/IP can also be installed later.

If you select "Yes," refer to the documentation that came with NetWare/IP to complete the NetWare/IP installation. Then return to this manual to complete the server installation.

5. **Continue with "Installing NetWare Directory Services" on page 130.**

Installing NetWare Directory Services

Once the preliminary files have been copied to the server, the network is scanned for Directory trees. Unless you are installing the first NetWare 4 server in the network, you will most likely want to install the server into an existing Directory tree.

Based on your network configuration, one of the following screens appears.

```
┌──────────────────────────────────────────────────┐
│        Is this the first NetWare 4 server?        │
├──────────────────────────────────────────────────┤
│ Yes, this is the first NetWare 4 server           │
│ No, connect to existing NetWare 4 network         │
└──────────────────────────────────────────────────┘
```
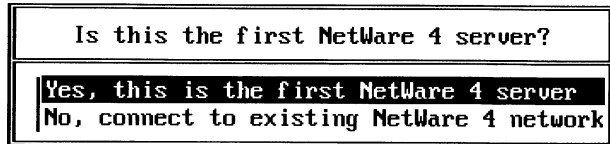
If no NetWare 4 server (and accompanying Directory tree) can be located on the network, the menu shown above appears.

If	Go to
The menu in Figure 3-36 appears	"A Nonlocatable Directory Tree, or the First Server," on page 132.

Figure 3-37
**When a Single
Directory Tree Is
Located**
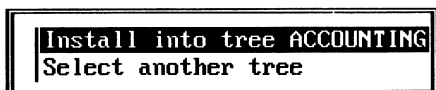
```
┌─────────────────────────────────┐
│ │Install into tree ACCOUNTING││
│ │Select another tree          ││
│ └─────────────────────────────┘│
└─────────────────────────────────┘
```

If a single Directory tree is located, the Directory tree name is displayed
as in the menu above.

If	Go to
The menu in Figure 3-37 appears	"A Single Directory Tree Is Found" on page 144.

Figure 3-38
**When Multiple
Directory Trees Are
Located**
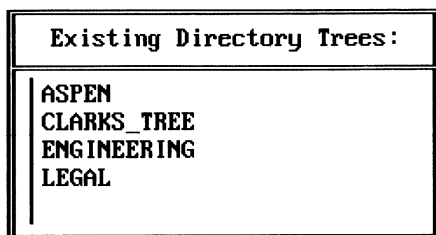
```
┌─────────────────────────────────┐
│    Existing Directory Trees:    │
├─────────────────────────────────┤
│ ASPEN                           │
│ CLARKS_TREE                     │
│ ENGINEERING                     │
│ LEGAL                           │
│                                 │
└─────────────────────────────────┘
```

If multiple Directory trees are located, the menu shown above appears.

If	Go to
The menu in Figure 3-38 appears	"Multiple Directory Trees are Found" on page 147.

A Nonlocatable Directory Tree, or the First Server

The menu below appears if there is no previously-installed NetWare 4 server, or the server you are installing cannot see the previously-installed NetWare 4 server(s).

Figure 3-39
When No Directory
Tree Is Located

```
┌─────────────────────────────────────────────┐
│     Is this the first NetWare 4 server?      │
├─────────────────────────────────────────────┤
│ Yes, this is the first NetWare 4 server      │
│ No, connect to existing NetWare 4 network    │
└─────────────────────────────────────────────┘
```
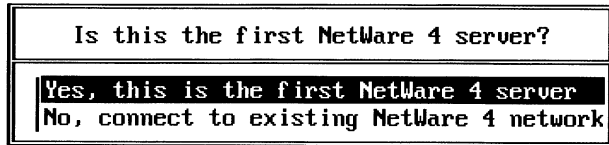
If the Server Cannot Locate a Directory Tree that Was Installed Previously

Procedure

Procedure

1. **From the "Is This the First NetWare 4 Server?" menu, choose "No, Connect to Existing NetWare 4 Network" and press <Enter>.**

   The following menu appears.

Figure 3-40
Select NetWare 4
Network Menu

```
┌─────────────────────────────────────────────────────┐
│            Select NetWare 4 Network                  │
├─────────────────────────────────────────────────────┤
│ Recheck for NetWare 4 network                        │
│ Specify NetWare 4 network name and server address    │
└─────────────────────────────────────────────────────┘
```

Note

You can find out the network name by loading MONITOR.NLM on an existing server on the network. The network name is the same as the Directory tree name.

2. Select one of the menu options.

If	Then
You have verified that an existing NetWare 4 server is up and physically connected to this server, and that both servers are bound to IPX with the proper LAN driver, frame type, and IPX external network number	Choose "Recheck for NetWare 4 Network" and press <Enter>. If a single Directory tree is located, go to "A Single Directory Tree Is Found," on page 144. If multiple Directory trees are located, go to "Multiple Directory Trees are Found," on page 147.
Your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server	Choose "Specify Address of NetWare 4 Server" and press <Enter>. Enter the name of the Directory tree and press <Enter>. Enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press <Enter>. If a single Directory tree is located, go to "A Single Directory Tree Is Found," on page 144. If multiple Directory trees are located, go to "Multiple Directory Trees are Found," on page 147.

If This Is the First NetWare 4 Server

Procedure

Procedure ▼
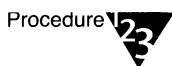
1. **Choose "Yes, This Is the First NetWare 4 Server" and press <Enter>.**

   The following screen appears, ready for you to name your new Directory tree.

Figure 3-41
Enter a name for the
Directory tree

```
╔══════════════════════════════════════════╗
║ Enter a name for this Directory tree       ║
╠══════════════════════════════════════════╣
║ >_                                         ║
╚══════════════════════════════════════════╝
```

For help on rules for naming a Directory tree, press <F1>.

2. **Specify the Directory tree name and press <Enter>.**

   Each Directory tree (hierarchy of the NetWare Directory database) must have a name that's unique across the internetwork. (Most organizations will have only one Directory tree.)

   The tree name

   ◆ Enables client workstations to access data on multiple servers in a Directory tree without logging in to each server.

   ◆ Enables client workstations to log in to different Directory trees by specifying the tree name.

Important ▼
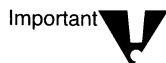
Each Directory tree has its own database of objects that is not visible from another tree. Be aware of this limitation before creating multiple Directory trees.

   Once a Directory tree name has been entered, a list of time zones appears. (This list does not contain all existing time zones.)

3. Set up time synchronization.

Time synchronization is important to NDS, because it

◆ Monitors and adjusts a NetWare server's internal time to ensure consistency of reported time across the network.

◆ Indicates when a server's time is synchronized with the rest of the network.

◆ Provides time stamps to establish the order of events in the Directory.

For more information on time synchronization, see "Understanding Time Synchronization in NDS" in *Introduction to NetWare Directory Services*, "Managing Network Time Synchronization" in Chapter 7 of *Supervising the Network*, and "Time synchronization" in *Concepts*.

To enable time synchronization, you need to specify

◆ What time zone the server will be in.

◆ What type of time server category this server falls into.

◆ Whether the server is in a zone that observes daylight saving time.

3a. Choose the time zone this server is installed in.

If the time zone	Then
Is listed	Move the cursor to the appropriate time zone and press <Enter>. Verify that the information presented is correct. If it is, press <F10> and skip to Step 4. If it isn't, follow Steps 3b through 3j to enter the correct information.
Is not listed	Press <Ins> and continue with Step 3b.

3b. At the "Time Configuration Parameters" screen, verify or specify time synchronization parameters.

The following screen appears. The cursor will be in the "Standard Time Zone Abbreviation" field.

Figure 3-42
Time Configuration Screen

```
┌─────────────────────────────────────────────────────────────────────┐
│          Verify/Enter Time Configuration Information for This Server  │
├─────────────────────────────────────────────────────────────────────┤
│                                                                       │
│  Time server type:              Single reference                      │
│                                                                       │
│  Standard time zone abbreviation:███████████████████                  │
│  Standard time offset from UTC:                                       │
│                                                                       │
│  Does your area have daylight saving time (DST):                      │
│  DST time zone abbreviation:                                          │
│  DST offset from standard time:                                       │
│  DST Start:                                                           │
│  DST End:                                                             │
│                                                                       │
└─────────────────────────────────────────────────────────────────────┘
```

3c. (Conditional) If you want to choose a different time server type, highlight the "Time Server Type" field and press <Enter>.

There are four time server types:

◆ Single Reference

◆ Reference

◆ Primary

◆ Secondary

The default sets the first NetWare 4.1 server in a Directory tree as a Single Reference server. All other servers default as Secondary servers.

Important

Do not change the time server defaults without a clear understanding of time server types. Press <F1> for help, or refer to "Time Servers" in Chapter 4 of *Introduction to NetWare Directory Services* for a description of these time server types.

3d. In the "Standard Time Zone Abbreviation" field, enter the three-letter abbreviation for your standard time zone and press <Enter>.

Not all time zones have agreed-upon abbreviations. Time zone information is subject to local custom and national rules. Find out what the commonly used abbreviation for your standard time zone is, or enter your own abbreviation.

The time information you specify is saved in this server's AUTOEXEC.NCF file. You can change it later by editing this file (see "Modify the AUTOEXEC.NCF File" on page 160).

3e. In the "Standard Time Offset from UTC" field, enter the offset (in hours) from UTC (Universal Coordinated Time, formerly known as Greenwich Mean Time) and press <Enter>.

If your time zone is east of UTC, use "AHEAD" with the number, since your time is ahead of UTC. For example, in Germany, you would type "1" and then press <Enter> to toggle to "AHEAD."

If your time zone is west of UTC, toggle to "BEHIND," because your time is behind UTC.

Use the following illustration to find your time zone's offset from UTC.

Figure 3-43
World Time Zones and Their Offsets
from UTC

World time zones
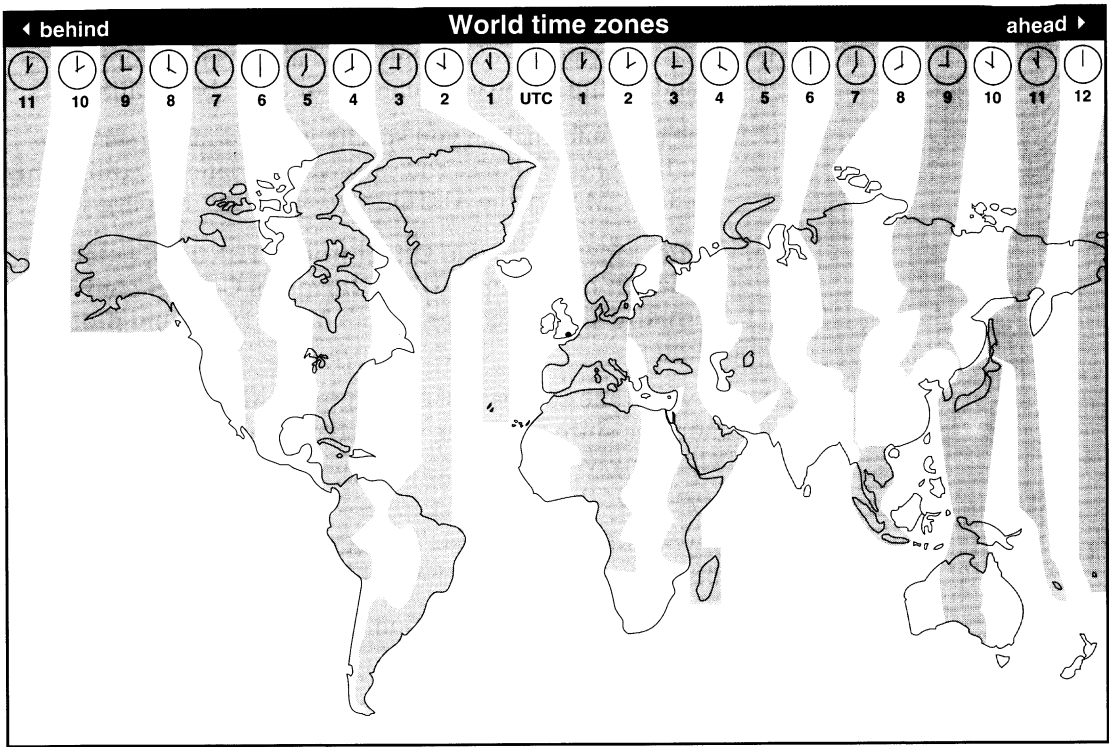
3f. In the "Does Your Area Have Daylight Saving Time (DST)"
field, press <Enter> and use the arrow keys to toggle
between "Yes" and "No."

Table 3-5
Daylight Saving Time Options

If	Then choose	And then
Your time zone switches to daylight saving time (and back to standard time) during each year	Yes	Continue with Step 3g.
Your time zone never switches to daylight saving time	No	Go to Step 3k.

3g. **In the "DST Time Zone Abbreviation" field, enter the three-letter abbreviation your time zone uses during daylight saving time and press** <Enter>.

If you do not specify the abbreviation for daylight saving time, the server won't automatically adjust for the seasonal change. Internal algorithms assume that if no DST abbreviation is specified, local custom is to not observe DST.

Not all time zones have agreed-upon abbreviations. Time zone information is subject to local custom and national rules. Find out what the commonly used abbreviation for your daylight saving time zone is, or enter your own abbreviation.

3h. **In the "DST Offset from Standard Time" field, enter the difference between standard time and daylight saving time and press** <Enter>.

Enter the offset in hours:minutes:seconds. The default is 1:00:00 (one hour) *ahead,* meaning that your daylight saving time is one hour ahead of your standard time.

If daylight saving time in your area varies from your standard time by more or less than the default (one hour), enter a different time offset.

3i. **In the "DST Start" field, specify the starting day for daylight saving time and press** <Enter>.

Follow the screen prompts to decide which format to use.

3j. **In the "DST End" field, specify the day daylight saving time ends and press** <Enter>.

Follow the screen prompts to decide which format to use.

3k. **Save the time configuration information by pressing** <F10> **and then** <Enter>.

4. Specify the server's (name) context.

The following screen appears, prompting you to specify the server's NDS context.

Figure 3-44
Server Context Screen

```
Company or Organization:
Level 1 (Sub)Organizational Unit (optional)
Level 2 (Sub)Organizational Unit (optional)
Level 3 (Sub)Organizational Unit (optional)

Server Context:

Administrator Name:
Password:
```

The server context, or name context, specifies where the server is located in the hierarchical Directory tree. The context is composed of

◆ A company or organization name (example: O=Novell).

◆ Optional names of organizational units and subunits, such as divisions or departments (example: OU=Sales).

◆ An optional country code (example: C=US).

Note ▼ For recommendations on how to lay out your Directory tree, see "Planning NetWare Directory Services Implementation" in Chapter 5 of *Introduction to NetWare Directory Services*.

For example, if your NetWare server were located in the "Sales_LA" group of the Sales department of a company called "Novell_US," the server's context would look like this:

● [Root]
   └ 🖧 Novell US
       └ 🖳 Sales
           └ 🖳 Sales LA
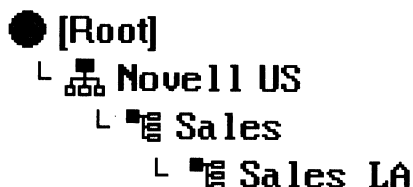
OU=Sales_LA.OU=Sales.O=Novell_US

Note ▼ The object "[Root]" is automatically created during NDS installation.

For more information on context and naming conventions, see "Understanding NetWare Directory Services" in Chapter 1 of *Introduction to NetWare Directory Services* and "Context" in *Concepts*.

4a. **In the "Company or Organization" field, type your company or organization name and press** <Enter>.

Only valid characters (letters A through Z or a through z, numbers 0 through 9, hyphen, underscore) may be used.

4b. **(Optional) In the "Level 1 (Sub)Organizational Unit" field, type in an Organizational Unit name (such as a division or a department) and press** <Enter>.

Use this name to further specify your Directory tree. This could be a division name, a locality name, a department name, or anything that reflects your organization's structure.

Notice that the information in the "Server Context" field is updated every time you enter a new name.

4c. **(Optional) In the "Level 2 (Sub)Organizational Unit" field, type in an additional Organizational Unit name and press** <Enter>.

4d. **(Optional) In the "Level 3 (Sub)Organizational Unit" field, type in an additional Organizational Unit name and press** <Enter>.

You can manually enter more than three levels of Organizational Units (up to 25) into the "Server Context" field. Make sure you enter a period (.) as a delimiter between each new name entry.

4e. (Optional) Return to the "Server Context" field and type a country code or additional Organizational Units and press <Enter>.

Enter the country code after the company name, separated by a period. For example, if your country is France, add ".C=FR" to the end of the server context.

Although a country code is not required, it can be useful in a multinational organization.

For a list of country codes, see Appendix B, "Country Codes," on page 281.

Important
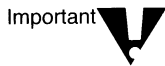
Adding a country name to the context may create some problems with default naming in some NetWare 4.1 utilities, because the utilities assume the highest level to be O=*organization*.

That means that if you use Country in the Directory tree, you always have to include name typing (CN=.OU=.O=) whenever you log in or refer to an object name in the tree, regardless of what context you or the other object are in.

For example, if you included the country code for the United States (US), the object name for Dave Smith might be

CN=DSMITH.OU=ACCOUNTING.O=NOVELL.C=US

For more information, see "Directory Objects" in *Introduction to NetWare Directory Services* and "CX" in *Utilities Reference*.

Note

If you want to establish more than three Organizational Unit levels, you can do so while in the "Server Context" field. For example, if you wanted to create a fourth Organizational Unit level in Figure 3-45, you would type OU=*organizational unit name* on the left end of the context.

5. **Record the administrator's name on the NetWare 4.1 Server Worksheet on page 179.**

The default common name (CN) for the administrator of the first NetWare 4.1 server in a Directory tree is ADMIN. The installation program creates this User object ADMIN directly under the Organization (O=) level.

The administrator can

◆ Manage this Server object.

◆ Manage User objects in this container.

◆ Manage the Directory tree (only applies to ADMIN created on the first NetWare 4.1 server).

You can change the name of user ADMIN using the NETADMIN (or NetWare Administrator) utility after the server is installed and you have set up a workstation.

6. **Type the administrator's password and press** <Enter>.

6a. **At the prompt, retype the password and press** <Enter>.

6b. **(Optional) Record the password on the NetWare 4.1 Server Worksheet on page 179.**

Note ▼ This password is also the password for the bindery user SUPERVISOR. If you change the administrator password later, the SUPERVISOR password will *not* change until you change it using the SYSCON utility.

7. **To save Directory information, press** <F10>.

A message appears indicating that NetWare Directory Services is being installed.

8. **Review "How Does the Directory Tree Appear Now?," on page 155 and "What Trustee Assignments were Created During the Installation?," on page 156. Then continue with "Modify the STARTUP.NCF File," on page 157.**

A Single Directory Tree Is Found

If, after scanning the network, a single Directory tree is found, the tree name is displayed along with the following menu.

Figure 3-46
When a Single Directory Tree Is Found

```
╔═══════════════════════════════════╗
║ Install into tree ACCOUNTING      ║
║ Select another tree               ║
╚═══════════════════════════════════╝
```

Procedure

1. Choose an option from the menu.

If	Then
You want to install into the displayed Directory tree	Go to "Install into the Displayed Directory Tree," on page 145.
You wish to install into a Directory tree that is not displayed	Go to "If the Server Cannot Locate a Directory Tree that Was Installed Previously," on page 132.
You want to create a new Directory tree	Choose "Select Another Tree" and press <Enter>. Press <Ins>. At the confirmation prompt, press <Enter>. Follow the procedures under "If This Is the First NetWare 4 Server," on page 134.

Install into the Displayed Directory Tree

Install the new NetWare 4.1 server into the Directory tree displayed in the menu below, by following the procedures that follow.

Figure 3-47
When a Single Directory Tree Is Found
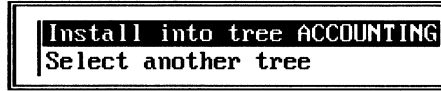
```
┌─────────────────────────────────┐
│ ┌─────────────────────────────┐ ║
│ │Install into tree ACCOUNTING│ ║
│ │Select another tree          │ ║
│ └─────────────────────────────┘ ║
└─────────────────────────────────┘
```

Important

Depending on its structure, the displayed Directory tree can be either a "simple" tree (only one level) or a "custom tree (multilevel).

Procedure

Procedure
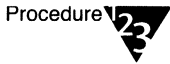
1. **Choose "Install into Tree** *tree name*" **and press** <Enter>.

   A list of time zones appear.

2. **Set up time synchronization by completing Step 3 on page 135.**

   After setting up time synchronization, one of the following screens appear.

Figure 3-48
When a Simple Directory Tree Is Found

```
┌─────────────────────────────────────────────────┐
║ Admin Password:                                 ║
└─────────────────────────────────────────────────┘
```
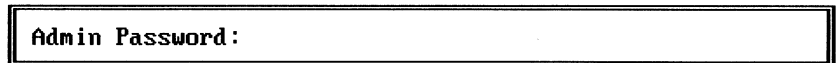
Figure 3-49
When a Custom Directory Tree Is Found

```
┌────────────────────────────────────────────────────────────────┐
│          Directory Services Login/Authentication               │
├────────────────────────────────────────────────────────────────┤
│ Administrator Name: CN=Admin.O=Novell                          │
│ Password:                                                      │
└────────────────────────────────────────────────────────────────┘
```

If	Then
The screen in Figure 3-48 appears	Type the administrator password and press <Enter>.
	Continue with"Modify the STARTUP.NCF File," on page 157.
The screen in Figure 3-49 appears	If necessary, type the administrator name and press <Enter>.
	Type the administrator password and press <Enter>.
	Go to page 141 and complete Steps 4a through 4e to set up the server's context.
	Then continue with"Modify the STARTUP.NCF File," on page 157.
The screen in Figure 3-48 appears and you want to customize the Directory tree	Press <F4>.
	If necessary, type the administrator name and press <Enter>.
	Type the administrator password and press <Enter>.
	Go to page 141 and complete Steps 4a through 4e.
	Then continue with "Modify the STARTUP.NCF File," on page 157.

Multiple Directory Trees are Found

If multiple Directory trees are found, the "Existing Directory Trees" menu appears.

Figure 3-50
When Multiple Directory Trees Are Found

```
┌─────────────────────────────────┐
│   Existing Directory Trees:     │
├─────────────────────────────────┤
│ ASPEN                           │
│ CLARKS_TREE                     │
│ ENGINEERING                     │
│ LEGAL                           │
│                                 │
└─────────────────────────────────┘
```
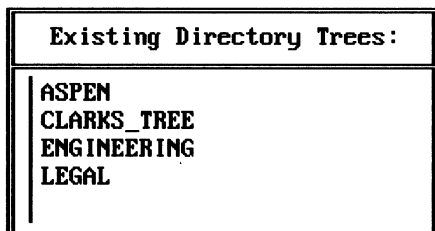
Procedure

Procedure

1. Choose the Directory tree you want this server to be part of.

A list appears of all Directory trees that are visible from this server. Most organizations will have only one Directory tree. The tree name is established during the installation of the first NetWare 4.1 server in a tree.

Important

Make sure you choose the correct Directory tree name. If your organization has more than one tree, attaching to the wrong tree or creating a new Directory tree will prevent this server from sharing data within the desired Directory database.

Choosing an existing tree makes this new server part of that tree's NetWare Directory database.

1a. (Conditional) If the Directory tree you want this server to be part of is not displayed, verify that an existing NetWare 4 server in that tree is up and physically connected to this server, and that both servers are bound to IPX with the proper LAN driver, frame type, and IPX external network number. Then press <F4> to rebuild the list.

1b. **(Conditional) If your network has SAP filtering and you know the IPX internal network number of an existing NetWare 4 server, press <F3> and enter the name of the Directory tree and press <Enter>. Then, enter the IPX internal network number of an existing NetWare 4 server in the Directory tree and press <Enter>.**

1c. **(Conditional) If you need to create a new Directory tree on the network, press <Ins>. At the confirmation prompt, press <Enter>. Follow the procedures under "If This Is the First NetWare 4 Server," on page 134.**

2. Specify time synchronization parameters.

2a. **Choose the time zone you want to install this server in.**

If	Then
Your time zone is listed	Move the cursor to your time zone and press <Enter>. Verify that the information presented is correct.
	If it is, press <F10> and continue with Step 3.
	If it isn't, enter the correct information using Steps 3b through 3j beginning on page 132.
Your time zone is not listed	Press <Ins> and proceed with Step 3b under "If This Is the First NetWare 4 Server," on page 134.

The time configuration defaults for all servers except the first NetWare 4.1 server appear.

Figure 3-51
Time Configuration Screen

```
╔═══════════════════════════════════════════════════════════════════════╗
║         Verify/Enter Time Configuration Information for This Server      ║
╟─────────────────────────────────────────────────────────────────────────╢
║                                                                          ║
║  Time server type:                Secondary                             ║
║                                                                          ║
║  Standard time zone abbreviation:                                        ║
║  Standard time offset from UTC:                                          ║
║                                                                          ║
║  Does your area have daylight saving time (DST):                         ║
║  DST time zone abbreviation:                                             ║
║  DST offset from standard time:                                          ║
║  DST Start:                                                              ║
║  DST End:                                                                ║
╚═══════════════════════════════════════════════════════════════════════╝
```

2b.   (Conditional) If you chose a simple Directory tree, the following screen appears.

Figure 3-52
If You Chose a
Simple Directory
Tree

```
╔═══════════════════════════════════════════════════════════════════════╗
║  Admin Password:                                                         ║
╚═══════════════════════════════════════════════════════════════════════╝
```

If	Then
You want to install this server into the simple Directory tree	Type the administrator password and press <Enter>. Continue with "Modify the STARTUP.NCF File," on page 157.
You want to customize the simple Directory tree (create multiple levels)	Press <F4>. If necessary, type the administrator name and press <Enter>. Type the administrator password and press <Enter>. Go to page 141 and complete Steps 4a through 4e to set up the server's context. Continue with "Modify the STARTUP.NCF File," on page 157.

2c. In the "Verify/Enter Time Configuration Information for this Server" screen, verify or specify time synchronization parameters.

Refer to "Understanding Time Synchronization in NDS" in *Introduction to NetWare Directory Services* for information on how to plan for time synchronization.

Then see "A Nonlocatable Directory Tree, or the First Server" on page 132 for instructions on how to configure time parameters.

2d. Press <F10> to save and continue.

After you have finished setting up time synchronization, you are prompted to specify a Directory administrator login name and password.

3. **(Conditional) If the administrator's name is not displayed, type the administrator's name and press <Enter>.**

   Enter the complete name of the administrator. This could be

   ◆ Your login name.

   ◆ The name of any User object with the Supervisor object right to this context.

   ◆ User object ADMIN.

   For example, type

   `CN=ADMIN.O=NOVELL` <Enter>

   Or, if you specified a country

   `CN=ADMIN.O=Novell.C=US`

   Note ▼ For more information about complete context names, refer to *Introduction to NetWare Directory Services*.

   When the first NetWare 4.1 server is installed, the administrator's default name is ADMIN, but this name could have been changed after the first NetWare 4.1 server was installed.

   There also could be more than one administrator in your Directory tree.

   Important ▼ Without supplying the correct name, you cannot install this server as part of the Directory tree.

4. **Type the administrator's password and press <Enter>.**

   This password authenticates the administrator (the user installing the server) to the Directory.

5. In the screen shown below, choose an existing NetWare 4.1 context or specify a new one.

Figure 3-53
Specify the Server Context

```
Company or Organization: NOVELL
Level 1 (Sub)Organizational Unit (optional)
Level 2 (Sub)Organizational Unit (optional)
Level 3 (Sub)Organizational Unit (optional)

Server Context: NOVELL
```

If you want to	Then
Place this new server into a context that has been previously defined	Press <Enter> at each organizational level to view existing container objects and choose the object you need.
Define a new context for this server	Enter one or more new Organizations (O=) and/or Organizational Units (OU=). See below for examples.

You can either place this new server into a previously defined context or you can specify a new context. By defining a context that doesn't exist yet, you "create" the context—that is, you create a new branch in the Directory tree.

Assume the context of the only existing NetWare 4.1 server is

OU=NEW_PRODUCTS.OU=MARKETING.O=NOVELL

If you specify the new server's context as

OU=SALES.O=NOVELL

the Directory tree will have a new "branch" (Sales). After server installation, you can view your Directory tree using the NETADMIN or NetWare Administrator utility.

The following illustration shows the expanded example tree.

```
● [Root]
  └ ⛁ Novell ·································· Organization
       ├ ▉ Marketing ····················· Organizational Units
       │  └ ▉ New_Products ······:
       │       ├ ▊ SERVER1 ··············· This server
       │       ├ ▣ SERVER1_SYS·········· Volumes on this
       │       └ ▣ SERVER1_MACVOL···    server
       ├ ▉ Sales ························· Organizational Unit
       │  ├ ▊ SALESERVER ··············· Additional server
       │  └ ▣ SALESERVER_SYS ········ Volume on
       │                                  additional server
       └ ▲ Admin ························· User
```
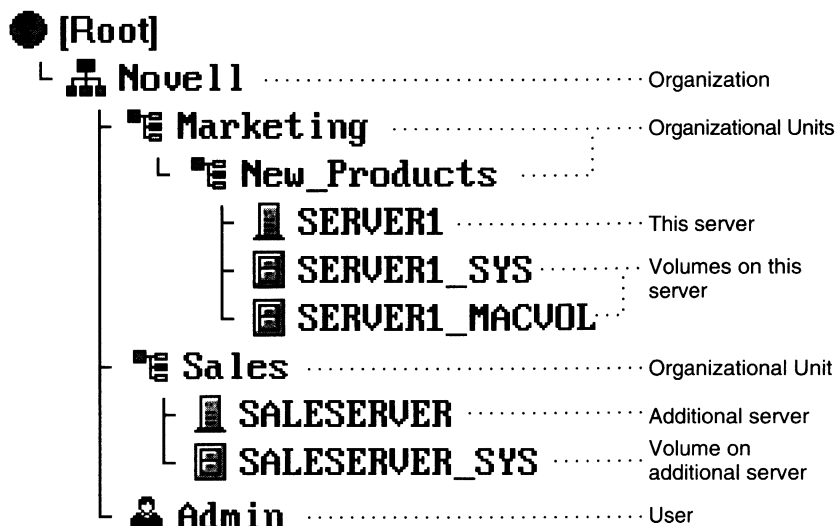
Important ▼

By default, the installation utility adds a replica of the partition that contains the server's context only if the total number of existing replicas is less than three.

However, if the server is not a NetWare 4 server and contains bindery files (SYS:SYSTEM\NET$*.SYS), a replica will be added, regardless of the number of replicas.

In the example above, the master replica of the partition "OU=Sales" resides on server SALESERVER. Its read-write replica resides on server SERVER1. You can modify partitions with the PARTMGR or NetWare Administrator utility, after server and workstation installations are complete.

For more information on Directory partitions, see "Understanding NetWare Directory Services" in *Introduction to NetWare Directory Services* and "NetWare Directory partition" in *Concepts.*

6. **To save Directory information, press** <F10>.

   A confirmation menu appears.

7. **Press** <Enter> **to select "Yes."**

8. **Review "How Does the Directory Tree Appear Now?," on page 155 and "What Trustee Assignments were Created During the Installation?," on page 156. Then continue with "Modify the STARTUP.NCF File," on page 157.**

How Does the Directory Tree Appear Now?

The following objects were created in the Directory tree:

◆ Server object.

◆ Volume objects (*servername*_SYS and other volumes you specified).

◆ User object ADMIN (the administrator who has Supervisor object rights to this context). The installation utility places this object directly under the Organization level.

Note ▼ User object ADMIN is created only once, and only on the first server in the Directory tree.

◆ User object Supervisor (for bindery services purposes only). This object can be recognized only from pre-NetWare 4.1 utilities. User object Supervisor takes on User object ADMIN's password.

These objects are placed in the same context you defined for your server. The following illustration shows what your Directory tree might look like after you installed your first NetWare 4.1 server.

● [Root]
   └ ⚏ Novell_US ························· Organization
      ├ ▣ Sales ························· Organizational Units
         └ ▣ Sales_LA ···············
           ├ ▤ SERVER1 ················ This server
           ├ ▣ SERVER1_SYS ·········· Volumes on this
           └ ▣ SERVER1_MACVOL··· server
      └ ♟ Admin ························· User
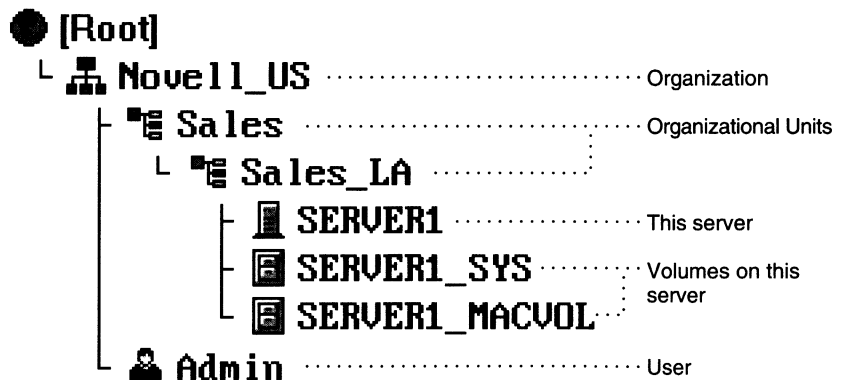
What Trustee Assignments were Created During the Installation?

◆ User object ADMIN has the Supervisor object right on the [Root] object. By inheritance, ADMIN also has the Supervisor right on all Volume objects in the Directory.

◆ [Public] has the Browse right on the [Root] object.

Note [Public] is equal to the group EVERYONE in the NetWare 3 environment.

◆ Any container object has Read and File Scan rights to the PUBLIC directories of all system volumes in that container.

◆ The [Root] object (or security equivalent) of a tree has the Browse right on all User objects in that tree. This can be blocked by an Inherited Rights Filter or removed from a container's trustee list (ACL).

◆ The [Root] object has the Read right to the member property of any Group object.

◆ The [Root] object has the Read right to the following properties of any Volume object: host server name (the server that the physical volume resides on) and host resource (the physical volume).

◆ All User objects have the Read right to their own properties and to the properties of any profile they belong to. User objects also have Read and Write rights to their user login script.

For more information on rights and trustee assignments, see "Rights" and "Trustee" in *Concepts* and Chapter 2, "Managing Directories, Files, and Applications," and Chapter 3, "Creating Login Scripts," in *Supervising the Network*.

Modify the STARTUP.NCF File

The STARTUP.NCF file resides on the boot disk partition, together with SERVER.EXE. It executes immediately after SERVER.EXE.

The STARTUP.NCF file contains the commands to load the disk drivers you specified under "Load Disk Drivers." You can add other commands to this file or delete existing ones.

A sample STARTUP.NCF file is shown below.

Figure 3-54
Sample
STARTUP.NCF File

```
                        File: STARTUP.NCF

Load IDE INT=E PORT=1F0
Load Mac
Load AHA1740 SLOT=3
Load ASPICD
Set Reserved Buffers Below 16 MEG=200
```

Note ▼ Volume SYS: is automatically mounted when its corresponding disk driver is loaded during the STARTUP.NCF file's execution.

The following table shows some of the commands you may want to add to the STARTUP.NCF file.

Table 3-6
Syntax Examples for Assorted Commands

If you want to	Add these or other commands
Load name spaces for Macintosh, OS/2, UNIX, or FTAM	LOAD MAC.NAM LOAD OS2.NAM LOAD NFS.NAM LOAD FTAM.NAM These commands must precede the command to mount the volume that stores the files using the name space.
Set server parameters	You can add the following six SET commands to the STARTUP.NCF file only. You can add other SET commands to either the STARTUP.NCF or the AUTOEXEC.NCF file. SET Maximum Physical Receive Packet Size SET Auto Register Memory Above 16 Megabytes SET Reserved Buffers Below 16 Meg SET Maximum Subdirectory Tree Depth SET Auto TTS Backout Flag SET Minimum Packet Receive Buffer (For more information on these and other SET commands, see "SET" in *Utilities Reference* or type "SET" at the server console.)
Pause after each command	PAUSE

Procedure

To modify the STARTUP.NCF file, complete these steps.

Procedure ▼

1. **Type one command on each line.**

   Table 3-6 on page 158 gives some syntax examples for assorted commands.

2. **To delete or modify commands, simply backspace to erase the command.**

3. **When you're finished modifying the file, press <F10>.**

4. **When asked whether you want to save the file, choose "Yes."**

Note ▼

   If you make changes to this file, they take effect only when you reboot the server after the installation is finished.

   Once STARTUP.NCF loads disk drivers and any name spaces you add to it, control is passed to the AUTOEXEC.NCF file to complete the boot process.

   You can also add commands to the STARTUP.NCF file by loading INSTALL.NLM, or by using the SERVMAN server utility.

For more information on	See
Editing the STARTUP.NCF file through INSTALL.NLM	"Creating or Editing a Server Batch (.NCF) File" in Chapter 7 of *Supervising the Network*.
Editing the STARTUP.NCF file using SERVMAN	"SERVMAN" in *Utilities Reference*.

5. **Continue with "Modify the AUTOEXEC.NCF File," on page 160.**

Modify the AUTOEXEC.NCF File

The AUTOEXEC.NCF file is located in the SYS:SYSTEM directory. It runs after the server has mounted the system volume (volume SYS:). It provides the NetWare server with commands to complete the boot process after SERVER.EXE and STARTUP.NCF are executed.

A sample AUTOEXEC.NCF file is shown below.

Figure 3-55
Sample
AUTOEXEC.NCF
File

```
                       New File: AUTOEXEC.NCF
set Time Zone = MST7MDT
set Daylight Savings Time Offset = 1:00:00
set Start Of Daylight Savings Time = (APRIL SUNDAY FIRST  2:00:00 AM)
set End Of Daylight Savings Time = (OCTOBER SUNDAY LAST  2:00:00 AM)
set Default Time Server Type = SINGLE
file server name SERVER1
ipx internal net 1D0C38A
LOAD NE2000 INT=3 PORT=300 FRAME=Ethernet_802.3  NAME=NE2000_1_E83
BIND IPX NE2000_1_E83 NET=1D0C301
```

The AUTOEXEC.NCF file will display commands you specified earlier in the program. These include:

◆ Time zone SET commands (time server type, time zones, daylight saving time status and offset).

◆ Bindery context (for bindery services, set automatically at this server's context).

Note▼▼ Users logging in, attaching, or mapping to a NetWare 4.1 server from a client running NETX rather than VLMs need to use the bindery context set in the server's AUTOEXEC.NCF file.

◆ Server name.

◆ IPX internal network number.

◆ All LOAD and BIND commands for LAN drivers, protocols, and frame types.

The following table shows some of the commands you may want to add to the AUTOEXEC.NCF file.

If you want to	Add these or other commands
Load other modules (NLMs) when the server boots	LOAD MONITOR LOAD *NLMname*
Mount volumes	MOUNT *volumename* MOUNT ALL **Note:** Volume SYS: is automatically mounted when its corresponding disk driver is loaded during the STARTUP.NCF file's execution.
Set server parameters, including time synchronization parameters	For a complete list of all available SET commands, see "SET" in *Utilities Reference*.
Execute any other valid console commands during the boot process	SECURE CONSOLE
Pause after a command	PAUSE

Note ▼ If you make changes to the AUTOEXEC.NCF file, they take effect only when you reboot the server after the installation is finished.

You can also add commands to the AUTOEXEC.NCF by loading INSTALL.NLM at the server (see "Creating or Editing a Server Batch (.NCF) File" in Chapter 7 of *Supervising the Network*), or the SERVMAN server utility (see "SERVMAN" in *Utilities Reference*).

Procedure

To modify the AUTOEXEC.NCF file, complete these steps.

Procedure ▼23
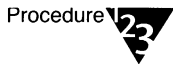
1. **Press the Up-arrow key to edit the AUTOEXEC.NCF file.**

2. **Verify the syntax for the command in *Utilities Reference*.**

3. **To add commands, type one command on each line.**

4. **To delete or modify commands, simply backspace to erase the command.**

5. **When you're finished modifying the file, press <F10>.**

6. **When asked whether you want to save this file, choose "Yes."**

   The remaining NetWare files are copied to the server. This could take a few minutes.

Note ▼

   After these files are copied, the server installation is essentially complete. If you want, you can install additional items or products (see "Perform Other Installation Options (Optional)," on page 164).

Figure 3-56
The Remaining NetWare Files Are Copied to the Server

```
                    File Copy Status (Main Copy)

  ████████
                             7%


Filegroup: NetWare System Files
Source path: D:NW410\INSTALL\ENGLISH
Destination path: SYS:\PUBLIC\NLS\ENGLISH

  →Copying file "FDDITSM.NLM"
  →Copying file "FILTCFG.NLM"
  →Copying file "FILTCONU.NLM"
  →Copying file "GENCFG.NLM"
  →Copying file "HCSS.NLM"
  →Copying file "HCSS_IR.NLM"
  →Copying file "HCSS_SM.NLM"
```
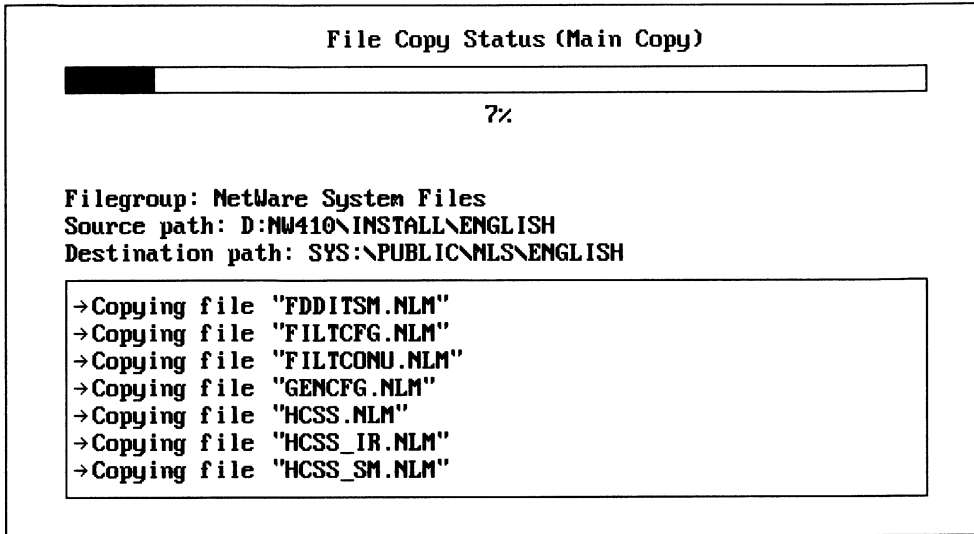
7. Continue with "Perform Other Installation Options (Optional)," on page 164.

Perform Other Installation Options (Optional)

The following screen appears listing other available installation options.

```
┌────────── Other Installation Items/Products ──────────┐
│ Create a Registration Diskette                        │
│ Upgrade 3.1x Print Services                           │
│ Create DOS/MS Windows/OS2 Client Install Diskettes    │
│ Create NetWare UPGRADE/MIGRATE Diskettes              │
│ Install NetWare for Macintosh                         │
│ Install NetWare MHS                                    │
│ Configure Network Protocols                           │
│ Install an Additional Server Language                 │
│ ▼ Change Server Language                              │
└───────────────────────────────────────────────────────┘

        ┌───────────────────────────────────────────┐
        ║           Other Installation Actions      ║
        ╠═══════════════════════════════════════════╣
        ║ Choose an item or product listed above    ║
        ║ Install a product not listed              ║
        ║ View/Configure/Remove installed products  ║
        ║ Return to the previous menu               ║
        ║ Continue installations                    ║
        └───────────────────────────────────────────┘
```

All of the options listed above can be performed at any time from the server by loading INSTALL.NLM at the server console.

If	Then
You want to perform any of the listed installation actions at this time	Follow the procedures under the headings that follow.
You want to install an optional product not listed	Choose "Install a Product Not Listed" from the "Other Installation Options" menu. Then follow the server prompts.
You do not want to perform any of the listed installation actions at this time	Choose "Continue Installation" from the "Other Installation Actions" menu and press <Enter>. After being prompted that the installation is complete, press <Enter> to get to the server console. Go to "Where to Go from Here," on page 178.

Create a Registration Diskette

Having a *Registration* diskette is useful in case you experience system problems in the future and must call Novell Technical Support[SM].

The installation program can read information such as OS version, addresses, number of licensed connections, SFT level, amount of RAM installed, network board configuration, and disk drive configuration, and copy this information to the *Registration* diskette.

This might be useful in case you experience system problems in the future and need to call Novell Technical Support. Novell support technicians can access the above information, which greatly speeds up their ability to help you.

Procedure

Procedure

1. **From the "Other Installation Actions" menu, select "Choose an Item or Product Listed Above" and press** <Enter>.

2. **Choose "Create a Registration Diskette" and press** <Enter>.

   The screen that appears lists three prerequisites:

   ◆ The NetWare 4.1 *Registration* diskette

   ◆ The name and address of your Novell Authorized Reseller[CLM]

   ◆ Your company's reseller contact (the person in your company in responsible for purchases).

3. **Press** <F10> **to continue.**

4. **In the "Reseller Information" form that appears, fill in the name and address of the Novell Authorized Reseller you purchased NetWare 4.1 from.**

   4a. **Press** <Enter> **after each entry.**

   4b. **Press** <F10> **to continue.**

5. In the "Customer Information" form, fill in the reseller contact's name and the name of your company (or organization).

    5a. Press <Enter> after each entry.

    5b. Press <F10> to continue.

6. Insert the *Registration* diskette into drive A: and press <Enter>.

The installation program now copies the registration information to this diskette.

7. (Optional) Copy configuration information to the *Registration* diskette.

    7a. Press <F2> to view configuration information.

    7b. Press <Esc> to exit the screen.

    7c. When asked "Copy This Information to the Diskette?" choose "Yes" or "No" and press <Enter>.

    7d. Insert the *Registration* diskette into the mailer labeled "Product Registration" and send it to Novell.

8. Continue performing any additional installation options listed on pages 167 through 177, or go to "Exit the Installation Utility," on page 178.

Upgrade 3.1*x* Print Services

This option allows system administrators upgrading their printer-supported NetWare 3.1*x* server to NetWare 4.1, to upgrade print configuration files.

For procedures on using this option see *Upgrade.*

Create DOS/MS Windows/OS2 Client Install Diskettes

If you don't want to make client diskettes at this time, you can make them later from the server by loading INSTALL.NLM or from a workstation by running MAKEDISK.BAT. (See Appendix D, "Creating Client Diskettes," on page 287.)

Prerequisites

Format the appropriate number of high-density diskettes using the table below.

For	Format
DOS/MS Windows workstations	Five 3.5-inch or 5.25 inch diskettes
OS/2 workstations	Six 3.5-inch diskettes

Procedure

Procedure

1. **From the "Other Installation Actions" menu, select "Choose an Item or Product Listed Above" and press** <Enter>.

2. **Choose "Create DOS/MS Windows/OS2 Client Install Diskettes" and press** <Enter>.

   The following menu appears.

Figure 3-58
Select the Client Files You Want to Copy to Diskette

```
[X] 3.5 inch   DOS/MS Windows Client Install      (5 diskettes)
[X] 3.5 inch   OS/2 Client Install               (6 diskettes)
[ ] 5.25 inch  DOS/MS Windows Client Install      (5 diskettes)
```

3. **Select or deselect the file groups you want copied by pressing** <Enter>.

4. **Press** <F10> **to accept the marked groups and continue.**

5. **Specify the destination that the client files will be copied to.**

   By default, the client files are copied to drive A:. To specify a new path, press <F3> and type the new path.

6. **Press** <Enter> **to accept the path.**

7. **Insert the labeled diskettes as prompted.**

8. **Continue performing any additional installation options listed on pages 170 through 177, or go to "Exit the Installation Utility," on page 178.**

Create NetWare *Upgrade/Migrate* Diskettes

This option allows system administrators to create the diskettes necessary to upgrade an existing NetWare 2.*x*, 3.*x*, or 4.*x* server to NetWare 4.1.

For procedures on using this option, see *Upgrade*.

Install NetWare for Macintosh

This option allows you to install NetWare for Macintosh on the NetWare 4 server.

Procedure

1. **From the "Other Installation Items/Products" menu, select "Choose an Item or Product Listed Above" and press** <Enter>.

2. **Choose "Install NetWare for Macintosh" and press** <Enter>.

   A screen appears, displaying the path that the NetWare for Macintosh files will be copied from.

If	Then
The path to the NetWare for Macintosh files is correct	Press <Enter> to continue.
The path to the NetWare for Macintosh files is incorrect	Press <F3> and specify a new directory path. When finished, press <Enter> to begin copying.

For detailed information on installing and configuring NetWare for Macintosh, read the NetWare for Macintosh documentation listed in the following table.

To	Read
Install and configure NetWare for Macintosh on the server	*NetWare for Macintosh File and Print Services.*
Install and configure a NetWare for Macintosh client	*Using MacNDS Client for NetWare 4.*

To view these documents online on a Macintosh workstation, you must install and configure the online documentation reader on a standalone Macintosh workstation with a connected CD-ROM drive.

For instructions, refer to the Macintosh section of *Installing and Using Online Documentation for NetWare 4.1.*

If you do not have a Macintosh workstation with a CD-ROM drive, view the manuals from an MS Windows workstation as described in *Installing and Using Novell Online Documentation for NetWare 4.1.*

3. **Continue performing any additional installation options listed on pages 172 through 177, or go to "Exit the Installation Utility," on page 178.**

Install NetWare MHS Services

Installing NetWare MHS Services adds NetWare message handling service functionality to the NetWare 4 server.

MHS allows users to communicate electronically across a network. Using MHS, users can exchange electronic mail, share calendars, schedule facilities, and perform many other activities.

Procedure
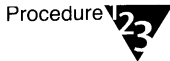
Procedure

1. **From the "Other Installation Items/Products" menu, select "Choose an Item or Product Listed Above" and press** <Enter>.

2. **Choose "Install NetWare MHS Services" and press** <Enter>.

   A screen appears, displaying the path that the NetWare MHS Services files will be copied from.

If	Then
The path to the NetWare MHS Services files is correct	Press <Enter> to continue.
The path to the NetWare MHS Services files is incorrect	Press <F3> and specify a new directory path. When finished, press <Enter> to begin copying.

3. **Continue performing any additional installation options listed on pages 173 through 177, or go to "Exit the Installation Utility," on page 178.**

Configure Network Protocols

Choosing this option loads the INETCFG.NLM, which allows you to configure the protocols you selected in Step 2 on page 96 as routing protocols.

This means that the server will not only function as a NetWare 4.1 server, but will also route IPX™, TCP/IP, and AppleTalk* packets to other network segments.

Procedure

1. **From the "Other Installation Actions" menu, select "Choose an Item or Product Listed Above" and press <Enter>.**

2. **Choose "Configure Network Protocols" and press <Enter>.**

3. **Use the table below to find out which manual to refer to for configuring the protocol.**

For Configuring	See
IPX	*NetWare IPX Router Reference.*
TCP/IP	*NetWare TCP/IP Reference.*
AppleTalk	*NetWare AppleTalk Reference.*

4. **Continue performing any additional installation options listed on pages 174 through 177, or go to "Exit the Installation Utility," on page 178.**

Install an Additional Server Language

This option allows you to install message and help files for a selected language. Languages include English, French Italian, German, and Spanish. You can later change the server language to display the installed language files through the "Change Server Language" option.
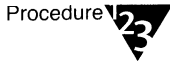
Procedure

Procedure

1. **From the "Other Installation Actions" menu, select "Choose an Item or Product Listed Above" and press** <Enter>.

2. **Choose "Install an Additional Server Language" and press** <Enter>.

   A screen appears indicating the source path that you installed from. By default, the source path is the location of the NETMAIN.ILS file, a script file used to locate file sets.

3. **Accept the path by pressing** <Enter>, **or press** <F3> **and indicate a new path.**

   The following screen appears.

Figure 3-59
Indicate Which File Groups You Want Installed

```
┌─────────────────────────────────────────────────────────────────────┐
│              Indicate which file groups you want installed:         │
├─────────────────────────────────────────────────────────────────────┤
│  [ ] NetWare 4.1 English Language-Specific Files (5 MB)             │
│  [ ] NetWare 4.1 French Language-Specific Files (5 MB)             │
│  [ ] NetWare 4.1 German Language-Specific Files (5 MB)             │
│  [ ] NetWare 4.1 Italian Language-Specific Files (5 MB)             │
│  [ ] NetWare 4.1 Spanish Language-Specific Files (5 MB)             │
└─────────────────────────────────────────────────────────────────────┘
```

4. **Indicate the language files you want to copy by highlighting each group and pressing** <Enter>.

5. **Press** <F10> **to accept the marked groups and continue.**

   The selected file sets are then copied to volume SYS: To implement the newly installed files, see "Change Server Language," on page 176.

6. **Continue performing any additional installation options listed on pages 176 through 177, or go to "Exit the Installation Utility," on page 178.**

Change Server Language

This option allows you to change the server language to a language selected earlier through the "Install an Additional Server Language" option.
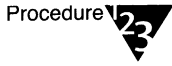
Procedure

Procedure

1. **From the "Other Installation Actions" menu, select "Choose an Item or Product Listed Above" and press** <Enter>.

2. **Choose "Change Server Language" and press** <Enter>.

   A screen appears indicating the source path that you installed from. By default, the source path is the location of the NETMAIN.ILS file, a script file used to locate file sets.

3. **Accept the path by pressing** <Enter>, **or press** <F3> **and indicate a new path.**

   The following screen appears.

   ```
   ┌─────────────────────────────────────┐
   │ Select default server language      │
   ├─────────────────────────────────────┤
   │ English                             │
   │ French                              │
   │ German                              │
   │ Italian                             │
   │ Spanish                             │
   └─────────────────────────────────────┘
   ```
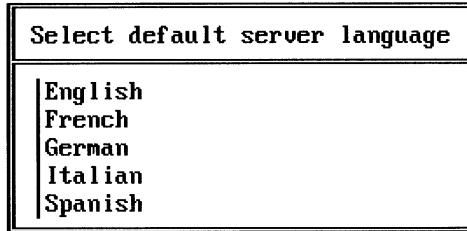
4. **Choose the desired server language.**

Note

This must be a language that you installed earlier through the "Install an Additional Server Language" option (see "Install an Additional Server Language," on page 174).

The files are copied to the server. To have the server invoke the new language, bring down the server and then bring it back up.

5. **Install the NetWare 4.1 online documentation to the server by reading "Install Online Documentation on the Server," on page 177, or go to "Exit the Installation Utility," on page 178.**

Install Online Documentation on the Server

This option installs the NetWare 4.1 online manual set and DynaText viewers on the NetWare 4.1 server.

Entire NetWare 4.1 online manual sets are available in English, French, Italian, German, and Spanish.

Be aware that a single language manual set requires 60 MB of free server disk space.

For complete instruction on installing the online documentation and viewers, see *Installing and Using Novell Online Documentation for NetWare 4.1.*

Exit the Installation Utility

The installation of the NetWare 4.1 server is now complete.

Procedure

Procedure
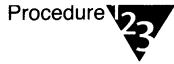
1. **To exit the installation utility and go to the server console, press** <Enter>.

2. **Continue with "Where to Go from Here."**

Where to Go from Here

If you want to	Go to
Install additional NetWare 4.1 servers	"Install the Server Software," on page 70.
Install NetWare clients	Chapter 6, "Install NetWare Clients," on page 265.
Install NetWare SFT III	Chapter 5, "Install NetWare 4.1 SFT III," on page 241.

Figure 3-60
NetWare 4.1 Server Worksheet

Server name: _____ **IPX internal network number:** _____
Server make/model: _____ **Tree name:** _____

Time server type: _____ Time zone: _____ Offset from UTC _____ ahead
                                    Daylight time zone: _____   _____ behind

Memory (RAM): Base: _____ Extended: _____ Total: _____

Server boot method: Hard disk ☐   Floppy diskette ☐ 3.5"   ☐ 5.25"

Network boards (Fill in columns that apply to each network board.)

Name	LAN driver	I/O port	Memory address	Interrupt (IRQ)	DMA channel	Node address	Slot number	IPX external network #

Other boards (Internal or external disk controllers, serial controllers, SCSI controllers, video adapters, etc.)

Name	Driver (if applicable)	I/O port	Memory address	Interrupt (IRQ)	DMA channel	SCSI address	Other info

Disks

Drive Make/Model	Size	Mirrored with #	Volume segments
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

Volumes

Volume name	File compression ON OFF	Block suballocation ON OFF	Data migration ON OFF	Name space

4 Install NetWare Server for OS/2

Overview

The installation of NetWare Server for OS/2* consists of two parts:

◆ A graphical installation program that installs drivers and utility programs that allow NetWare 4™ to operate on an OS/2 computer. This chapter explains that installation.

◆ The NetWare installation program that installs NetWare 4.1. That installation is explained in Chapter 3, "Custom Installation," on page 67.

Necessary Resources

Hardware Requirements

Checklist ☑ A PC (or PC compatible) with a 386 or 486 processor. In a large network, the first NetWare Server for OS/2 you install should have a fast processor for more efficient NetWare Directory Services™ (NDS) synchronization.

☐ At least 16 MB of RAM (a minimum of 8 MB to be used by OS/2 and a minimum of 8 MB to be used by NetWare Server for OS/2).

Important ☑ If you plan to install from a remote network installation area, you will need at minimum of 18 MB of RAM. The additional 2 MB of RAM are needed for CLIB.NLM and STREAMS.NLM.

☐ A hard disk with a minimum storage capacity of 150 MB. A minimum of 80 MB of that total must be partitioned as free space on the hard disk when OS/2 is installed (the OS/2 installation uses approximately 50 MB). The free space is used by NetWare Server for OS/2.

Note ▼ Although these minimum requirements will allow you to install OS/2 and NetWare Server for OS/2, Novell® recommends that you install a larger hard disk to accommodate your storage needs.

❏ (Conditional) If you install the NetWare 4 online documentation on the server, another 60 MB of disk space is required.

❏ If you want to share a network board between NetWare Client™ for OS/2 and NetWare Server for OS/2 (on the same computer), you need at least one network board. If you do not want to share a network board, you will need at least one network board for the client and one network board for the server.

❏ A CD-ROM drive (if installing from CD-ROM) with the corresponding OS/2 drivers.

Software Requirements

Checklist ▼ ❏ OS/2 version 2.1*x* or later.

❏ If installing from CD-ROM, the *NetWare 4.1 Operating System* CD-ROM and the NetWare 4 *Online Documentation* CD-ROM.

❏ If installing from floppy diskettes, working copies of all the NetWare 4.1 diskettes.

❏ *License* diskette.

❏ (Conditional) If you are sharing a network board between NetWare Client for OS/2 and NetWare Server for OS/2, and the client software has not been installed, you will need the latest version of the client software.

❏ (Optional) Working copies of NetWare 4.1 compatible third-party disk drivers, LAN drivers, or NetWare Loadable Modules™ (NLMs™).

Install Server Software

For help during installation, select the "Help" menu, choose the "Help" buttons when boxes appear, or press <F1>.

To move back to a previous dialog box during installation, choose the "Cancel" button.

Prerequisites

Checklist

❏ Make sure you have the necessary hardware, software and memory requirements to install NetWare Server for OS/2 and NetWare 4.1. See "Necessary Resources" on page 181.

❏ If your OS/2 computer will be used as a Netware Server for OS/2 and a NetWare Client for OS/2 sharing one network board, you need to install the client software before installing the server. (If you have not installed the client, the installation program will prompt you).

❏ Install at least one network board (if you are sharing the network board between the client and server) and cabling according to manufacturer instructions. Note the network board settings such as interrupt, I/O, DMA, etc. (You enter these settings during installation.)

❏ Install OS/2 version 2.1 (or later) on your computer and leave at least 80 MB of free disk space for NetWare. (80 MB is the absolute minimum needed to install NetWare. If you want to store files and applications on the server, you will need to leave more free space for NetWare.)

Note

If OS/2 is already installed on your computer, you may need to use the OS/2 FDISK utility to delete a current partition and create free disk space. For more information, see the OS/2 documentation about FDISK.

Using FDISK to create free space could destroy data on your hard disk. Be sure to back up files before using FDISK.

Choose an Installation Medium

You can install NetWare Server for OS/2 either from CD-ROM, from floppy diskettes (available only through the NetWare Fulfillment Center), or from an existing NetWare server from a remote network installation area.

There are advantages and disadvantages to each:

◆ **Remote network.** This is the fastest installation option. It requires that you have a CD-ROM mounted as a NetWare volume, or that you have another NetWare 4 server.

◆ **CD-ROM.** This option is not as fast as installing from the network, but is faster than installing from floppy diskettes. It requires a CD-ROM drive installed as an OS/2 device on the computer on which you want to install NetWare Server for OS/2.

◆ **Floppy diskettes.** This is the slowest option. It requires a 3.5-inch floppy disk drive.

The following procedures explain how to install from each medium.

Install from CD-ROM

Make sure you have installed a SCSI board in your OS/2 computer and have connected a CD-ROM drive to it. (See your CD-ROM documentation for information about installing the CD-ROM drive and the corresponding drivers.)

Procedure

Procedure

1. **Insert the *NetWare 4.1 Operating System* CD-ROM into the CD-ROM drive.**

2. **Open an OS/2 window or full screen session.**

3. **Change to the drive corresponding to the CD-ROM.**

   If you are unsure which drive corresponds to the CD-ROM, choose the "OS/2 System" icon; then choose the "Drives" icon from the "OS/2 System Icon View" window.

   A list of OS/2 drives and their corresponding devices appears. The CD-ROM drive corresponds to the "CD-ROM" icon.

4. **Type**

   `INSTALL` <Enter>

   A dialog box similar to the one shown in Figure 4-1 will appear.

Figure 4-1
Choose a Language to Install

5. **Choose the language you want to install and press** <Enter>.

6. **Go to "Determine Which Installation Option to Use" on page 193.**

Install from a Remote Network Installation Area

A NetWare 4.1 Server for OS/2 can be installed over the network from either a mounted CD-ROM NetWare volume or another NetWare 4 server.

In either scenario, an OS/2 workstation running NetWare client software logs in to a remote area server and becomes a NetWare Server for OS/2 through the installation utility.

Requirements and recommendations for a remote installation are outlined below.

Requirements for a Network Installation Area

◆ The server with the CD-ROM image should not be RIP-filtered from the server being installed.

◆ The server being installed should use an IPX internal network number that is not RIP-filtered from the server with the CD-ROM image.

Note

When installing using the "Simplified NetWare Server for OS/2" option, a randomly generated IPX internal network number is chosen for you. If you need to enter a specific IPX internal network number, you should install using the "NetWare Server for OS/2" option.

◆ If you are installing from a NetWare 4 server, the NDS User object you log in as must be in the same container as the Server object.

Recommendations for a Network Installation Area

◆ For better performance, the server with the CD-ROM image should have Packet Burst™ support. NetWare 3.12 and NetWare 4 servers have Packet Burst support built in. NetWare 3.11 requires PBURST.NLM for Packet Burst support.

◆ For better performance, the server with the CD-ROM image should have LIP (Large Internet Packet) support enabled. NetWare 3.12 and NetWare 4 servers have LIP support enabled by default (using the SET command "Allow LIP = On"). NetWare 3.11 requires LIPX.NLM for LIP support.

Remote Installation Areas

The remote installation area can consist of one of the following:

◆ The *NetWare 4.1 Operating System* CD-ROM mounted as a NetWare volume.

◆ The *NetWare 4.1 Operating System* CD-ROM files copied to a volume on a NetWare 4 server.

If you want to	Go to
Install from the *NetWare 4.1 Operating System* CD-ROM mounted as a NetWare volume	"Install from a CD-ROM Mounted as a NetWare Volume" on page 188.
Install from the NetWare server volume containing copied *NetWare 4.1 Operating System* CD-ROM files	"Install from a NetWare Volume with Files Copied on a Server" on page 190.

Install from a CD-ROM Mounted as a NetWare Volume

Necessary Resources

Checklist ▼

❏ A CD-ROM drive that can read ISO 9660 formatted CD-ROM disks.

❏ An existing NetWare 4.1 server. (This will be the host server.)

❏ An existing NetWare workstation. (This will be the new server you install.)

Procedure

Procedure ▼

1. **Cable the CD-ROM drive to the NetWare 4 server.**

    Since you are installing the CD-ROM as a NetWare volume, you do not need to install any drivers at this time.

2. **Insert the *NetWare 4.1 Operating System* CD-ROM into the CD-ROM drive.**

3. **At the C:\NWSERVER directory, type**

    NWOS2 <Enter>

4. **At the server console, type**

    LOAD INSTALL <Enter>

    The following menu appears.

Figure 4-2
The "Installation
Options" Menu

```
┌─────────────────────────────────────────────────────────────┐
│                     Installation Options                      │
├─────────────────────────────────────────────────────────────┤
│ Driver options      (load/unload disk and network drivers)   │
│ Disk options        (configure/mirror/test disk partitions)  │
│ Volume options      (configure/mount/dismount volumes)       │
│ License option      (install the server license)             │
│ Copy files option  (install NetWare system files)            │
│ Directory options  (install NetWare Directory Services)      │
│ NCF files options  (create/edit server startup files)        │
│ Product options     (other optional installation items)      │
│ Server options      (install/upgrade/this server)            │
│ Exit                                                         │
└─────────────────────────────────────────────────────────────┘
```

5. **Choose "Driver Options."**

   The "Driver Options" menu appears.

6. **Choose "Configure Disk and Storage Device Drivers."**

   The "Additional Driver Actions" menu appears.

7. **Choose "Select an Additional Driver."**

   The "Select a Driver" list appears.

8. **Choose the necessary CD-ROM drivers according to the documentation that accompanied your CD-ROM drive.**

Note ▼

If the device drivers you need are not listed, press <Ins> and follow the prompts to access a new list of drivers.

Load CDROMSHR.DSK if you want the CD-ROM drive to be shared by OS/2 and NetWare Server for OS/2. CDROMSHR.DSK allows NetWare to access CD-ROM devices operating under OS/2. CDROMSHR.DSK is the interface from NetWare to OS/2 and OS/2 is the interface to the CD-ROM drive.

9. **Once you have loaded all necessary drivers, from the "Additional Driver Actions" menu choose "Return to Previous Menu."**

10. **Press <Alt>+<F10> and choose "Yes" to exit INSTALL.NLM.**

    You are returned to the server console.

11. **At the console prompt, type the following commands:**

    ```
    LOAD NWPA  <Enter>
    LOAD CDROM  <Enter>
    CD MOUNT NW410  <Enter>
    ```

12. **Go to the OS/2 workstation on which you want to load NetWare Server for OS/2 and log in to the host server with the mounted CD-ROM NetWare volume.**

13. **Map a drive to the CD-ROM.**

14. **On the CD-ROM drive, type**

    `INSTALL` <Enter>

    A dialog box allowing you to choose the language you want to install appears (see Figure 4-1 on page 185).

15. **Choose the language you want to install and press** <Enter>.

16. **Go to "Determine Which Installation Option to Use" on page 193.**

Install from a NetWare Volume with Files Copied on a Server

Necessary Resources

Checklist ▼

❏ An existing NetWare server with sufficient disk space (at least 170 MB) to store the NetWare 4.1 operating system files. (This will be the host server.)

❏ An existing OS/2 workstation with the NetWare Client for OS/2 installed on it. (This will be the new NetWare Server for OS/2.)

❏ (Conditional) A CD-ROM drive that can read ISO 9660 formatted CD-ROMs.

    This is used to copy the NetWare 4.1 files from the CD-ROM to the host server.
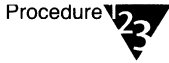
Procedure

1. **Create a NETWARE directory on an existing server and copy the files from the installation medium to that directory.**

    For example, to copy from CD-ROM drive D: to network drive K:, type

    ```
    K:  <Enter>
    MD NETWARE  <Enter>
    CD NETWARE  <Enter>
    NCOPY D:  /S  /E  /V  <Enter>
    ```

    To copy from floppy diskettes, make subdirectories for each of the diskettes, type the following command for each floppy diskette:

    ```
    NCOPY A:  /S  /E  /V  <Enter>
    ```

2. **Install NetWare Client for OS/2 on each computer you want to be a NetWare Server for OS/2.**

    If the client software is not installed, you cannot connect to the host server. For instructions on installing client software, see "Install NetWare Client for OS/2" on page 216.

3. **On every computer you want to make a NetWare Server for OS/2, map a drive to the network server directory that contains the NetWare 4.1 files.**

4. **Change to the drive corresponding to the server where you copied the installation files.**

5. **Type**

    ```
    INSTALL  <Enter>
    ```

    A dialog box allowing you to choose the language you want to install appears (see Figure 4-1 on page 185).

6. **Choose the language you want to install and press <Enter>.**

7. **Go to "Determine Which Installation Option to Use" on page 193.**

Install from Floppy Diskettes

Procedure

Procedure
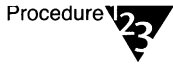
1. **Open an OS/2 window or full screen session.**

2. **Insert the *Install* diskette into drive A:.**

3. **Change to the floppy drive and type**

   `INSTALL` <Enter>

   A dialog box allowing you to choose the language you want to install appears (see Figure 4-1 on page 185).

4. **Choose the language you want to install and press** <Enter>.

5. **Continue with the next section, "Determine Which Installation Option to Use."**

Determine Which Installation Option to Use

After you choose the language you want to install, the installation utility appears (see Figure 4-3).

Figure 4-3
NetWare for OS/2
Installation Utility

```
┌──────────────────────────────────────────────────────────────────┐
│ ⌐ NetWare Workstation for OS/2 Installation Utility          ▐ ▐ │
│                                                                    │
│  Welcome to the NetWare Installation program.                    ▲ │
│                                                                    │
│  This installation program is used for both NetWare Client for OS/2 │
│  and NetWare for OS/2. See options under the Installation menu.    │
│                                                                    │
│  NetWare Client for OS/2 has been installed on this workstation and │
│  is currently running. You have the following options available:  │
│                                                                    │
│  ✕  To install a new version of NetWare Client for OS/2, choose "Requester │
│     on workstation" from the Installation menu.                   │
│     ✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕ │
│     IMPORTANT!  Previous versions of the NetWare statements in the │
│     CONFIG.SYS may not be compatible with NetWare Client for OS/2  │
│     version 2.10. Be sure to choose "Edit CONFIG.SYS and Copy All Files" │
│     from the Requester Installation window. This is the default option │
│     of the installation utility. Choosing this option will ensure that │
│     proper paths will be set up and drivers will be loaded in the │
│     correct order in the CONFIG.SYS.                              │
│     ✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕✕ │
│                                                                    │
│  ✕  To configure or reconfigure NetWare Client for OS/2 on this workstation, │
│     choose "This workstation" from the Configuration menu.       ▼ │
│                                                                    │
│                                                                    │
└──────────────────────────────────────────────────────────────────┘
```

This utility is used for installing NetWare Server for OS/2 and NetWare Client for OS/2.

The main screen includes help information. For example, if NetWare Client for OS/2 is not running on your computer, a help message indicates possible reasons. The help message also indicates how to begin the installation.

There are three options for installing. Use the table below to determine which option to use.

If you want to	Go to
Install a new custom NetWare Server for OS/2	"Install Using the NetWare Server for OS/2 Option" on page 198.
Install a new simplified NetWare Server for OS/2 using defaults the system chooses for you	"Install Using Simplified NetWare Server for OS/2 Option" on page 195.
Upgrade an existing NetWare Server for OS/2 to a newer version	"Upgrade NetWare Server for OS/2" on page 223.

Install Using Simplified NetWare Server for OS/2 Option

The "Simplified NetWare Server for OS/2" option is designed to make installation of NetWare Server for OS/2 easier. When you use this option, it makes certain assumptions about your setup that may or may or may not be acceptable.

Assumptions Made by the Simplified Option

The "Simplified NetWare Server for OS/2" option assumes

Checklist ✔

☐ NetWare Server for OS/2 and NetWare Client for OS/2 are running on the same computer.

☐ NetWare Client for OS/2 and NetWare Server for OS/2 share a network board.

☐ Default selections for network board sharing.

☐ Only IPX/SPX communication protocols with TCP/IP support (no IBM* communication protocols) will be used on the network.

☐ Randomly generated IPX internal network numbers and other server information defaults are acceptable.

☐ The hard disk will not be mirrored or duplexed.

☐ One NetWare volume per disk.

☐ Automatic update of the CONFIG.SYS, NET.CFG, AUTOEXEC.NCF, and STARTUP.NCF files.

☐ A default NetWare Directory Services hierarchy. The Simplified Installation (in NetWare 4.1) assumes a single container for all objects.

Prerequisites

❑ Determine whether this computer will be a

◆ NetWare Server for OS/2 and NetWare Client for OS/2 sharing a network board.

◆ NetWare Server for OS/2 and NetWare Client for OS/2 using more than one network board for the server and client.

◆ NetWare Server for OS/2 only (using no client software).

❑ (Conditional) If you are sharing a network board, you must install NetWare Client for OS/2 before installing NetWare Server for OS/2.

For information on installing the client software, see "Install NetWare Client for OS/2" on page 216.

For more detailed information about installing and configuring the client software, see *NetWare Client for OS/2 User Guide*.

Procedure

Procedure ▼

1. **From the "Installation" pull-down menu, choose "Simplified NetWare Server for OS/2."**

The following dialog box appears.

Figure 4-4
NetWare Server for OS/2 Installation
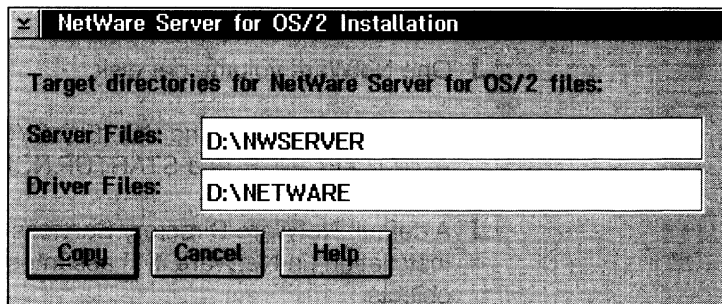
This dialog box allows you to verify the target directories where the server and driver files will be copied. The target directories are \NETWARE for driver files and \NWSERVER for server files on your OS/2 boot drive.

2. **Choose "Copy" to copy the server and driver files to the target directories.**

   The bar at the bottom of the installation utility indicates which files are being copied. After several minutes, an "Installation Message" appears indicating that the files have been copied.

3. **Choose "OK" to continue the installation.**

   The "Server Information" dialog box appears (see Figure 4-5).

Figure 4-5
The "Server Information" Dialog Box
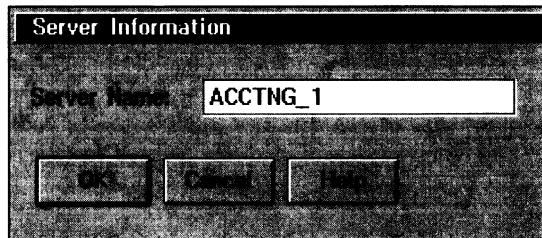
4. **Type the server name in the box provided and record the name for future reference.**

   When the NetWare operating system (SERVER.EXE) loads, it reads this name.

5. **Choose "OK" to accept the server name.**

   The installation utility main screen appears with a message indicating that you have completed the first part of the NetWare for OS/2 installation. The second part consists of installing NetWare 4.1.

6. **Exit the installation program by double-clicking on the small icon in the upper-left corner of the installation utility main screen.**

   A message appears indicating that you need to reboot the computer so the changes made to the CONFIG.SYS and NET.CFG files will take effect.

7. **Choose "OK" to close the message.**

8. **Use the OS/2 shutdown feature to reboot your computer.**

   Click the right mouse button on the desktop and select "Shut Down" from the menu that appears.

   When the computer reboots, the second part of the installation (installing NetWare 4.1) starts automatically.

9. **Go to "Choose the Server Drivers" on page 209.**

Install Using the NetWare Server for OS/2 Option

Prerequisites

Checklist ✔

❑ Determine whether this computer will be a
   ◆ NetWare Server for OS/2 and NetWare Client for OS/2 sharing a network board.
   ◆ NetWare Server for OS/2 and NetWare Client for OS/2 using more than one network board for the server and client.
   ◆ NetWare Server for OS/2 only (no client software).

❑ (Conditional) If you are sharing a network board, you must install NetWare Client for OS/2 before installing NetWare Server for OS/2.

   For information on installing the client software, see "Install NetWare Client for OS/2" on page 216.

   For more detailed information about installing and configuring the client software, see *NetWare Client for OS/2 User Guide*.

Procedure

1. **From the "Installation" pull-down menu, choose "NetWare Server for OS/2."**

   If NetWare Client for OS/2 is installed and running on your computer, the following dialog box appears.

Figure 4-6
Target Directories
for Server Files
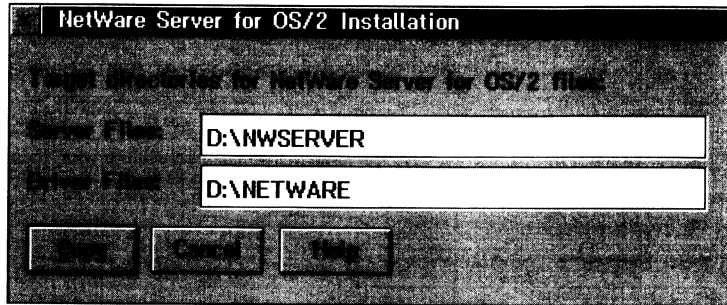
This dialog box allows you to verify the target directories where the server and driver files will be copied. The target directories are \NETWARE for driver files and \NWSERVER for server files on your OS/2 boot drive.

Note ▼▼▼ If NetWare Client for OS/2 is not installed, a message appears indicating that if you are sharing a network board, you must install the client software before installing NetWare Server for OS/2.

If you need to install the client software, choose "OK" and go to "Install NetWare Client for OS/2" on page 216.

2. **Choose "Copy" to copy the server and driver files to the target directories.**

   The bar at the bottom of the installation utility indicates which files are being copied. After several minutes, a message appears indicating that the files have been copied (see Figure 4-7).

Figure 4-7
System Message
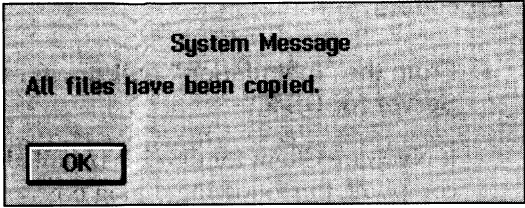
3. Choose "OK" to continue the installation.

The following message appears (see Figure 4-8).

Figure 4-8
Sharing a Network
Board Between the
Client and Server
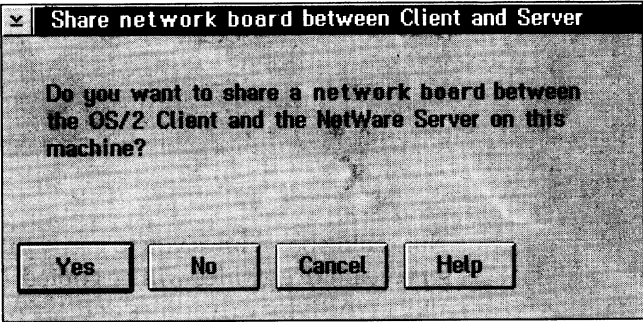
Use the decision table below to determine how to answer the message.

If the client and server	Then
Will share the same network board (the client and server are on the same computer)	Choose "Yes." The "Network Board Sharing Options" dialog box appears. Continue with the next section, "Sharing a Network Board."

If the client and server	Then
Will not share the same network board.	Choose "No."
	The "Save Changes to CONFIG.SYS" dialog box appears.
	Choose "OK" to save changes to the CONFIG.SYS file.
	Go to "Enter Installation Information" on page 206.

Sharing a Network Board

If you answered Yes to sharing a network board between the client and server, the "Network Board Sharing Options" dialog box appears (see Figure 4-9).

Figure 4-9
Network Board
Sharing Options
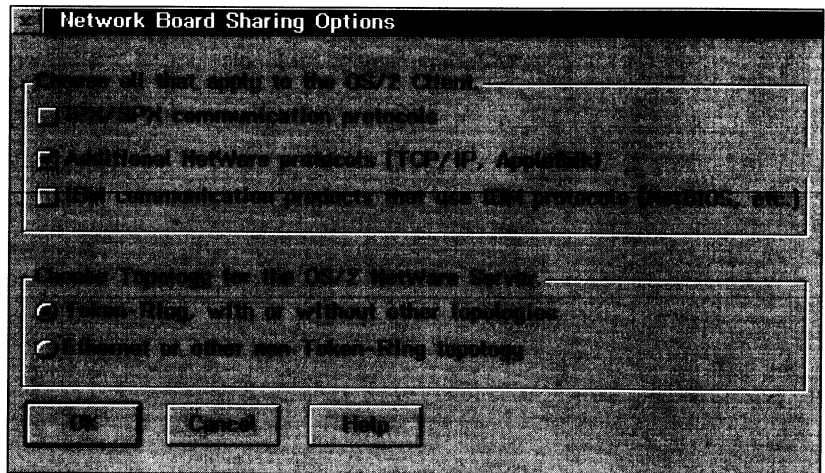
Procedure
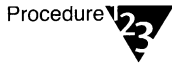
1. Select the options in the "Network Board Sharing Options" dialog box that apply to your NetWare Server for OS/2 setup.

The "Additional NetWare Protocols" and "Token Ring, With or Without Other Topologies" options are selected as defaults.

Use the decision box below to determine if you need to select options other than the defaults.

If your computer is sharing a network board using	Choose
Other NetWare protocols in addition to IPX/SPX (TCP/IP, AppleTalk*, etc.)	"Additional NetWare Protocols" and "Token Ring With or Without Other Topologies." TOKENSHR.LAN will be loaded for you in the NetWare 4.1 installation. Continue with Step 2 below.
IBM communication protocols	"IBM Communication Products that Use IBM Protocols" and "Token Ring With or Without Other Topologies." TOKENLNK.LAN will be loaded for you in the NetWare 4.1 installation. This option requires that you are on a token ring network, that you have a token ring network board installed in your computer, and that you set up ODINSUP. Continue with Step 2 below.
IPX/SPX protocols only	"IPX/SPX Communication Protocols" and "Ethernet or Other Non-Token Ring Topology." LANSHARE.LAN will be loaded for you in the NetWare 4.1 installation. Continue with Step 2 below.

2. Choose "OK" to continue the installation.

The "Save Changes to CONFIG.SYS" dialog box appears.
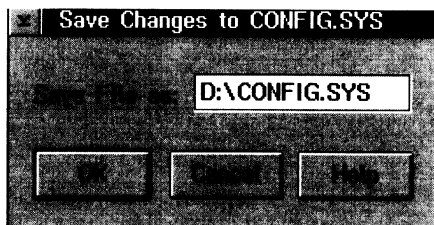
Several lines are added to the CONFIG.SYS file based on the options you selected in the "Network Board Sharing Options" dialog box (in Step 1). This dialog box confirms the location of your CONFIG.SYS file.

Note ▼ If you want to save the changes to another file, you can enter the path in this box. You would then need to update changes to the CONFIG.SYS file manually.

3. Choose "OK" to save the changes to the CONFIG.SYS file.

One of two different dialog boxes will appear depending on the choices you made in the "Network Board Sharing Options" dialog box (in Step 1).

If you chose	Then
"IBM Communication Products that use IBM Protocols"	A message appears indicating that you need to set up ODINSUP.
	Choose "Yes" and continue with the next section, "Set Up ODINSUP for Network Board Sharing."
Any other option	The "Enter Installation Information" box appears (see Figure 4-13).
	Continue with "Enter Installation Information" on page 206.

Set Up ODINSUP for Network Board Sharing

The "ODINSUP Configuration Files" box appears (see Figure 4-11).

Figure 4-11
ODINSUP
Configuration Files


```
┌──────────────────────────────────────────┐
│ ⌄  ODINSUP Configuration Files           │
├──────────────────────────────────────────┤
│                                          │
│  PROTOCOL.INI :  │D:\IBMCOM\PROTOCOL.I│   │
│                                          │
│  NET.CFG :       │D:\NET.CFG          │   │
│                                          │
│  CONFIG.SYS :    │D:\CONFIG.SYS       │   │
│                                          │
│    ┌──────┐   ┌────────┐   ┌──────┐      │
│    │  OK  │   │ Cancel │   │ Help │      │
│    └──────┘   └────────┘   └──────┘      │
│                                          │
└──────────────────────────────────────────┘
```
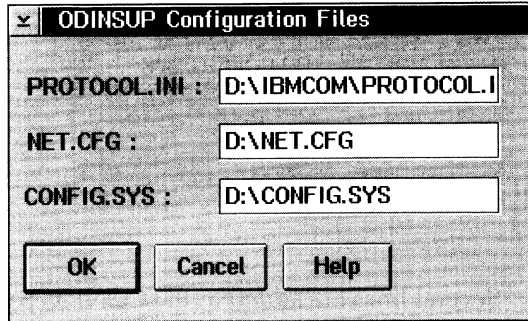
OS/2 and IBM communication programs, such as Extended Services and LAN Services, use protocol drivers and network drivers written to the NDIS specification.

NetWare Server for OS/2 and NetWare Client for OS/2 use protocol drivers and network drivers written to the ODI™ (Open Data-link Interface™) specification.

The ODINSUP setup provides a way for NetWare products and IBM products to share a network board, by replacing the NDIS driver with a driver called ODINSUP.SYS.

The "ODINSUP Configuration Files" dialog box displays the location of the PROTOCOL.INI, NET.CFG, and CONFIG.SYS files. These files are edited during ODINSUP setup.

If the location of the configuration files as they appear in this box is incorrect, type the correct path in the box next to each filename.

Note ▼ For more information about sharing network boards and setting up ODINSUP, see *NetWare Client for OS/2 User Guide* and "ODINSUP" in *Concepts*.

Procedure
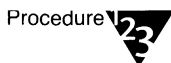
Procedure ▼ 1. **Choose "OK" to continue the installation.**

The following dialog box appears (see Figure 4-12).

Figure 4-12
ODINSUP Setup Box
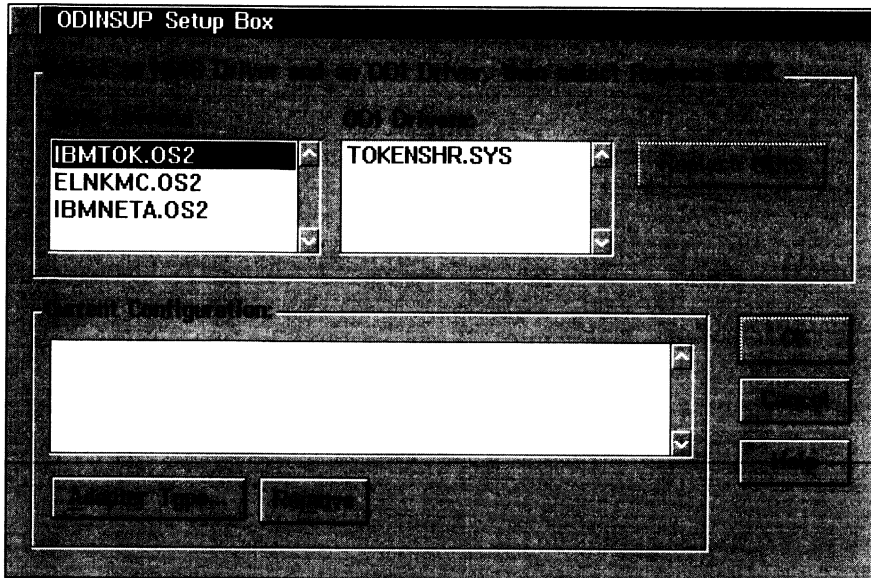
2. **Select the NDIS driver and the ODI driver you want to replace it with from the lists in the "ODINSUP Setup Box."**

   If you do not know which NDIS driver to select, check the documentation for the IBM program you are using.

   The "Replace NDIS" button is not active until a driver from each list is selected.

3. **Choose "Replace NDIS."**

   The drivers you select are displayed in the "Current Configuration" field with a message indicating that the ODI driver is replacing the NDIS driver.

   Note ▼ If you select the wrong NDIS or ODI driver to be replaced, choose "Remove" to remove the selected drivers from the "Current Configuration" field.

4. **Repeat Step 2 and Step 3 for each NDIS driver you want replaced by an ODI driver.**

5. **Choose "OK" to replace the NDIS drivers with the ODI drivers you selected.**

   ODINSUP is set up and your NET.CFG, CONFIG.SYS, and PROTOCOL.INI files are edited for you.

Note ▼ For more detailed information about setting up ODINSUP, and editing the NET.CFG and CONFIG.SYS files, see "Using ODINSUP" in *NetWare Client for OS/2 User Guide*.

6. **Continue with the next section, "Enter Installation Information."**

Enter Installation Information

The "Enter Installation Information" box appears (see Figure 4-13).

Figure 4-13
Enter Installation
Information

To move among the fields in the "Enter Server Information" dialog box, press <Tab> or use the mouse.

Procedure
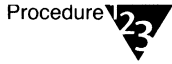
1. **In the "Server Name" field, type the server name in the box provided and record the name for future reference.**

   When the NetWare operating system (SERVER.EXE) loads, it reads this server name.

2. **In the "IPX Internal Network Number" field, accept the randomly generated number, or assign a new IPX number to this server.**

   The IPX internal network number is a logical network number that identifies an individual NetWare 4 server. Each server on a network must have a unique IPX internal network number.

   If your NetWare Server for OS/2 is on a small network, the randomly generated number is probably sufficient, because there is low probability that it will be repeated.

   Whether you accept the random number or enter your own, you should record the number for future reference.

   Note

   For more information about IPX internal network numbers, see "Network numbering" in *Concepts*.

3. **(Optional) Verify the country code, code page, and keyboard information for your server.**

   For information on the country code, code page, or keyboard mapping, see your OS/2 manual.

   For a brief explanation, choose "Help" or press <F1>.

4. **(Optional) Select a filename format.**

   The "DOS Filename Format" is selected as a default and is recommended. This filename format limits you to using valid DOS filename characters according to the country code and code page selections.

   Limiting the server to valid DOS filename characters prevents workstations using NETX shells from creating files using nonstandard DOS filename characters.

   Selecting "NetWare Filename Format" allows you to use NetWare-acceptable characters that may or may not be valid DOS characters.

5. **Choose "OK" to accept the settings in the "Enter Installation Information" box.**

   The installation main screen appears again with a message indicating that you have completed the first part of the NetWare Server for OS/2 installation. The second part consists of installing NetWare 4.1.

6. **Exit the installation program by double-clicking on the small icon in the upper-left corner of the main screen.**

   A message appears indicating that you should reboot the computer so the changes you made to the CONFIG.SYS and NET.CFG files will take effect.

Figure 4-14
Reboot the Computer
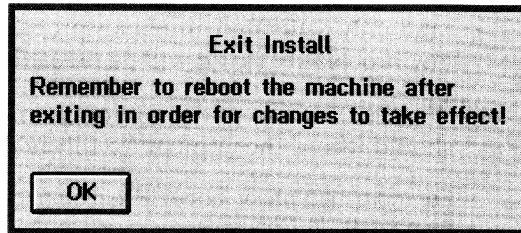
7. **Choose "OK."**

8. **Use the OS/2 shutdown feature to reboot your computer.**

   Click the right mouse button on the desktop and select "Shut Down" from the menu that appears.

   When the computer reboots, the second part of the installation (installing NetWare 4.1) will start automatically.

9. **Continue with the next section, "Choose the Server Drivers."**

Choose the Server Drivers

After you reboot the computer, the server is brought up automatically and the NetWare 4.1 installation utility starts. A screen listing the available LAN drivers appears (see Figure 4-15).

If this screen does not appear after rebooting, open an OS/2 Window or Full Screen and change to the \NWSERVER directory. Then type

NWINSTAL <Enter>

This will bring up the server and start the NetWare 4.1 installation program.

Load a LAN Driver

When the NetWare 4.1 installation program starts, it scans for available disk and LAN drivers, and the following screen appears.

Figure 4-15
Available LAN
Drivers

```
| NWINSTAL.CMD                                               ▣▣

Choose the Server Drivers - Network Driver

Select a driver corresponding to a network interface board in this computer.

┌──────────────────────────────────────────────────────────────────────┐
│ ▲│NE2000.LAN │ Novell Ethernet NE2000                                 │
│  │NE2100.LAN │ Novell Ethernet NE2100                                 │
│  │NE2_32.LAN │ Novell Ethernet NE/2-32                                │
│  │NE3200.LAN │ Novell Ethernet NE3200                                 │
│  │NE3200P.LAN│ Novell Ethernet NE3200P                                │
│ ▼│NE3210.LAN │ Novell/Eagle EISA Ethernet NE3210                      │
└──────────────────────────────────────────────────────────────────────┘

          ┌──────────────────────────────────────────────────┐
          │ "NE2000.LAN" Help                              ▲ │
          │                                                ▓ │
          │ This driver (NE2000.LAN) supports NE2000 or    ▓ │
          │ NE2000T network boards installed in 16-bit     ▓ │
          │ expansion slots in ISA servers. You can install up ▼ │
          └───────────(To scroll, <F7>-up <F8>-down)──────────┘

  Select a listed driver <Enter>          Install an unlisted driver <Ins>
  Help                    <F1>            Continue without selecting <F10>
```

Procedure

1. Choose the driver corresponding to the network board installed in your computer.

Use the Up- and Down-arrow keys to select the LAN driver. (The mouse does not function in the NetWare 4.1 installation program.)

If	Then
The driver is listed	Choose the appropriate LAN driver and press <Enter>.
	Continue with Step 2.
The driver is not listed	Press <Ins> and follow the prompts.
	Continue with Step 2.

Note

If you chose the TOKENLNK network board sharing option (see "Sharing a Network Board" on page 201), you must have a token ring network board installed in your computer and you must load the token ring driver corresponding to it.

For a current list of network boards and drivers that work with TOKENLNK, see the README file included with the NetWare Server for OS/2 installation utility.

A screen similar to the following appears (see Figure 4-16).

Figure 4-16
Network Driver
Parameters


```
┌─────────────────────────────────────────────────────────────────────┐
│ ▓ │ NWINSTAL.CMD                                            │◄│  │►│ │
├─────────────────────────────────────────────────────────────────────┤
│                                                                       │
│  Choose the Server Drivers - Network Driver Parameters                │
│               ┌──────────────── NE2000_1 Protocols ──────────────┐    │
│               │ ---   IPX (always selected)                      │    │
│               │ [ ]   TCP/IP                                     │    │
│               │ [ ]   AppleTalk                                  │    │
│               └──────────────────────────────────────────────────┘    │
│                                                                       │
│               ┌──────────────── NE2000_1 Parameters ─────────────┐    │
│                                                                  ▲    │
│               Interrupt number:     3                            █    │
│               Port value:           300                          █    │
│               Node Address:                                      ░    │
│               Retries:              5                            ▼    │
│               └──────────────────────────────────────────────────┘    │
│                                                                       │
│           ┌─────────────────────────────────────────────────────┐    │
│           │     Board NE2000_1 (Driver NE2000) Actions          │    │
│           ├─────────────────────────────────────────────────────┤    │
│           ││Select/Modify driver parameters and protocols│       │    │
│           ││Save parameters and load driver              │       │    │
│           └─────────────────────────────────────────────────────┘    │
│                                                                       │
├─────────────────────────────────────────────────────────────────────┤
│ Help <F1>   Previous screen <Esc>   Change Lists <Tab>   Abort <Alt><F10> │
└─────────────────────────────────────────────────────────────────────┘
```
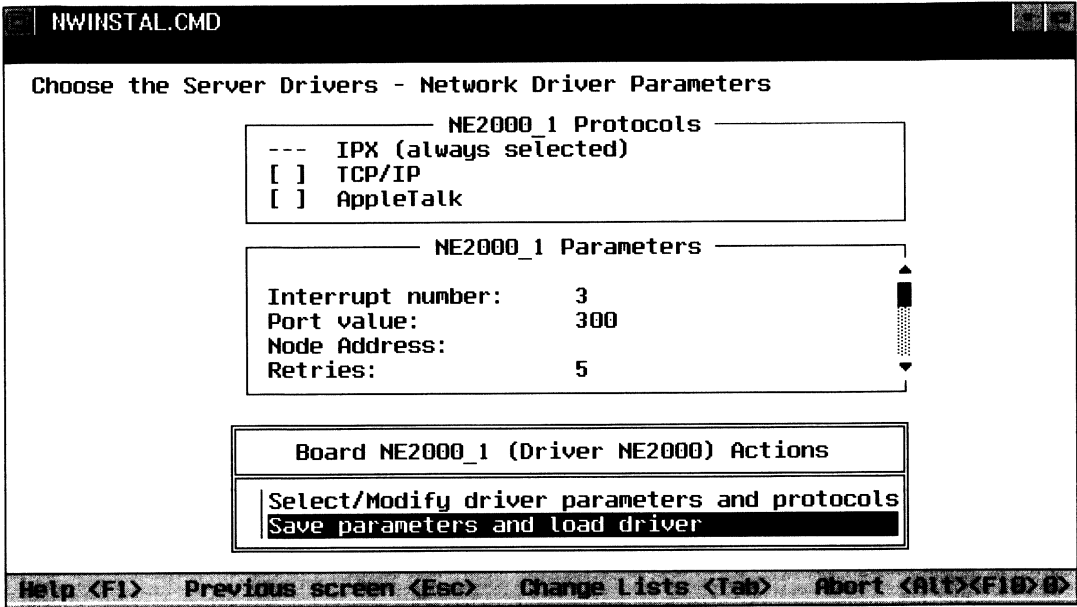
2. Verify that the driver parameters match the settings on the network board in your computer.

If the default values	Then
Are correct	Continue with Step 3.
Are incomplete or conflict with other hardware settings	Choose "Select/Modify Driver Parameters" and enter the parameters. Press <F10> or <Esc> to exit the screen and save your changes. Continue with Step 3.

Note ▼ If you chose the TOKENLNK network board sharing option, random ring numbers have been selected for you. If you need to enter specific ring numbers for your network board, choose "Select/Modify Driver Parameters" and enter the ring numbers.

3. **Choose "Save Parameters and Load Driver" and press** <Enter>.

A screen appears indicating that IPX will be bound to the driver you just selected.

4. **Press** <Enter> **to continue.**

A screen appears asking if you want to select another network driver.

5. **Choose "No" and press** <Enter>.

The following screen appears (see Figure 4-17).

Figure 4-17
Choose the Server
Drivers

```
┌─────────────────────────────────────────────────────────────────┐
│ ▣  NWINSTAL.CMD                                          ▫ ▫ □   │
├─────────────────────────────────────────────────────────────────┤
│                                                                   │
│  Choose the Server Drivers - Summary                              │
│                                                                   │
│  Select the drivers corresponding to the disk and network        │
│  hardware (cards, controllers, etc.) in this machine.            │
│                                                                   │
│   ┌──────────────────────────────────── Driver Names ──────────┐ │
│   │                                                             │ │
│   │  Disk and CD-ROM Drivers:               >DSKSHARE           │ │
│   │                                                             │ │
│   │  Network (LAN) Drivers:                 >TOKENSHR, NE2000   │ │
│   │                                                             │ │
│   └─────────────────────────────────────────────────────────────┘ │
│                                                                   │
│                  ┌──────────────────────────────┐                │
│                  │ .   Driver Actions            │                │
│                  │  ┌──────────────────────────┐ │                │
│                  │  │ Select Disk or LAN drivers│ │                │
│                  │  │ Continue installation    │ │                │
│                  │  └──────────────────────────┘ │                │
│                  └──────────────────────────────┘                │
│                                                                   │
├─────────────────────────────────────────────────────────────────┤
│ Help <F1>         Previous screen <Esc>      Abort INSTALL <Alt><F10> │
└─────────────────────────────────────────────────────────────────┘
```
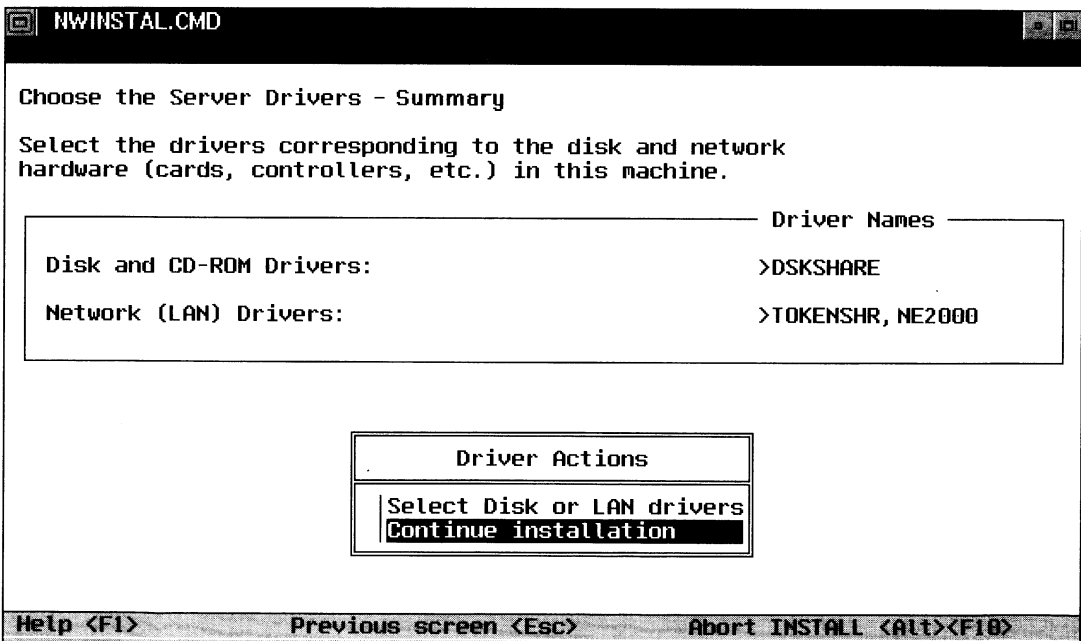
This screen indicates that the LAN driver you have just selected is currently loaded. This screen also displays the default disk and LAN drivers that were chosen for you to be loaded.

When the NetWare 4.1 installation utility started automatically, it scanned for available disk and LAN drivers (see "Choose the Server Drivers" on page 209).

DSKSHARE is always the default disk driver if your OS/2 and NetWare file systems share the same hard disk. DSKSHARE allows OS/2 and NetWare to use separate partitions on the same hard disk.

DSKSHARE is the interface to OS/2, and OS/2 is the interface to the driver for the hard drive.

If you install additional hard disks that are used only by NetWare, you will need to install additional NetWare disk drivers to handle those disks.

The default LAN driver chosen for you varies depending on the choices you made for sharing a network board (see "Sharing a Network Board" on page 201).

For example, if you chose "IBM Communication Products that Use IBM Protocols," TOKENLNK is the chosen default driver.

If you chose "IPX/SPX Communication Protocols Only," LANSHARE is the default driver.

If you accepted the default choices, TOKENSHR is the default driver.

The default driver must be loaded in addition to the LAN driver you loaded corresponding to the network board in your computer.

The default driver allows OS/2 and NetWare to share the same physical network board. The default driver is the interface from OS/2 to NetWare. The LAN driver you loaded in Step 1 is the interface from NetWare to the network board.

6. Choose "Continue Installation."

The "Bind LAN Driver to IPX" screen appears (see Figure 4-18).

Figure 4-18
Bind LAN Driver to
IPX

```
┌──────────────────────────────────────────────────────────────────────┐
│ ▣  NWINSTAL.CMD                                              ▪ ▣        │
├──────────────────────────────────────────────────────────────────────┤
│                                                                        │
│  Bind LAN Driver to IPX                                                │
│                                                                        │
│  LAN driver TOKENSHR_1 has been loaded with frame type TOKEN-RING.     │
│  Select an IPX network number to bind the driver to. This number       │
│  must be unique across all interconnected networks visible to this     │
│  server. Accept the default random number or enter another number.     │
│                                                                        │
│  Note:  this number should be different from the IPX internal          │
│  network number (43404C5C).                                            │
│       ┌────────────────────────────────────────────────────────┐      │
│       │  Network number to bind IPX to TOKENSHR_1 (frame TOKEN-RING): │
│       │                                                          │      │
│       │ >55851D77                                                │      │
│       └────────────────────────────────────────────────────────┘      │
│                                                                        │
│                                                                        │
├──────────────────────────────────────────────────────────────────────┤
│  Accept random network address and continue <Enter>                    │
│  Don't bind to IPX; continue                   <Esc>                   │
│  Help                                          <F1>                    │
└──────────────────────────────────────────────────────────────────────┘
```

The LAN driver you selected corresponding to the network board in your computer has already been loaded and bound to IPX. The default LAN driver (LANSHARE or TOKENSHR) must also be bound to IPX.

Use this screen to assign an IPX external network number to the driver. The IPX external network number assigned to this driver must be unique and cannot match the IPX external network number that is bound to the other LAN driver you loaded.

You can accept the randomly generated IPX external network number or enter your own IPX external network number to be bound to the default driver.

Record this IPX external number for future reference.

For more information about the IPX external network number, see "Network numbering" in *Concepts*.

Note ▼ If you are using the TOKENLNK network board sharing option, your token ring driver and TOKENLNK will not be bound to IPX. A message will appear indicating that the drivers have loaded successfully.

7. Press <Enter> to accept the IPX external network number and continue with the installation.

8. Use the table below to determine where to go to continue the installation.

If you installed the	Go to
"Simplified NetWare Server for OS/2" option	"NetWare Partition Overview" on page 43. (Located in Chapter 2 "Simple Installation.")
"NetWare Server for OS/2" option	"Create NetWare Disk Partitions" on page 100. (Located in Chapter 3 "Custom Installation.")

Install NetWare Client for OS/2

If NetWare Client for OS/2 is not installed or is not currently running on your computer and you attempt to install NetWare Server for OS/2, the following message appears.
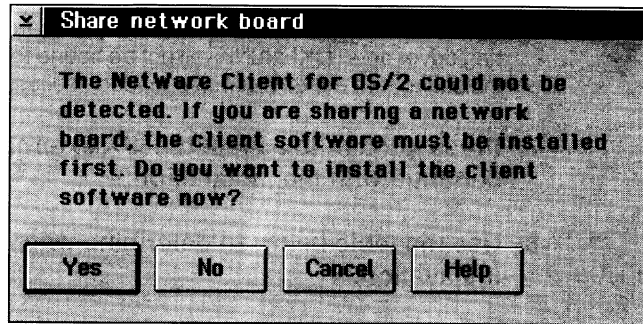
If you are sharing a network board between the client and server, you must install NetWare Client for OS/2.

If you answer "Yes," a "Set Target Directory" dialog box appears (see Figure 4-20).
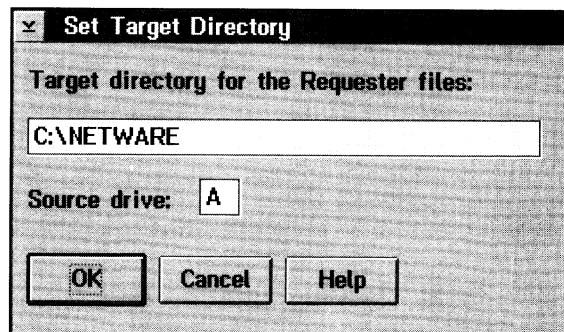
This dialog box allows you to verify the source drive that the client files will be copied from and the target directory that the files will be copied to.

For example, if you are installing from CD-ROM, the source drive is the drive associated with the CD-ROM reader and the target directory is \NETWARE on your OS/2 boot drive (for example, D:\NETWARE).

This section briefly explains how to install the client software. For a more detailed explanation, see *NetWare Client for OS/2 User Guide*.

Procedure

Procedure
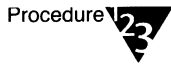
1. **Choose "OK" in the "Set Target Directory" dialog box to confirm where the client files will be copied to.**

   The "Requester Installation" dialog box appears (see Figure 4-21).

Figure 4-21
Requester
Installation
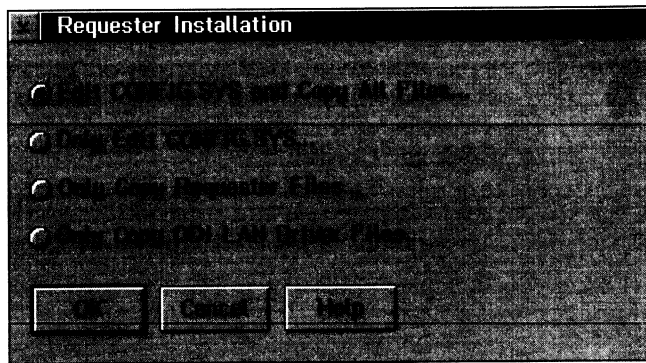
The "Edit CONFIG.SYS and Copy All Files" option is selected as a default. You should use this default option if you are doing a complete client installation for the first time.

For information about the other options in this dialog box, either press <F1>, choose "Help," or refer to *NetWare Client for OS/2 User Guide*.

2. **Choose "OK" to copy the files to your target directory.**

   The "Choose the ODI LAN Driver" dialog box appears.

Figure 4-22
Choose the ODI
LAN Driver

Step 1 - Choose the ODI LAN Driver

Choose from the list or type in the driver name:

NE2000.SYS

| Continue | Cancel | Help |
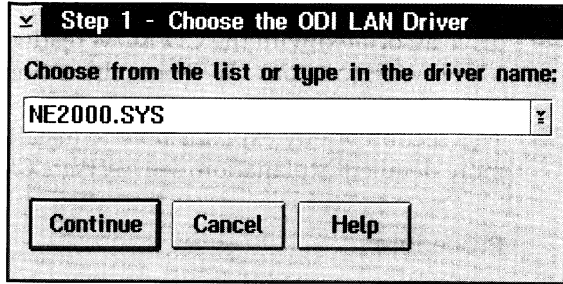
3. Choose the LAN driver for your computer.

You can type the name of the driver in the "Choose the ODI LAN Driver" dialog box or click on the scroll arrow and select the driver from the list.

Note

If you are installing NetWare Client for OS/2 from floppy diskettes, you will be prompted to insert the *WSDRV_1* diskette.

4. Choose "Continue."

The "Choose NetWare Support for DOS and Windows Applications" dialog box appears (see Figure 4-23).

Figure 4-23
Choose NetWare Support for DOS and Windows Applications

Step 2 - Choose NetWare Support for DOS and Windows Applications

IPX Support for DOS and Windows: ◉ On   ○ Off

Default NetWare Shell Support

◉ Private NetWare Shell Support

○ Global NetWare Shell Support

○ No NetWare Shell Support

| Continue | Cancel | Help |
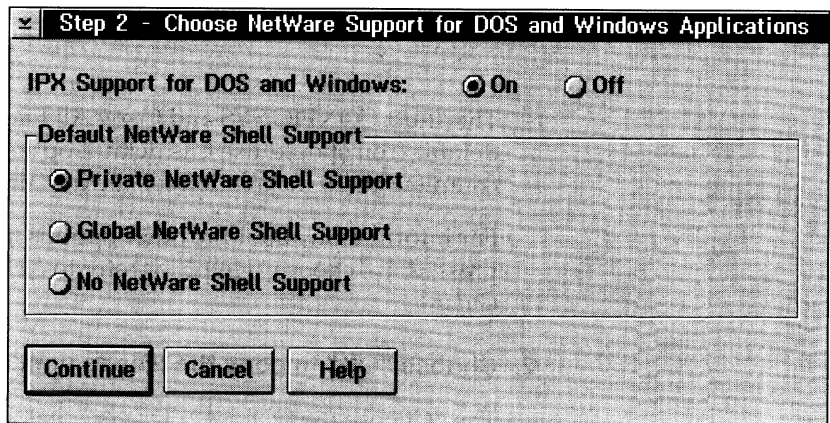
5. **Turn on "IPX Support for DOS and Windows" and select one of the "Default NetWare Shell Support" options.**

   If "IPX Support for DOS and Windows" is turned off, you cannot access the NetWare network from DOS or MS Windows sessions.

   For more information about the other options in this dialog box, either press <F1>, choose "Help," or refer to *NetWare Client for OS/2 User Guide*.

6. **Choose "Continue" to accept the options you selected.**

   The "Save Changes to AUTOEXEC.BAT" dialog box appears (see Figure 4-24).

Save Changes to AUTOEXEC.BAT

D:\AUTOEXEC.BAT
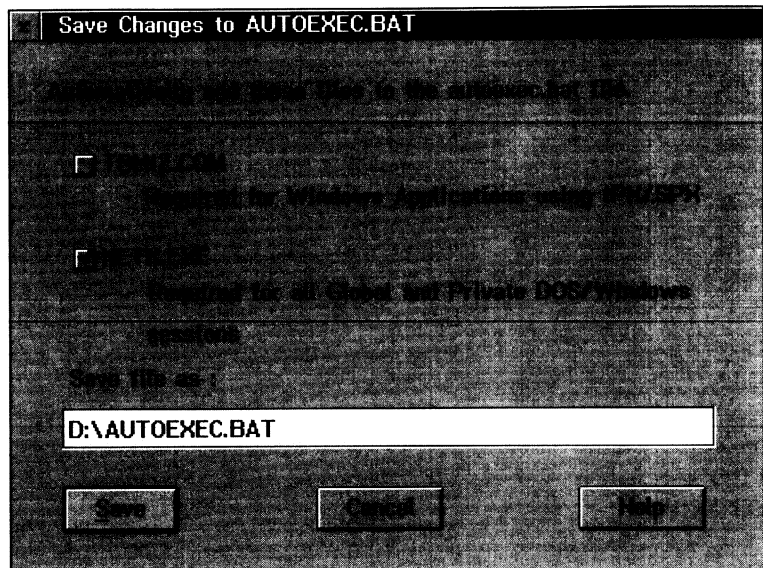
If you selected "Private or Global NetWare Support" (in Step 5), make sure that "NETX.EXE" is selected. This causes NETX.EXE to be loaded automatically when you start a DOS or MS Windows session.

If you selected IPX/SPX support, you need to select "TBMI2.COM" if you are using any MS Windows applications that use TBMI2 to directly access the network (some E-mail packages may require TBMI2).

7. **Choose "Save" to save the changes to the AUTOEXEC.BAT file and continue with the installation.**

A message appears asking if you want to add NETX.EXE and TBMI2.COM commands to another batch file.
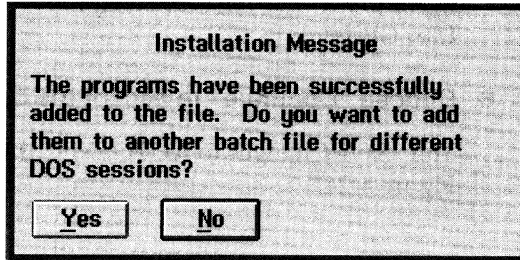
8. **Choose "No" to continue with the installation.**

For more information about adding NETX.EXE and TBMI2.COM to another batch file, see *NetWare Client for OS/2 User Guide*.

A message appears (see Figure 4-26) indicating that you need to set "DOS_LASTDRIVE=" to the last drive of your hard disk in the "DOS Window Settings" and "DOS Full Screen Settings" dialog boxes. (For example, if you have partitioned drives C:, D:, and E: on your hard disk, you would set DOS_LASTDRIVE=E).

For more information about entering settings for DOS sessions, see your OS/2 manual.

9. **Choose "OK" to continue with the installation.**

   The "Choose Optional Protocols" dialog box appears (see Figure 4-27).

Figure 4-27
Choose Optional
Protocols
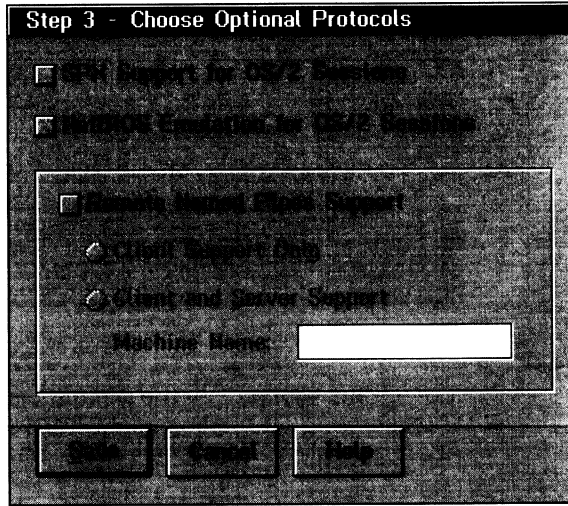
10. **Choose the protocol support you want, then choose "Save."**

    For more information about protocol support, either press <F1>, choose "Help," or refer to *NetWare Client for OS/2 User Guide*.

    The "Save Changes to CONFIG.SYS" dialog box appears.

Figure 4-28
Save Changes to
CONFIG.SYS
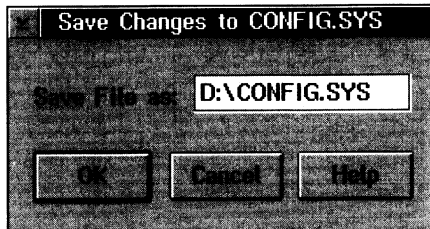
This dialog box displays the current location of your CONFIG.SYS file.

11. **Choose "OK."**

   The "Copy ODI LAN Driver Files" dialog box appears (see Figure 4-29).

Figure 4-29
**Copy ODI LAN
Driver files**
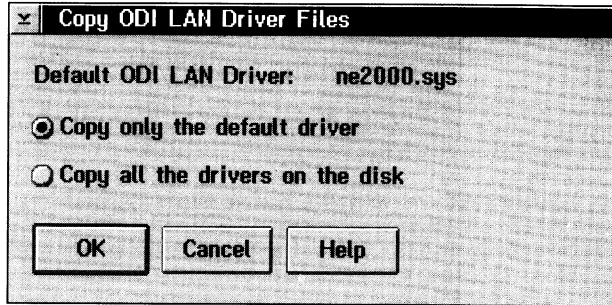
   The option "Copy Only the Default Driver" is selected as a default. If you want to copy all available ODI drivers to your client directory, choose "Copy All the Drivers on the Disk."

12. **Choose "OK" to copy the driver files.**

   The driver files are copied to the target directory. The "Copy Requester Files" dialog box appears.

Figure 4-30
**Copy Requester
Files**
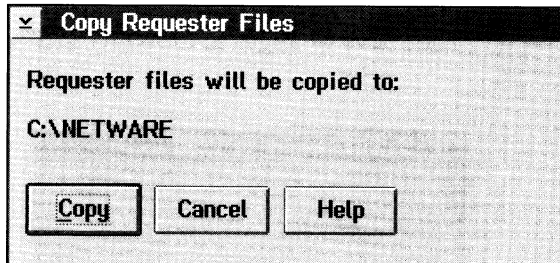
13. **Choose "Copy" to copy the client files to the target directory shown in the "Copy Requester Files" box.**

14. **Follow the screen prompts to complete the NetWare Client for OS/2 installation.**

15. Go to "Install Using the NetWare Server for OS/2 Option" on page 198.

Upgrade NetWare Server for OS/2

Use this installation option if you are upgrading from a NetWare 4.01 or 4.02 Server for OS/2 to a NetWare 4.1 Server for OS/2.

You can upgrade NetWare Server for OS/2 from CD-ROM, or from a remote server installation area that has the updated NetWare filed copied onto it.

Upgrade from CD-ROM

Procedure

Procedure
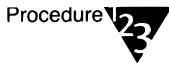
1. **Change to the CD-ROM drive and type**

   INSTALL <Enter>

   The installation utility appears.

   You do not need to down the server.

2. **From the "Installation" pull-down menu, choose "Upgrade NetWare Server for OS/2."**

   The "NetWare Server for OS/2 Installation" dialog box appears (see Figure 4-31).

Figure 4-31
NetWare Server for OS/2 Installation
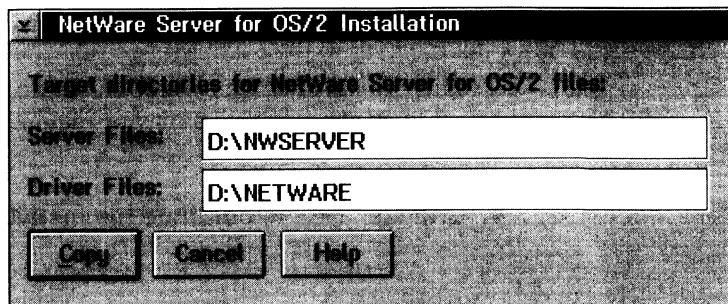
This dialog box allows you to verify the target directories that the server and driver files will be copied to. For example, the target directories are \NETWARE for driver files and \NWSERVER for server files on your OS/2 boot drive.

Note ▼ If you want to copy the files into directories other than the ones indicated, you can change the path and target directories in the boxes provided. However, the driver files *must* be copied to the same directory that contains NetWare Client for OS/2 (the \NETWARE directory).

3. **Choose "Copy" to copy the server and driver files to the target directories.**

The bar at the bottom of the installation utility indicates which files are being copied.

After the files are copied, a "Drivers Not Updated" box similar to Figure 4-32 may appear.

Figure 4-32
List of Drivers Not Upgraded
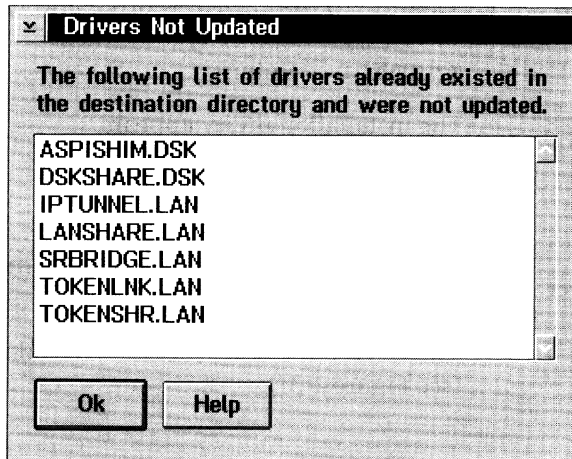
This is a list of drivers found in the destination path that were not updated. These drivers may or may not work with the updated version.

4. **Choose "OK" to continue the installation.**

5. **Exit the installation utility by double-clicking on the small icon in the upper-left corner of the main screen.**

   A message appears indicating that you should reboot the computer so the changes you made to the CONFIG.SYS and NET.CFG files will take effect.
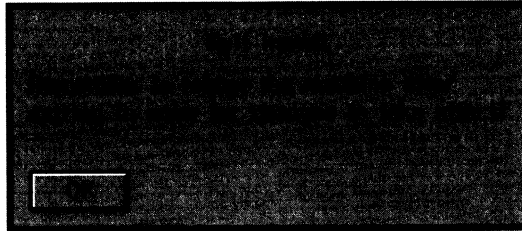
6. **Choose "OK."**

7. **Down the server.**

8. **Use the OS/2 shutdown feature to reboot your computer.**

   Click the right mouse button on the desktop and select "Shut Down" from the menu that appears.

   When the computer reboots, the second part of the installation (installing NetWare 4.1) will start automatically.

9. **Go to "Choose the Server Drivers" on page 209.**

Upgrade from a Remote Server Installation Area

Procedure

Procedure ▼
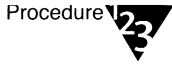
1. **Open an OS/2 window or full screen session.**

2. **Map a drive to the server that has a copy of the NetWare 4.1 installation files.**

3. **Change to the drive you mapped in Step 2.**

4. **Change to the 4.10 subdirectory and type**

   `INSTALL` <Enter>

   The installation utility appears.

5. **From the "Installation" pull-down menu, choose "Upgrade NetWare Server for OS/2."**

   The "NetWare Server for OS/2 Installation" dialog box appears (see Figure 4-31).

Figure 4-34
NetWare Server for OS/2 Installation
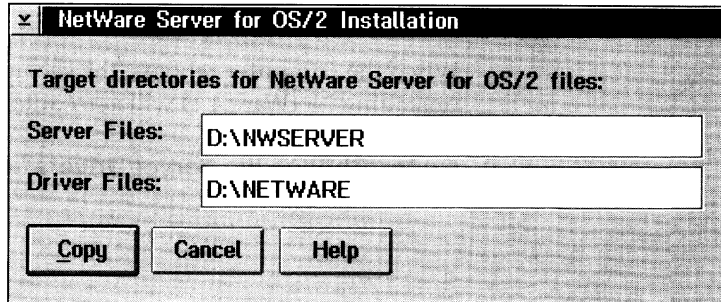

```
┌─────────────────────────────────────────────┐
│ ⌄  NetWare Server for OS/2 Installation       │
│                                               │
│   Target directories for NetWare Server for OS/2 files: │
│                                               │
│   Server Files:   D:\NWSERVER                 │
│                                               │
│   Driver Files:   D:\NETWARE                  │
│                                               │
│    ┌──────┐  ┌────────┐  ┌──────┐             │
│    │ Copy │  │ Cancel │  │ Help │             │
│    └──────┘  └────────┘  └──────┘             │
└─────────────────────────────────────────────┘
```

This dialog box allows you to verify the target directories that the server and driver files will be copied to. For example, the target directories are \NETWARE for driver files and \NWSERVER for server files on your OS/2 boot drive.

Note

If you want to copy the files into directories other than the ones indicated, you can change the path and target directories in the boxes provided. However, the driver files *must* be copied to the same directory that contains NetWare Client for OS/2 (the \NETWARE directory).

6. **Choose "Copy" to copy the server and driver files to the target directories.**

The bar at the bottom of the installation utility indicates which files are being copied.

After the files are copied, a "Drivers Not Updated" box similar to Figure 4-32 may appear.

Figure 4-35
List of Drivers Not Upgraded
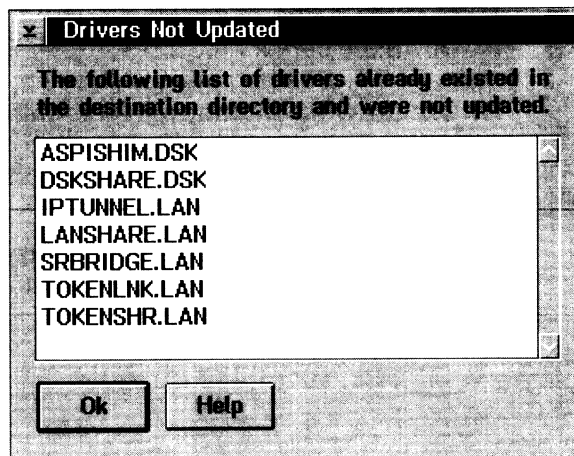
This is a list of drivers found in the destination path that were not updated. These drivers may or may not work with the updated version.

7. **Choose "OK" to continue the installation.**

8. **Exit the installation utility by double-clicking on the small icon in the upper-left corner of the main screen.**

   A message appears indicating that you should reboot the computer.
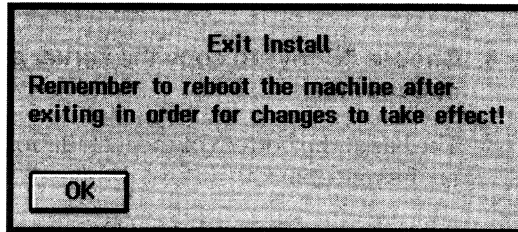
9. **Choose "OK."**

10. **Down the server.**

11. **Use the OS/2 shutdown feature to reboot your computer.**

    Click the right mouse button on the desktop and select "Shut Down" from the menu that appears.

    When the computer reboots, the second part of the installation (installing NetWare 4.1) will start automatically.

12. **Go to "Choose the Server Drivers" on page 209.**

Changing Network Board Sharing Configurations

This section explains how to load and unload drivers for different network board sharing configurations after the server has been installed.

Changing from TOKENSHR to TOKENLNK

Procedure
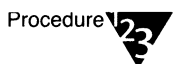
Procedure ▼

1. **At the NetWare Server for OS/2 console, type**

   LOAD INSTALL <Enter>

   The "Installation Options" menu appears (see Figure 4-37).

Figure 4-37
Installation Options


```
┌─┬─────────────────────────────────────────────────────────────────┬────────┐
│═│ NWOS2.EXE                                                         │ ▨ ▢    │
├─┴─────────────────────────────────────────────────────────────────┴────────┤
│                                                                             │
│    ┌──────────────────────────────────────────────────────────────┐        │
│    │                   Installation Options                        │        │
│    ├──────────────────────────────────────────────────────────────┤        │
│    │▐Driver options    (load/unload disk and network drivers)▌      │        │
│    │ Disk options      (configure/mirror/test disk partitions)│      │
│    │ Volume options    (configure/mount/dismount volumes)     │      │
│    │ License option    (install the server license)           │      │
│    │ Copy files option (install NetWare system files)         │      │
│    │ Directory options (install NetWare Directory Services)    │      │
│    │ NCF files options (create/edit server startup files)     │      │
│    │ Product options   (other optional installation items)    │      │
│    │ Server options    (install/upgrade/update this server)   │      │
│    │ Exit                                                      │      │
│    └──────────────────────────────────────────────────────────────┘        │
│                                                                             │
│                                                                             │
│                                                                             │
│ Use the arrow keys to highlight an option, then press <Enter>.              │
└─────────────────────────────────────────────────────────────────────────────┘
```

2. Choose "Driver Options."

The "Driver Options" menu appears (see Figure 4-38).

Figure 4-38
Driver Options
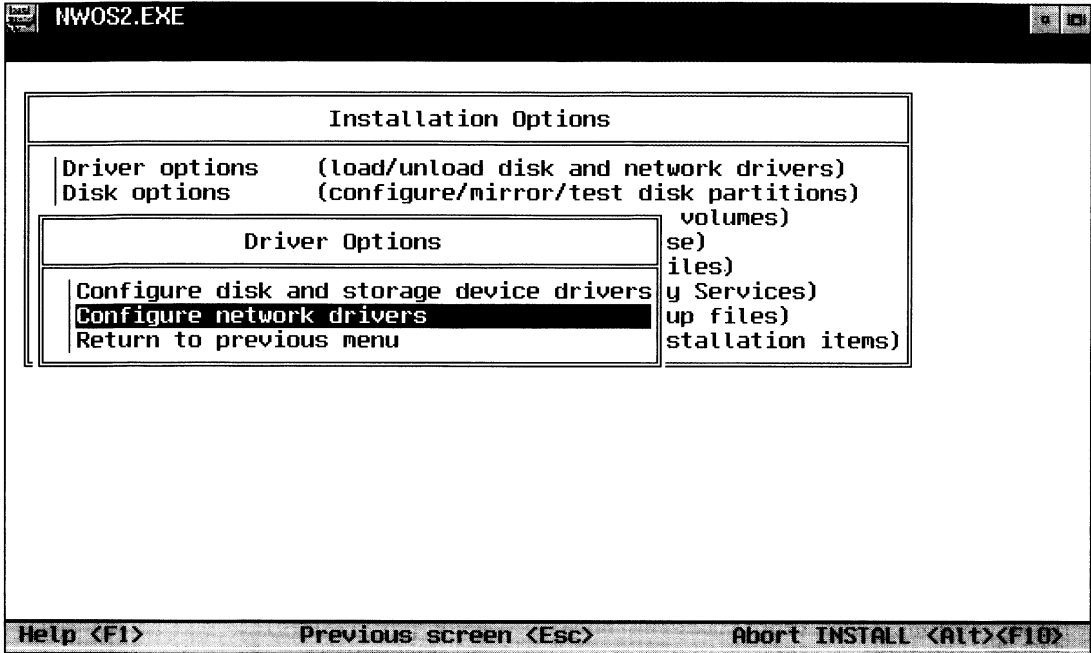
```
┌──┐
│▒▒│ NWOS2.EXE                                                    ▣ ▣
└──┘
┌──────────────────────────────────────────────────────────────────┐
│                                                                    │
│   ┌──────────────────────────────────────────────────────────┐    │
│   │                  Installation Options                     │    │
│   ├──────────────────────────────────────────────────────────┤    │
│   │ Driver options      (load/unload disk and network drivers)│    │
│   │ Disk options        (configure/mirror/test disk partitions)│   │
│   │ ┌────────────────────────────────────────┐ volumes)       │    │
│   │ │             Driver Options             │ se)            │    │
│   │ ├────────────────────────────────────────┤ iles)          │    │
│   │ │ Configure disk and storage device drivers│ y Services)   │    │
│   │ │ Configure network drivers              │ up files)      │    │
│   │ │ Return to previous menu                │ stallation items)│  │
│   │ └────────────────────────────────────────┘                │    │
│   └──────────────────────────────────────────────────────────┘    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│                                                                    │
│ Help <F1>          Previous screen <Esc>        Abort INSTALL <Alt><F10>│
└──────────────────────────────────────────────────────────────────┘
```

3. Choose "Configure Network Drivers."

The "Additional Driver Actions" menu appears (see Figure 4-39).

Figure 4-39
Additional Driver
Actions
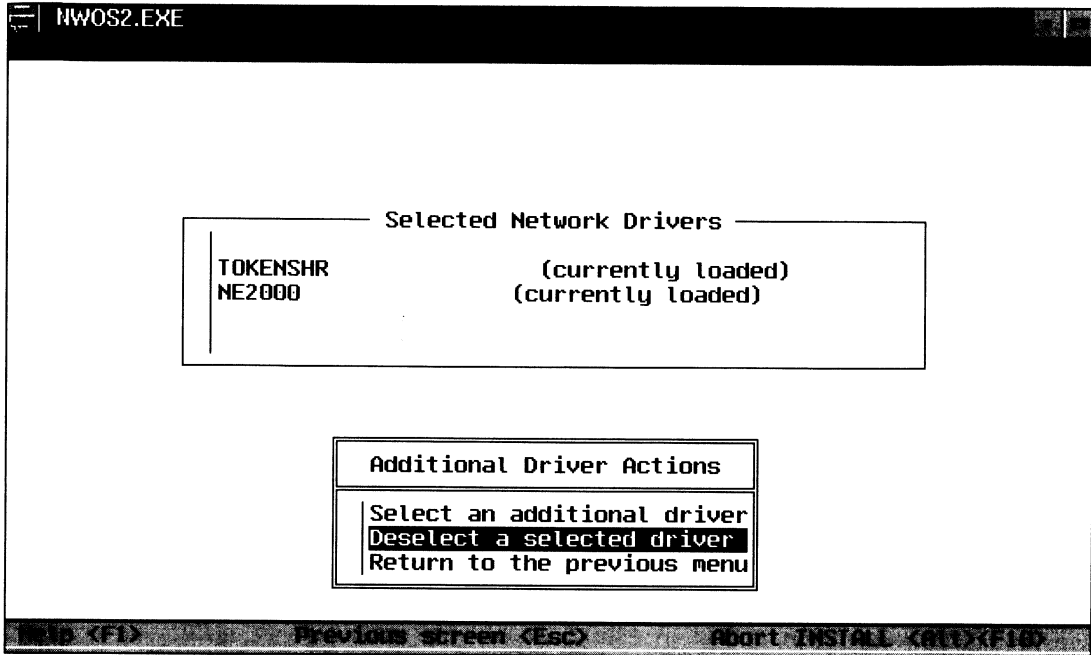
4. **Choose "Deselect a Selected Driver."**

5. **Choose "TOKENSHR" from the "Selected Network Drivers" field.**

   Use the Up- and Down-arrow keys to select the driver.

6. **Press <Enter> to unload the selected driver.**

   A message appears indicating that the selected driver has been successfully unloaded.

7. **Press <Enter> to continue.**

8. **Choose "Select an Additional Driver" from the "Additional Driver Actions" menu.**

A list of available drivers appears (see Figure 4-40).

**List of Available
Drivers**

```
┌────────────────────────────────────────────────────────────────────────┐
│ ▣  NWINSTAL.CMD                                                   ▫ ▣▫  │
├────────────────────────────────────────────────────────────────────────┤
│                                                                          │
│ Choose the Server Drivers - Network Driver                               │
│ Select a driver corresponding to a network interface board in this computer.│
│                                                                          │
│   ┌──────────────────────────────────────────────────────────────────┐  │
│   │▲│NE2000.LAN │ Novell Ethernet NE2000                              │  │
│   │ │NE2100.LAN │ Novell Ethernet NE2100                              │  │
│   │ │NE2_32.LAN │ Novell Ethernet NE/2-32                             │  │
│   │ │NE3200.LAN │ Novell Ethernet NE3200                              │  │
│   │ │NE3200P.LAN│ Novell Ethernet NE3200P                             │  │
│   │▼│NE3210.LAN │ Novell/Eagle EISA Ethernet NE3210                   │  │
│   └──────────────────────────────────────────────────────────────────┘  │
│                                                                          │
│        ┌─────────────────────────────────────────────────────┐          │
│        │ "NE2000.LAN" Help                            ▲│       │          │
│        │                                              ▒│       │          │
│        │ This driver (NE2000.LAN) supports NE2000 or  ▒│       │          │
│        │ NE2000T network boards installed in 16-bit   ▒│       │          │
│        │ expansion slots in ISA servers. You can install up ▼ │          │
│        └──────────────(To scroll, <F7>-up <F8>-down)─────────┘          │
├────────────────────────────────────────────────────────────────────────┤
│ Select a listed driver <Enter>        Install an unlisted driver <Ins>   │
│ Help                   <F1>           Continue without selecting <F10>    │
└────────────────────────────────────────────────────────────────────────┘
```

9. **Select TOKENLNK.LAN from the list of available drivers.**

A screen appears allowing you to verify the ring numbers for the selected driver.

10. **Choose "Save Parameters" and load driver and press <Enter>.**

A message appears indicating that the driver has been successfully loaded.

A message appears asking if you want to select an additional network driver.

11. **Choose "No" and press** <Enter>.

The "Additional Driver Actions" menu appears again.

12. **Choose "Return to the Previous Menu."**

The "Driver Options" menu appears.

13. **Choose "Return to Previous Menu."**

The "Installation Options" menu appears.

14. **Choose "Exit" to exit the installation utility.**

15. **Bring down the server and reboot your computer so that the changes will take effect.**

Changing from TOKENLNK to TOKENSHR

Procedure
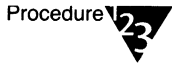
Procedure

1. **At the NetWare Server for OS/2 console, type**

   LOAD INSTALL <Enter>

   The "Installation Options" menu appears (see Figure 4-37).

2. **Choose "Driver Options."**

   The "Driver Options" menu appears (see Figure 4-38).

3. **Choose "Configure Network Drivers."**

   The "Additional Driver Actions" menu appears (see Figure 4-39).

4. **Choose "Deselect a Selected Driver."**

5. **Choose "SRBRIDGE" from the "Selected Network Drivers" field.**

   SRBRIDGE is the multiple protocol source routing bridge driver used with TOKENLNK.LAN. Use the Up- and Down-arrow keys to select the driver.

6. **Press <Enter> to unload the selected driver.**

   A message appears indicating that the selected driver has been successfully unloaded.

7. **Press <Enter> to continue.**

8. **Unload each token ring driver bound to SRBRIDGE.LAN.**

   Choose "Deselect a Selected Driver" from the "Additional Driver Actions" menu for each token ring driver.

   The drivers need to be unloaded because they are bound to SRBRIDGE.LAN. (Because SRBRIDGE.LAN is unloaded, the drivers have nothing to be bound to.)

9. **Choose "Select an Additional Driver" from the "Additional Driver Actions" menu.**

   A list of available drivers appears.

10. **Select each token ring driver that you unloaded in Step 8.**

   The drivers need to be reloaded so they can be bound to IPX and TOKENSHR.LAN.

   A screen appears allowing you to verify the parameters for the selected driver.

11. **Choose "Save Parameters and Load Driver" and press <Enter>.**

   A screen appears allowing you to bind the driver to IPX.

12. **Enter an IPX external network number for each token ring driver, or press <Enter> to accept the randomly generated IPX external network number.**

   For more information about the IPX external network number, see "Network numbering" in *Concepts*.

   A message appears asking if you want to select an additional network driver.

13. **Choose "Yes" to select an additional network driver.**

14. **Select TOKENSHR.LAN from the list of available drivers.**

    The "Parameter Actions" menu appears.

15. **Choose "Save Parameters and Load Driver."**

16. **Enter an IPX external network number, or press** <Enter> **to accept the randomly generated IPX external network number.**

    A message appears asking if you want to select an additional network driver.

17. **Choose "No."**

    The "Additional Driver Actions" menu appears again.

18. **Choose "Return to the Previous Menu."**

    The "Driver Options" menu appears.

19. **Choose "Return to Previous Menu."**

    The "Installation Options" menu appears.

20. **Choose "Exit" to exit INSTALL.**

21. **Bring down the server and reboot your computer so that the changes will take effect.**

Changing from LANSHARE to TOKENSHR or TOKENLNK

Procedure

Procedure 23
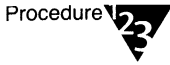
1. **Open the NET.CFG file in an OS/2 text editor by typing the following in an OS/2 window:**

   `EPM NET.CFG` <Enter>

2. **Add the following lines to the NET.CFG file:**

   `LINK DRIVER` *drivername*
      `NODE ADDRESS` *address*

   Replace *drivername* with TOKENSHR or TOKENLNK, depending on the network board sharing option you are using. Replace *address* with a 12-byte node address.

3. **Open the CONFIG.SYS file in an OS/2 text editor.**

   Replace the following line:

   `DEVICE=`*drive*`:\NETWARE\LANSHARE.SYS`

   with the following two lines:

   `DEVICE=`*drive*`:\NETWARE\`*drivername*`.SYS`
   `DEVICE=`*drive*`:\NETWARE\ROUTE.SYS`

   Replace *drive* with the letter of the drive where the \NETWARE directory is located. Replace *drivername* with TOKENSHR or TOKENLNK, depending on the network board sharing option you are using.

4. **Start NetWare Server for OS/2.**

   You can start the server by double-clicking on the NetWare Server for OS/2 icon, or by changing to the \NWSERVER directory in an OS/2 window and typing

   `NWOS2` <Enter>

5. **At the NetWare Server for OS/2 console prompt, type**

   LOAD INSTALL <Enter>

   The "Installation Options" screen appears (see Figure 4-37).

6. **Choose "Driver Options."**

   The "Driver Options" menu appears (see Figure 4-38).

7. **Choose "Configure Network Drivers."**

   The "Additional Driver Actions" menu appears (see Figure 4-39).

8. **Choose "Deselect a Selected Driver."**

9. **Choose "LANSHARE" from the "Selected Network Drivers" field.**

10. **Press** <Enter> **to unload the selected driver.**

    A message appears indicating that the selected driver has been successfully unloaded.

11. **Press** <Enter> **to continue.**

12. **Choose "Select an Additional Driver" from the "Additional Driver Actions" menu.**

    A list of available LAN drivers appears.

13. **Select "TOKENSHR.LAN" or "TOKENLNK.LAN," depending on the network board sharing option you are using.**

    The "Parameters Actions" menu appears.

14. **Choose "Save Parameters and Load Driver."**

15. **Enter an IPX external network number, or press** <Enter> **to accept the randomly generated IPX external network number.**

    A message appears asking if you want to select an additional network driver.

16. **Choose "No."**

    The "Additional Driver Actions" menu appears again.

17. **Choose "Return to the Previous Menu."**

    The "Installation Options" menu appears.

18. **Choose "Exit" to exit INSTALL.**

19. **Bring down the server and reboot your computer so that the changes will take effect.**

Changing from TOKENSHR or TOKENLNK to LANSHARE

Procedure

Procedure
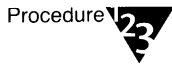
1. **Open the CONFIG.SYS file in an OS/2 text editor by typing the following in an OS/2 window**

   ```
   EPM CONFIG.SYS <Enter>
   ```

2. **Delete the following two lines from the CONFIG.SYS file.**

   ```
   DEVICE=drive:\NETWARE\drivername.SYS
   DEVICE=drive:\NETWARE\ROUTE.SYS
   ```

   Replace *drive* with the letter of the drive where the \NETWARE directory is located. Replace *drivername* with TOKENSHR or TOKENLNK, depending on the network board sharing option you are using.

3. **Add the following line to the CONFIG.SYS file.**

   ```
   DEVICE=drive:\NETWARE\LANSHARE.SYS
   ```

   Replace *drive* with the letter of the drive where the \NETWARE directory is located.

4. **Start NetWare Server for OS/2.**

   You can start the server by double-clicking on the NetWare Server for OS/2 icon, or by changing to the \NWSERVER directory in an OS/2 window and typing

   `NWOS2` <Enter>

5. **At the NetWare Server for OS/2 console prompt, type**

   `LOAD INSTALL` <Enter>

   The "Installation Options" screen appears (see Figure 4-37).

6. **Choose "Driver Options."**

   The "Driver Options" menu appears (see Figure 4-38).

7. **Choose "Configure Network Drivers."**

   The "Additional Driver Actions" menu appears (see Figure 4-39).

8. **Choose "Deselect a Selected Driver."**

9. **Choose "TOKENSHR" or "SRBRIDGE," depending on the network board sharing option you are using.**

   SRBRIDGE is the multiple protocol source routing bridge driver used with TOKENLNK.LAN.

10. **Press** <Enter> **to unload the selected driver.**

    A message appears indicating that the selected driver has been successfully unloaded.

11. **Press** <Enter> **to continue.**

12. **Choose "Select an Additional Driver" from the "Additional Driver Actions" menu.**

    A list of available LAN drivers appears.

13. **Choose "LANSHARE" from the list of available drivers.**

    The "Parameters Actions" menu appears.

14. **Choose "Save Parameters and Load Driver."**

15. **Enter an IPX external network number, or press** <Enter> **to accept the randomly generated IPX external network number.**

    A message appears asking if you want to select an additional network driver.

16. **Choose "No."**

    The "Additional Driver Actions" menu appears again.

17. **Choose "Return to Previous Menu."**

    The "Installation Options" menu appears.

18. **Choose "Exit" to exit INSTALL.**

19. **Bring down the server and reboot your computer so that the changes will take effect.**

5 Install NetWare 4.1 SFT III

This chapter describes how to install the NetWare 4.1® SFT III™ operating system on two network servers: a NetWare® 4.1 server (Server 1), and a computer that doesn't have NetWare installed on it (Server 2).

Important

You must have NetWare 4.1 installed on one server or NetWare SFT III 3.11 installed on two servers before you can install NetWare 4.1 SFT III.

To upgrade from NetWare SFT III 3.11 to NetWare 4.1 SFT III, see "Upgrade from SFT III 3.11" on page 258.

If you have	Do the following
NetWare 2.x, 3.x, or 4.0x installed on one server	Upgrade to NetWare 4.1.
NetWare 4.1 installed on one server	Begin with "Prerequisite Tasks" on page 244.
NetWare SFT III 3.11 installed on two servers	Follow steps in "Edit SFT III 3.11 .NCF Files (Optional)" on page 259.

Necessary Resources

❏ The NetWare 4.1SFT III Installation quick path card to get an overview of the process.

❏ Two similar (preferably identical) 386, 486, or Pentium* computers (certified by Novell®) to be used as NetWare servers. Both computers must have similar (preferably identical)

    ◆ CPU speed, memory, and storage capacity

    ◆ Brand and version of DOS (3.1 or later)

    ◆ Monitors (both monochrome or both color) and monitor boards (both VGA or both EGA, for example)

❏ A minimum of 16 MB of RAM in each NetWare server. (Some configurations may require more RAM.)

❏ CPU hardware running at a minimum of 25 MHz in each NetWare server.

❏ A CD-ROM drive and drivers installed as a DOS device on Server 1.

❏ A diskette drive on each server. (NetWare 4.1 *Main Server License* diskette is 3$^1/_2$ inches)

❏ The NetWare 4.1 *Operating System* CD-ROM.

❏ The *NetWare 4.1 SFT III License* diskette.

❏ (Optional) Working copies of third-party disk drivers, LAN drivers, MSL™ drivers, or NLMs™.

❏ A Mirrored Server Link (MSL) connecting the two servers.

    The following table lists the third-party MSL boards certified at the time of publication. Additional boards may have been certified since. For full details on MSL board compatibility with NetWare 4.1 SFT III, call one of the following numbers

    Faxback: 1-801-429-2776
                   1-800-414-LABS (5227)
    Hotline: 1-801-429-5544

Company/Board Name	Bus type	Driver name
Digital Equipment Corporation 1-800-DIGITAL or 1-603-884-6660		
DEC* DEFEA Series Adapter for MSL	EISA	DECMSL4X.MSL
Eagle Technology 1-800-733-2453 or 1-408-441-7453		
NMSL	EISA	NMSL.MSL
NE2000® (limited)	ISA	HNE2000.MSL
NE/2-32® (limited)	MCA	HNE232.MAL
Microdyne 1-800-255-3967 or 1-703-329-3700		
NMSL	EISA	NMSL.MSL
Plaintree Systems 1-800-370-2724 or 1-617-239-8077		
WaveBus MSL (latest)	EISA, MCA	WBMSL.MSL
Thomas Conrad Corporation 1-800-332-8683 or 1-512-836-1935		
Thomas Conrad MSL (latest)	EISA, MCA, ISA	TCMSL.MSL
TCNS* MSL (latest)	EISA, MCA, ISA	TCMSL.MSL
TCNS* MSL Adapters (latest)	EISA, MCA, ISA	TCMSL.MSL
SysKonnect 1-408-725-4650		
SK-Net Series MSL	EISA MCA ISA	SKFEMSL.MSL SKFMMSL.MSL SKFMSL.MSL
Vinca 1-801-223-3100		
V32 MSL	EISA, MCA, ISA	V32MSL.MSL

Prerequisite Tasks

❏ Install NetWare 4.1 on Server 1. (See Chapter 3, "Custom Installation", on page 67.)

❏ Create a DOS partition on Server 2 that is preferably the same size as the DOS partition on Server 1 (at least 15 MB).

Note ▼✓ If you wish to accommodate core dumps to your hard drive, make the DOS partitions 15 MB plus the number of megabytes (MB) of RAM per server. For example, if each server has 16 MB of RAM, the DOS partition would be at least 31 MB (15 MB + 16 MB).

❏ Format three high-density diskettes and label them "Disk 1," "Disk 2," and "Disk 3."

❏ Install MSL (Mirrored Server Link™) boards in Server 1 and Server 2. Cable the MSL boards in each server directly to each other (as shown in Figure 5-1). See the MSL board manufacturer's documentation for installation details.

Note the MSL board's address and the interrupt number for use later during installation.

Figure 5-1
MSL Installation

244   Installation
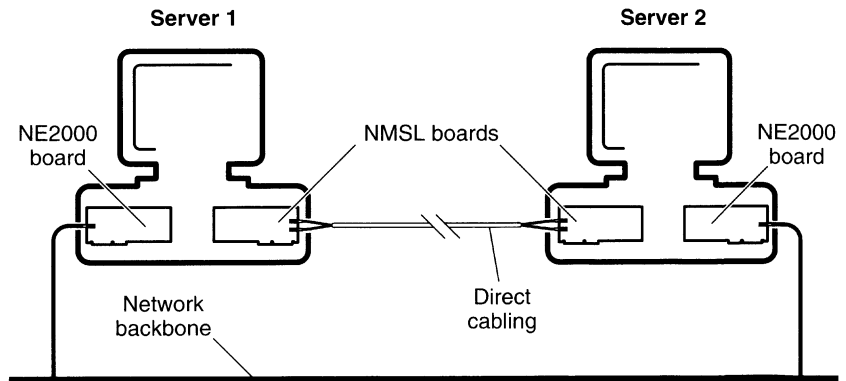
For best performance, assign the MSL board a higher priority interrupt than the network boards in the server.

Interrupt priorities from high to low are: 0, 1, 2 or 9, A, B, C, D, E, F, 3, 4, 5, 6, 7, and 8. Interrupt 2 is the highest priority you can assign to an MSL board, because interrupts 0 and 1 are reserved.

❑ (Optional) Install and cable an alternate MSL board in each server for hardware redundancy in case of primary MSL board failure.

Install SFT III Servers

The installation of NetWare 4.1 SFT III includes these procedures:

◆ Naming and numbering the server engines

◆ Copying NetWare 4.1 SFT III files

◆ Choosing MSL (Mirrored Server Link) drivers

◆ Installing NetWare 4.1 SFT III on Server 2

◆ Creating and mirroring the NetWare partitions

Name and Number the Server Engines

Procedure

Procedure ▼②▼

1. **Insert the NetWare 4.1 *Operating System* CD-ROM into the CD-ROM drive on Server 1.**

2. **Turn on the CD-ROM drive.**

3. **Boot DOS on Server 1.**

4. **Change to the root directory of the CD-ROM drive.**

   For example, type

   `D:` <Enter>
   `CD\` <Enter>

5. **Type**

   `INSTALL` <Enter>

6. **Select the language in which you want to install the software.**

7. **Select "NetWare Server Installation."**

8. **Select "NetWare 4.1 SFT III Installation."**

   A menu displaying NetWare 4.1 SFT III installation options appears.

9. **Select "Convert NetWare 4.1 to SFT III."**

10. **In the space provided, type the MSEngine name and press <Enter>.**

    By default, the name you assigned to Server 1 when you installed NetWare 4.1 appears in the box. You may use this name for the MSEngine, or type in a different name.

Note ▼▼▼

The MSEngine name should be a unique name that is 2 to 47 characters long, with no periods or spaces. Valid characters are A-Z, 0-9, hyphen, and underscore.

SFT III requires three unique server names: one for the mirrored operating system functions (MSEngine), and one for each server's input and output functions (IOEngine).

The system creates two IOEngine names by appending the characters "_IO1" and "_IO2" to the MSEngine name.

For more information see "MSEngine" and "IOEngine" in *Concepts*.

11. **Specify IPX internal network numbers for each engine by doing one of the following:**

11a. **Select "Continue with Installation" to accept the randomly-generated numbers.**

11b. **Select "Modify Network Numbers" to assign your own IPX internal network numbers.**

Note ▼▼

Each internal network number should be a unique, hexadecimal number that is one to eight digits long. You can't assign an IPX internal network number of "0" or "FFFFFFFF."

Each IOEngine must have its own unique IPX internal network number, and the MSEngine number must be different from both IOEngine numbers.

Copy NetWare 4.1 SFT III Files

Procedure

Procedure ▼▼
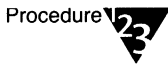
1. **On Server 1, accept the default DOS boot directory or specify a new one.**

The installation utility copies MSERVER.EXE and other SFT III-specific files to the boot directory.

If you specify a directory other than the one in which the STARTUP.NCF file for NetWare 4.1 is located, you will be asked to provide the location of STARTUP.NCF.

2. **Specify the location of your AUTOEXEC.BAT file.**

If SERVER.EXE is in Server 1's AUTOEXEC.BAT file, the installation utility changes SERVER.EXE to MSERVER.EXE.

3. **Specify the diskette drive letter for Server 1.**

4. **Insert *Disk 1* (a blank, formatted, high-density diskette) into the diskette drive on Server 1 and press <Enter>.**

The installation utility copies SFT III-specific files, MSL drivers, and batch files to Disk 1.

Note ▼▼

If the diskette isn't blank, answer "Yes" to the prompt, "This diskette is not empty. Delete data and proceed?" If you wish to retain the data currently on the diskette, replace it with a blank diskette.

5. **Insert the other two diskettes as prompted.**

The installation utility copies MSERVER.EXE and installation batch files to *Disk 2* and *Disk 3*.

Choose Mirrored Server Link (MSL) Drivers

Procedure
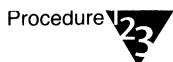
1. **Specify the MSL driver for the MSL board installed in Server 1.**

2. **(Conditional) If the MSL board uses an MSL driver not listed on the screen, press <Ins>.**

   2a. **Specify the drive for the MSL driver diskette.**

   2b. **Select the MSL driver.**

   2c. **Specify the memory address and interrupt number for the MSL board.**

3. **(Conditional) If you installed an alternate MSL board in Server 1, specify an additional MSL driver.**

The INSTALL program loads the IOEngine on Server 1. After the MSL driver loads, installation on Server 1 is complete.

Install SFT III on Server 2

Procedure
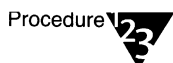
1. **Leave Server 1 running and take the three DOS diskettes, the driver diskette(s), and the *NetWare 4.1 SFT III License* diskette to Server 2.**

2. **Boot DOS on Server 2.**

3. **Insert *Disk 1* into the diskette drive on Server 2.**

4. **Change to the diskette drive on Server 2 and type**

   `INSTALL` <Enter>

The installation utility copies MSERVER.EXE, SFT III-specific files, MSL drivers, and batch files to Server 2's boot directory, which is the same as on Server 1.

5. **When prompted, insert** *Disk 2* **and** *Disk 3* **into the diskette drive on Server 2 and press** <Enter>.

6. **After the files have been copied, remove** *Disk 3* **from the diskette drive.**

7. **Specify the MSL driver for the MSL board installed in Server 2.**

8. **(Conditional) If the MSL board uses an MSL driver not listed on the screen, press** <Ins>.

   8a. **Specify the path to the MSL driver diskette.**

   8b. **Select the MSL driver.**

   8c. **Specify the memory address and interrupt for the MSL board.**

9. **(Conditional) If you installed an alternate MSL board in Server 2, specify an additional MSL driver.**

Important

Load the MSL drivers on Server 2 in the same order they were loaded on Server 1.

The installation utility loads the IOEngine on Server 2, synchronizes the memory, and executes the ACTIVATE SERVER command. ACTIVATE SERVER loads the MSEngine. The two server consoles display the same installation screen.

10. **Choose the server drivers for the hardware installed in Server 2.**

   If Server 2's LAN and Disk hardware are the same as the hardware in Server 1, select "Make Drivers on the New Machine the Same as the Original."

11. **From the "Driver Actions" menu, select "Continue Installation."**

   The disk and LAN drivers for Server 1 load, and the IPX external network numbers bound to the network boards in Server 1 are displayed.

Note the board names if you have multiple network boards of the same type in the server.

12. **Continue by pressing** <Enter>.

The disk and LAN drivers for Server 2 load, and you are prompted to accept or change the protocols bound to the network boards in Server 2.

Note the board names if you have multiple network boards of the same type in the server.

13. **Continue by pressing** <Enter>.

Create and Mirror the NetWare Disk Partitions

Procedure
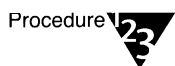
1. **Choose a partitioning method.**

"Automatically" creates a NetWare disk partition in the available free space on Server 2, then mirrors the NetWare disk partition from Server 1 to Server 2. This method assumes that the disk storage is identical on both machines.

"Manually" allows you to specify the NetWare partition size and Hot Fix™ Redirection Area on Server 2. Then, you must set up disk mirroring between the two servers' disk partitions.

1a. **If you chose "Automatically," go to Step 15.**

1b. **If you chose "Manually," continue with Step 2.**

2. **Select "Create, Delete, and Modify Disk Partitions."**

3. **From the "Available Disk Drives" menu, select the disk drive for Server 2 (***MSEnginename_***IO2).**

4. **Select "Create NetWare Disk Partition" and press** <Enter>.

5. **Specify the NetWare partition size on the disk drive for Server 2** (*MSEnginename_IO2*) **so that it matches the size of the NetWare partition for Server 1**(*MSEnginename_IO1*)**.**
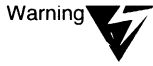
If you don't make the NetWare partitions the same size on both servers, they will not mirror.

5a. **From the "Disk Partition Information" screen, highlight the number next to "MB" on the "Partition Size" line.**

5b. **Type the size of the NetWare partition in megabytes (MB) and press** <Enter>.

5c. **Continue by pressing** <F10>.

6. **When prompted to "Create NetWare Partition," choose "Yes."**

7. **Return to "Disk Partition and Mirroring Options" by pressing** <Esc> **twice.**

8. **Set up disk mirroring between the two servers by selecting "Mirror/Unmirror Disk Partition Sets."**
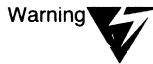
Mirror each disk to a disk on the other server. This preserves your data if one server goes down.

9. **Select the disk partition for Server 1 (**MSEnginename_IO1**) and press** <Enter>.

10. **Add the disk partition for Server 2 (**MSEnginename_IO2**) to the mirrored set by pressing** <Ins>.

11. **Select the disk partition for Server 2 (**MSEnginename_IO2**) and press** <Enter>.

12. **Continue by pressing** <F10>.

The "Disk Partition Mirroring Status" list appears.

An "In Sync" status on one partition alone does not mean the disk data is mirrored. After disk mirroring is complete, *both* partitions will be "In Sync."

13. **Return to "Disk Partition and Mirroring Options" by pressing** <Esc>**.**

The percentage of mirroring completed appears. You can continue the installation process while the disks are mirroring.

14. **Select "Continue with Installation" and press** <Enter>.

    The installation utility mounts volume SYS:.

15. **When prompted, insert the *NetWare 4.1 SFT III License* diskette into the drive on Server 2 and press** <Enter>.

    Installation on both NetWare 4.1 SFT III servers is now complete.

    Although the installation process is finished, disk mirroring continues in background mode. The mirror status is displayed on the screen.

Warning

    Do not bring down the server or turn on Server Test Mode until the disks are fully mirrored. Otherwise, data may be lost.

16. **Exit the installation utility or edit the server configuration files as explained below.**

Edit Server Configuration Files (Optional)

When you turn on or restart the servers, NetWare 4.1 SFT III reads from server configuration files with the .NCF filename extension that were automatically created by the installation utility.

After you set up disk mirroring, you can edit the .NCF files to customize your NetWare 4.1 SFT III system with additional LOAD commands or SET parameters. You can cut from one file and paste to another.

To cut text, press <Tab> to move to the window from which you want to copy. Use the arrow keys to place the cursor at the beginning of the text you wish to copy. Press <F5> and then use the arrow keys to place the cursor at the end of the text you wish to copy. The selected text will be highlighted. Press <delete> to cut. Press <F6> to copy.

To paste text, press <Tab> to move to the window into which you want to copy. Use the arrow keys to place the cursor at the point you want to paste and then press <Ins>.

Table 5-1 lists the SFT III server configuration files, locations, and contents.

Table 5-1
SFT III Configuration Files in Order of Execution

File	Location	Contents
IOSTART.NCF (Two files—one for each server)	DOS partition	IOEngine name and IPX internal network number; loading instructions for disk drivers and MSL drivers; IOEngine SET parameters; loading instructions for NLMs that do not require an active MSEngine or a mounted volume SYS:.
MSSTART.NCF (Two identical files)	DOS partition of each machine in the startup directory with MSERVER.EXE	Commands that are executed by the MSEngine after the server is mirrored but before the system volume is mounted. Some SET parameters can be set only in MSSTART.NCF.
MSAUTO.NCF	SYS:SYSTEM	Commands that are executed by the MSEngine after the server is mirrored and the system volume mounted; initialization commands for Time Services; Directory Services, and most other Mirrored-Server NLMs; name and IPX internal network number; loading instructions for MSEngine NLMs.
IOAUTO.NCF (Two files—one for each server)	DOS partition or Volume SYS:	Commands for loading network drivers and binding network protocols; loading instructions for NLMs that require an active MSEngine and a mounted volume SYS: (such as printing and backup NLMs).

Note ▼ Changes to commands in the .NCF files do not take effect until you reboot the server.

Edit the IOSTART.NCF Files

Procedure

Procedure 23
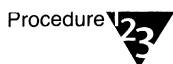
1. From the MSEngine prompt on either SFT III server, type

`INSTALL` <Enter>

2. Select "NCF Files" and edit the IOSTART.NCF files for each NetWare server.

3. Select the IOSTART.NCF option for Server 1.

Example of IOSTART.NCF for primary IOEngine:

```
ioengine name SFT3_IO1
ioengine ipx internal net 7654321
load isadisk port=1f0 int=e
load nmsl
```

Important

The LOAD command for the MSL driver should be the last line of the IOSTART.NCF file. The disk and MSL drivers should be in the same directory as MSERVER.EXE.

4. Save the file by pressing <F10> or <Esc> and then <Enter>.

5. Select the IOSTART.NCF option for Server 2.

Example of IOSTART.NCF for secondary IOEngine:

```
ioengine name SFT3_IO2
ioengine ipx internal net 6543210
load isadisk port=1f0 int=e
load nmsl
```

Important
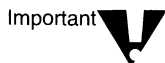
The LOAD command for the MSL driver should be the last line of the IOSTART.NCF file.

6. Save the file by pressing <Esc> and then <Enter>.

Edit IOAUTO.NCF Files

Procedure

Procedure 23
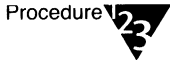
1. **From "NCF Files," select the IOAUTO.NCF option for Server 1.**

   Example of IOAUTO.NCF file:

   ```
   LOADNE2000INT=3PORT=300FRAME=ETHERNET_802.2
     NAME=NE2000_2_E82
   BIND IPX NE2000_2_E82 NET=1012672
   ```

2. **Edit the file to load additional modules in Server 1's IOEngine.**

3. **Save the file by pressing <Esc> and then <Enter>.**

4. **Select the IOAUTO.NCF option for Server 2.**

5. **Edit the file to load modules in Server 2's IOEngine.**

6. **Save the file by pressing <Esc> and then <Enter>.**

Edit MSAUTO.NCF Files

Procedure

Procedure 23
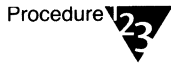
1. **From "NCF Files," select the MSAUTO.NCF option.**

2. **Edit the file to change the MSEngine name or IPX internal network number.**

   Note

   Changes to the MSEngine name or IPX internal network number do not take effect until after you bring down both servers and reboot them.

3. **Save the file by pressing <Esc> and then <Enter>.**

Edit MSSTART.NCF Files

Procedure

Procedure ▼🗶
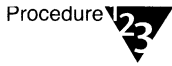
1. **From "NCF Files," select the MSSTART.NCF option.**

2. **Type instructions in the MSSTART.NCF file to customize the SET parameters for your MSEngine.**

   MSEngine parameters that can be set only in the MSSTART.NCF file include Minimum Packet Receive Buffers, Cache Buffer Size, Maximum Subdirectory Tree Depth, Auto TSS Blackout Flag, and Concurrent Remirror Requests. See SFT III Parameters under "SET" in *Utilities Reference*.

3. **Save the file by pressing <Esc> and then <Enter>.**

View SFT III Console Displays

SFT III servers have three console displays: the primary IOEngine, the secondary IOEngine, and the MSEngine.

Press <Alt> to see the console title bar. The right side of the title bar indicates the primary or secondary console.

Press <Alt>+<Esc> or <Ctrl>+<Esc> to view the server console displays in SFT III.

◆ To select the primary IOEngine, the secondary IOEngine, the MSEngine, or other console displays (such as the installation screen), press <Alt>+<Esc>.

◆ To display a menu of console options, press <Ctrl>+<Esc>. Type the number of the console you wish to display.

Implement Dual Processing (Optional)

To implement dual processing with NetWare 4.1 SFT III, you must have a server with two CPUs installed and a dual-processing driver (available from your server hardware manufacturer).

A second processor may be installed in one or both SFT III servers.

Follow the procedure below to assign one CPU to the IOEngine and one CPU to the MSEngine.

Procedure

Procedure
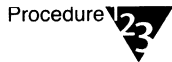
1. **From the IOEngine console of the server with two CPUs installed, load the dual processing driver.**

   See the server hardware manufacturer's installation instructions for loading the dual processing driver. For example, type

   `LOAD 2NDPROC` <Enter>

2. **To implement dual processing at startup, put the load command in the IOSTART.NCF file of the server with two CPUs.**

Upgrade from SFT III 3.11

Necessary Resources

Checklist ✔

❏ The NetWare 4.1 SFT III Installation quick path card to get an overview of the process

❏ NetWare SFT III 3.11 installed on two servers

❏ A CD-ROM drive on one server

❏ A diskette drive on each server

❏ The NetWare 4.1 *Operating System* CD-ROM and the NetWare 4.1 *Main Server License* diskette

❏ The *NetWare 4.1 SFT III License* diskette

❏ Three formatted, high-density diskettes labeled "Disk 1," "Disk 2," and "Disk 3"

Prerequisite Tasks

Checklist ✔

❏ Back up your NetWare SFT III 3.11 servers, including files in the DOS partitions of both servers.

❏ Note the directory in which MSERVER.EXE currently resides if you plan to install version 4.1 in the same directory as version 3.11.

❏ Make sure that all users are logged out.

❏ (Optional) Edit the .NCF files in both servers. See "Edit SFT III 3.11 .NCF Files (Optional)" on page 259.

❏ Bring down the MSEngine and both IOEngines.

Edit SFT III 3.11 .NCF Files (Optional)

Before upgrading your NetWare SFT III servers to NetWare 4.1 SFT III, edit both servers' .NCF files if

◆ The .NCF files contain LOAD commands for third-party drivers or modules that aren't compatible with NetWare 4.1. To determine which drivers and modules are compatible with NetWare 4.1, call one of the following numbers:

Faxback: 1-801-429-2776
1-800-414-LABS (5227)
Hotline: 1-801-429-5544

Update the LOAD commands with the 4.1 driver or module names and the appropriate path names (if not on volume SYS:).

◆ Your servers use the Ethernet 802.3 frame type, but the frame type is not specified in the .NCF files.

Specify the 802.3 frame type in the LOAD command in the IOAUTO.NCF files. For example, type

`LOADNE2000FRAME=ETHERNET_802.3INT=3PORT=300`

◆ The .NCF files contain old SET parameter names. Use the table below to update SET parameter names from previous versions to NetWare 4.1 SFT III SET parameter names.

Old SET parameter names	SFT III 4.1 SET parameter names
Mirrored Server Comm ACK Wait Time Out	MSL Error Wait Time
Secondary Take Over Delay Amount	Secondary Take Over Wait Time
Comm Deadlock Detect Wait Time	MSL Deadlock Wait Time
Check Server to Server Comm	Extra MSL Checking
Primary Server Comm Deadlock Recovery Option	Primary Server MSL Deadlock Recovery Option

Old SET parameter names	SFT III 4.1 SET parameter names
Secondary Server Comm Deadlock Recovery Option	Secondary Server MSL Deadlock Recovery Option
MSEngine Outputs Different	MSEngine Outputs Different Recovery Option
Primary Server Comm Consistency Recovery Option	Primary Server MSL Consistency Error Recovery Option
Secondary Server Comm Consistency Recovery Option	Secondary Server MSL Consistency Error Recovery Option
Primary Server Comm Driver Stuck Recovery Option	Primary Server MSL Send Blocked Recovery Option
Secondary Server Comm Driver Stuck Recovery Option	Secondary Server MSL Send Blocked Recovery Option
Primary Server Comm Hardware Failure Recovery Option	Primary Server MSL Hardware Failure Recovery Option
Secondary Server Comm Hardware Failure Recovery Option	Secondary Server MSL Hardware Failure Recovery Option
Notify Users Of Mirrored Server Synchronization	Notify All Users Of Mirrored Server Synchronization
Notify Users Of Mirrored Server Failures	Server Failure Notification Name

Upgrade Server 1

Procedure

Procedure▼
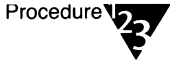
1. **Install the DOS CD-ROM drivers on the server with the CD-ROM drive.**

2. **Insert the NetWare 4.1 *Operating System* CD-ROM into the CD-ROM drive on Server 1.**

3. **Turn on the CD-ROM drive.**

4. **Boot DOS on Server 1.**

5. **Change to the root directory of the CD-ROM drive.**

   For example, type

   `D:` <Enter>
   `CD\` <Enter>

6. **Type**

   `INSTALL` <Enter>

7. **Select the language in which you want to install the software.**

8. **Select "NetWare Server Installation."**

9. **Select "NetWare 4.1 SFT III."**

   A menu displaying SFT III installation options appears.

10. **Select "Upgrade SFT III 3.11 to SFT III 4.1" and press** <Enter>.

11. **Specify the path for the destination directory.**

    The destination directory can be the directory where the 3.11 version of MSERVER.EXE currently resides or it can be a new directory.

Warning▼
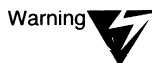
If you install to the directory where the 3.11 version resides, you should first backup that directory. The installation utility will overwrite existing files when it copies the 4.1 MSERVER.EXE and other SFT III-specific files to the destination directory.

12. (Conditional) Check the list of third-party drivers that were not updated in the DOS boot directory. These drivers may be compatible with NetWare 4.1, but if they are not you will need NetWare 4.1-compatible replacements on diskette.

13. Specify the locale configuration and file format.

   See "Specify Language and Filename Format Information" on page 84.

14. Create diskettes for Server 2.

   Insert *Disk 1*, *Disk 2*, and *Disk 3* as prompted.

15. Remove *Disk 3* when the files have been copied.

16. Take the three diskettes to Server 2.

Upgrade Server 2

Procedure
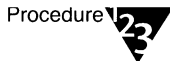
Procedure

1. **Boot DOS on Server 2.**

Important

   If you are using third-party drivers on Server 2, you will have to copy the drivers to the DOS boot directory and SYS:SYSTEM manually. They will not be copied during the automated installation procedure.

2. **Insert *Disk 1* in the diskette drive of Server 2.**

3. **Change to the diskette drive and type**

   `INSTALL` <Enter>

4. **Insert *Disk 2* and *Disk 3* when prompted.**

5. **Specify the path to the 3.11 IOSTART.NCF and MSSTART.NCF files from SFT III 3.11.**

6. **Remove *Disk 3* when the files have been copied and you are prompted for the NetWare 4.1 *Main Server License* diskette.**

7. **Insert the NetWare 4.1 *Main Server License* diskette when prompted.**

8. **Insert the *SFT III License* diskette when prompted.**

Note ▼▼   For additional information about the procedural steps below, see Chapter 3, "Custom Installation," beginning with "Select Optional NetWare File Groups" on page 127.

9. **Select optional NetWare files to copy.**

10. **Choose a Directory tree or create a new Directory tree.**

11. **Specify the time zone and time configuration.**

12. **Specify the server context.**

13. **Specify the password for ADMIN.**

14. **Save the NetWare Directory Services™ information.**

    NetWare files copy to the SYSTEM and PUBLIC directories.

15. **(Conditional) If the IOSTART.NCF files contain load commands for network drivers, move those load commands from the IOSTART.NCF files to the IOAUTO.NCF files.**

    The upgrade to NetWare 4.1 SFT III is complete.

6 *Install NetWare Clients*

Overview

This chapter provides a basic overview of the procedures for installing a NetWare client on your network.

Introduction

Before you can continue setting up your network, you must install a single client. Installing a client will allow you to view the additional manuals provided in the NetWare 4.1 online documentation set, and to run either the NetWare Administrator utility or NETADMIN to start creating objects on your network.

You can install and customize other clients later, using the following manuals provided in NetWare 4.1 online documentation.

Client	Manual Title
DOS and MS Windows	*NetWare Client for DOS and MS Windows User Guide*
OS/2*	*NetWare Client for OS/2 User Guide*
Macintosh	*Using MacNDS Client for NetWare 4*

Note Due to the extensive procedures for installing a Macintosh* client, and then configuring the AppleTalk* protocol, procedures for installing a Macintosh client are not included in this manual.

Installing NetWare Client Software

Before you can install the client software, you must have access to installation diskettes for NetWare Client™ software.

If you are installing the NetWare server from CD-ROM, you need to create these client diskettes. For instructions, see "Create Client Diskettes from a Workstation" on page 290.

When you have client installation diskettes available, use the table below to locate installation procedures for your particular client operating system.

If you want to install	Go to
NetWare Client software for DOS and MS Windows client workstations	"Install a DOS and MS Windows Client" on page 267.
NetWare Client software for OS/2 client workstations	"Install an OS/2 Client" on page 270.

Install a DOS and MS Windows Client

DOS and MS Windows clients share the same installation program. To provide for this, the installation program runs within the DOS environment.

Prerequisites

Checklist ❏ An IBM* PC (or compatible) with an XT, AT, 386, 486, or higher (SX or DX) processor.

❏ A hard drive or a floppy drive and diskette with the following amount of available disk space:

◆ DOS only: 1.2 MB

◆ DOS and MS Windows: 4 MB

❏ A network board installed in your client computer.

Network boards are supplied with default settings for the interrupt, base I/O port address and base memory address. You should already know the hardware board settings for your particular network board before running the installation program. For more information on installing the network board, see the manufacturer's documentation.

Most network boards use interrupt 3 or 5 if these are not used by COM2: or LPT2:.

The base I/O port addresses often available for the network board are 300h and 340h.

Important If you specify an interrupt for the network board that is already being used by another device, you can still install the network board, but the network software will not run successfully.

The base memory address often available for the network board is D800 (sometimes written as D8000). Some network boards do not use RAM; if your network board is one of these, you do not need to specify a value for this setting.

Note If you use a memory manager (for example, EMM386 or QEMM*), you might need to exclude the base memory address controlled by the memory manager, if the memory manager cannot automatically detect that it is used by the network board.

❏ Network cabling.

Each type of network board requires unique cabling. See the manufacturer's documentation packaged with your network board for requirements.

Token ring network boards require a cable connection to the MAU before installing the operating system. Otherwise, the NTR2000 driver will not load.

❏ (Optional) A computer cabled to the network and running MS Windows 3.1.

If you are using MS Windows, close MS Windows before loading the installation program. The client installation program will modify some MS Windows files that are used when in MS Windows.

Do not install from an MS Windows DOS Box.

❏ At least one NetWare 4.1 server installed.

❏ Five formatted diskettes with the following names and labels:

Diskette name	Volume label
NetWare Client for DOS and MS Windows Disk 1	WSDOS_1
NetWare Client for DOS and MS Windows Disk 2	WSDOS_2
NetWare Client for DOS and MS Windows Disk 3	WSDOS_3
NetWare Client for DOS and MS Windows Disk 4	WSDOS_4
NetWare Client for DOS and MS Windows ODI LAN drivers	WSDOS_5

Procedure

Procedure
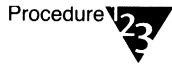
1. **Insert the** *NetWare Client for DOS and MS Windows Installation Diskette #1* **into your floppy disk drive.**

2. **Change to the drive containing the installation diskette.**

   For example, to install from drive A:, type

   A: <Enter>

3. **Load the installation utility by typing**

   INSTALL <Enter>

4. **Follow the installation instructions on your screen.**

   Default settings for the NetWare Client software should be sufficient for an initial connection. You can do a standard installation with the default settings and configure other options later.

Note

   Use the arrow keys to move between the fields. Press <Enter> to modify a particular field.

5. **Exit the installation utility by pressing the** <Esc> **key.**

6. **Reboot your computer.**

   In order for your modifications or new installation to take effect, you need to reboot your computer.

7. **Set up your workstation for accessing the online documentation by reading** *Installing and Using Novell Online Documentation for NetWare 4.1.*

Install an OS/2 Client

Review the following checklist to make sure you are prepared to install the NetWare Client software for OS/2.

Prerequisites

Checklist ▼

❏ An IBM PC (or compatible) with a 386 or 486 (SX or DX) processor. OS/2 v2.*x* operates only with 386 (SX and DX) processors and above because of its 32-bit architecture.

❏ A hard disk with 4.5 MB of storage.

❏ A network board installed in your client computer.

Network boards are supplied with default settings for the interrupt, base I/O port address and base memory address. You should already know the hardware board settings for your particular network board before running the installation utility. For more information on installing the network board, see the manufacturer's documentation.

Most network boards use interrupt 3 or 5 if these are not used by COM2 or LPT2.

The base I/O port addresses often available for the network board are 300h and 340h.

Important ▼

If you specify an interrupt for the network board that is already being used by another device, you can still install the network board, but the network software will not run successfully.

The base memory address often available for the network board is D800 (sometimes written as D8000). Some network boards do not use RAM; if your network board is one of these, you do not need to specify a value for this setting.

❑ Network cabling.

Each type of network board requires unique cabling. See the manufacturer's documentation packaged with your network board for requirements.

Token ring network boards require a cable connection to the MAU before installing the operating system. Otherwise, the TOKEN driver will not load.

❑ At least one NetWare 4.1 server installed.

❑ Six formatted diskettes (seven if you want to create an optional VLM boot diskette) with the following diskette names and volume labels:

Diskette Name	Volume Label
WSOS2_1	WSOS2_1
WSOS2_2	WSOS2_2
WSOS2_3	WSOS2_3
OSUTIL1	OSUTIL1
OS2DOC_X	OS2DOC_X 1 = English 2 = French 3 = German 4 = Italian 5 = Spanish
WSDRV_1	WSDRV_1
VLMBOOT (optional)	VLMBOOT

Procedure

These procedures are presented in greater detail in Chapter 4 "Install NetWare Server for OS/2." If you are installing an OS/2 client for the first time, we recommend following the procedures under "Install NetWare Client for OS/2" on page 216.

Procedure

1. **Start the OS/2 client and open an OS/2 full screen or window.**

2. **Insert the *WSOS2_1* diskette into the diskette drive.**

3. **Change to the drive where you inserted the diskette and type**

   `INSTALL` <Enter>

4. **Select "Requester on Client" from the "Installation" menu.**

5. **Follow the screen prompts and the online help to finish installing the Requester.**

   Because this computer is being installed to get you started with the network setup, you can do a standard installation with the default settings and configure other options later.

   Note   During installation, a directory called NETWARE is created for the Requester files on the drive you booted OS/2 from. A program group called NOVELL is also created on the OS/2 desktop.

6. **Exit the installation program by selecting "Exit" from the "Installation" menu.**

7. **Remove the diskette from the floppy drive, and then select the OS/2 shutdown feature to reboot the computer.**

   In order for your modifications or new installation to take effect, you need to reboot your computer.

8. **Set up your workstation for accessing the online documentation by reading *Installing and Using Novell Online Documentation for NetWare 4.1***

A *Calculate RAM Requirements*

This appendix provides a detailed formula for calculating your
NetWare® 4.1 RAM requirements.

Calculating RAM requirements involves defining RAM usage for three
major components:

◆ NetWare operating system

◆ Volumes

◆ NetWare Loadable Modules™ (NLM™) programs

The following charts list items that take up RAM, and provide a
formula for calculating that item's RAM usage. An example calculation
follows in "Example RAM Calculation" on page 276.

For information on any item in the charts, see *Concepts*.

NetWare Operating System Requirements

Some of the following information can only be obtained by installing a
server and loading MONITOR.NLM to see server statistics.

Table A-1
Operating System Requirements

Item	RAM usage	Notes
Core NetWare operating system	7 MB	
Cache memory	1 MB + (MB of disk space online x 3 KB)	This formula is an estimate based on reasonable performance per user. It assumes that the number of users increases with disk space.
Media Manager	150 KB + (0.2 KB x MB of disk space online)	
Connections in use	2 KB per user connection	For an installed server, see MONITOR.NLM.
Packet receive buffers	2.3 KB per buffer	For an installed server, see MONITOR.NLM.
Directory cache buffers	4.3 KB per buffer	For an installed server, see MONITOR.NLM.
Service processes	9 KB per service process	For an installed server, see MONITOR.NLM.
File compression enabled on any volume	250 KB	

Volume-Related Requirements

You need to calculate the following items for each volume individually and then add up the results from all volumes.

Table A-2
Volume Requirements

Item	RAM usage	Notes
File Allocation Tables (FAT)	*Volume Blocks* x 8.2 bytes	Calculate *Volume Blocks* by dividing the size of the volume by its block size. For a listing of default volume block sizes, refer to "Modify Volume Block Size (Optional)" on page 115.
Block suballocation enabled	((Blocksize x 2)–1) x 4096 bytes) + (5 x Number of files) bytes	Calculate the approximate number of files by dividing the volume size by the average file size.
Directory Entry Tables (DET)	Number of files x 10 bytes	Calculate the approximate number of files by dividing the volume size by the average file size.

NLM Requirements

The following chart lists some NLMs that take up more RAM than most other NLMs and, therefore, should be included in this calculation.

Table A-3
NLM Requirements

Item	RAM usage	Notes
BTRIEVE.NLM	700 KB	Needed for products such as NetWare for Macintosh* and NetWare for NFS
CLIB.NLM	500 KB	Needed for products such as Print Server, and for many other NetWare Loadable Modules
INSTALL.NLM	600 KB	Needed for installation and maintenance
PSERVER.NLM	200 KB	Needed for Print Server

Calculate Your RAM Requirements

Procedure
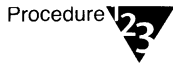
Procedure▼ 1. **Calculate each of the operating system requirements in Table A-1 on page 274.**

2. **Then add the volume requirements calculated in Table A-2 on page 275.**

3. **Then add the NLM requirements calculated in Table A-3 on page 275.**

   See the example below.

Example RAM Calculation

Assume you want to install a system with

◆ 500 users

◆ 2 GB (2,000 MB) of disk space

◆ Four volumes with file compression and block suballocation enabled:

   ◆ Volume SYS: with 100 MB

   ◆ Volume MACVOL: with 500 MB

   ◆ Volume DATA: with 1 GB (file compression enabled)

   ◆ Volume ACCOUNTS: with 400 MB

◆ An average file size of 30 KB

Based on these assumptions, a RAM calculation would look like the following.

NetWare OS Requirements

To make the calculation easier, assume 1 KB to mean 1,000 bytes (instead of 1,024 bytes), and 1 MB to mean 1,000,000 bytes (instead of 1,048,576 bytes.)

1. Assume a core operating system requirement of 7 MB.

2. Add 11 MB for cache memory.

   1 MB + (2000 x 5 KB) = 11 MB

3. Add 550 KB for the Media Manager.

   150 KB + (0.2 KB x 2000) = 550 KB

4. Add 1 MB for user connections.

   2 KB x 500 users = 1,000 KB = 1 MB

5. Add 230 KB for packet receive buffers.

   Assume you need about 100 buffers for a system of this size.

   2.3 KB x 100 = 230 KB

6. Add 430 KB for directory cache buffers.

   Assume you need about 100 buffers for a system of this size.

   4.3 KB x 100 = 430 KB

7. Add 180 KB for service processes.

   Assume about 20 service processes for a system of this size. (Service processes are workstation requests that are tracked by MONITOR.NLM.)

8. Add 250 KB for file compression.

Total approximate RAM requirements for the NetWare operating system: 20.7 MB

Volume Requirements

Calculate these requirements individually for each volume on your system.

1. Add 2 MB for FAT tables on all four volumes.

   Volume SYS: (100 MB) needs 0.1 MB

   Volume MACVOL: (500 MB) needs 0.5 MB

   Volume DATA: (1 GB) needs 1 MB

   Volume ACCOUNTS: (400 MB) needs 0.4 MB

   Total requirements for FAT tables: 2 MB

2. Add 1 MB for block suballocation on all four volumes.

   Volume SYS: (100 MB) needs 80 KB

   Volume MACVOL: (500 MB) needs 341 KB

   Volume DATA: (1 GB) needs 425 KB

   Volume ACCOUNTS: (400 MB) needs 194 KB

   Total requirements for block suballocation: 1 MB

3. Add 666 KB for directory entries on all four volumes.

   Volume SYS: (100 MB) needs 33 KB

   Volume MACVOL: (500 MB) needs 167 KB

   Volume DATA: (1GB) needs 333 KB

   Volume ACCOUNTS: (400 MB) needs 133 KB

   Total requirements for directory entries: 666 KB

Total approximate RAM requirements for all volumes: 3.67 MB

NLM Requirements

Assuming that you need CLIB.NLM (500 KB), INSTALL.NLM (600 KB), and PSERVER.NLM (200 KB), add 1.3 MB for NLMs.

Grand Total

OS + Volume + NLM requirements = Grand Total

20.7 MB + 3.67 MB + 1.3 MB = 25.67 (25.7) MB

The approximate minimum RAM requirement for a NetWare system of this size is 25.7 MB.

B Country Codes

This appendix lists the CCITT country codes you can use in specifying the NetWare® 4.1 server's context.

The country object is optional in the Directory tree, and can be used if you have a multinational organization or if you want to match the ISO X.500 standard. You can, however, comply with X.500 without specifying a country code.

Important ▼ The following list of country codes may be incomplete or inaccurate due to the constantly changing worldwide geopolitical situation.

Figure B-1
Country Codes

Country names and codes

AF	Afghanistan	BV	Bouvet Island	CY	Cyprus
AL	Albania	BR	Brazil	CZ	Czech Republic
DZ	Algeria	IO	British Indian Ocean Territory	DK	Denmark
AS	American Samoa	VG	British Virgin Islands	DJ	Djibouti
AD	Andorra	BN	Brunei Darussalam	DM	Dominica
AO	Angola	BG	Bulgaria	DO	Dominican Republic
AI	Anguilla	BF	Burkina Faso	TP	East Timor
AQ	Antartica	BI	Burundi	EC	Ecuador
AG	Antigua and Barbuda	KH	Cambodia	EG	Egypt
AR	Argentina	CM	Cameroon	SV	El Salvador
AW	Aruba	CA	Canada	GQ	Equatorial Guinea
AU	Australia	CV	Cape Verde	ER	Eritrea
AT	Austria	KY	Cayman Island	EE	Estonia
AZ	Azerbaijan	CF	Central African Republic	ET	Ethiopia
BS	Bahamas	TD	Chad	FK	Falkland Islands (Malvinas)
BH	Bahrain	CL	Chile	FO	Faroe Islands
BD	Bangladesh	CN	China	FJ	Fiji
BB	Barbados	CX	Christmas Island	FI	Finland
BY	Belarus	CC	Cocos (Keeling) Islands	FR	France
BE	Belgium	CO	Colombia	FX	France, Metropolitan
BZ	Belize	KM	Comoros	GF	French Guiana
BJ	Benin	CG	Congo	PF	French Polynesia
BM	Bermuda	CK	Cook Islands	TF	French Southern Territories
BT	Bhutan	CR	Costa Rica		
BO	Bolivia	CI	Cote d'Ivoire		
BA	Bosnia and Herzegovina	HR	Croatia (Hrvatska)		
BW	Botswana	CU	Cuba		*continued* ▼

Country names and codes *continued*

GA	Gabon	**MT**	Malta	**SN**	Senegal
GM	Gambia	**MH**	Marshall Islands	**SC**	Seychelles
GE	Georgia	**MQ**	Martinique	**SL**	Sierra Leone
DE	Germany	**MR**	Mauritania	**SG**	Singapore
GH	Ghana	**MU**	Mauritius	**SK**	Slovakia
GI	Gibraltar	**YT**	Mayotte	**SI**	Slovenia
GR	Greece	**MX**	Mexico	**SB**	Solomon Islands
GL	Greenland	**FM**	Micronesia, Federated States of	**SO**	Somalia
GD	Grenada	**MD**	Moldova, Republic of	**ZA**	South Africa
GP	Guadeloupe	**MC**	Monaco	**GS**	South Georgia and the South
GU	Guam	**MN**	Mongolia		Snadwich Islands
GT	Guatemala	**MS**	Montserrat	**ES**	Spain
GN	Guinea	**MO**	Morocco	**LK**	Sri Lanka
GW	Guinea-Bissau	**MZ**	Mozambique	**SD**	Sudan
GY	Guyana	**MM**	Myanmar	**SR**	Suriname
HT	Haiti	**NA**	Namibia	**SJ**	Svalbard and Jan Mayen Islands
HM	Heard and McDonald Islands	**NR**	Nauru	**SZ**	Swaziland
HN	Honduras	**NP**	Nepal	**SE**	Sweden
HK	Hong Kong	**NL**	Netherlands	**CH**	Switzerland
HU	Hungary	**AN**	Netherlands Antilles	**SY**	Syrian Arab Republic
IS	Iceland	**NC**	New Caledonia	**TW**	Taiwan, Province of China
IN	India	**NZ**	New Zealand	**TJ**	Tajikistan
ID	Indonesia	**NI**	Nicaragua	**TZ**	Tanzania, United Republic of
IR	Iran, Islamic Republic of	**NE**	Niger	**TH**	Thailand
IQ	Iraq	**NG**	Nigeria	**TG**	Togo
IE	Ireland	**NU**	Niue	**TK**	Tokelau
IL	Israel	**NF**	Norfolk Island	**TO**	Tonga
IT	Italy	**MP**	Northern Mariana Islands	**TT**	Trinidad and Tobago
JM	Jamaica	**NO**	Norway	**TN**	Tunisia
JP	Japan	**OM**	Oman	**TR**	Turkey
JO	Jordon	**PK**	Pakistan	**TM**	Turkmenistan
KZ	Kazakhstan	**PW**	Palau	**TC**	Turks and Caicos Islands
KE	Kenya	**PA**	Panama	**TV**	Tuvalu
KI	Kiribati	**PG**	Papua New Guinea	**UG**	Uganda
KP	Korea, Democratic People's Republic of	**PY**	Paraguay	**UA**	Ukraine
KR	Korea, Republic of	**PE**	Peru	**AE**	United Arab Emirates
KW	Kuwait	**PH**	Philippines	**GB**	United Kingdom
KG	Kyrgyzstan	**PN**	Pitcairn	**US**	United States
LA	Laos, People's Democratic Republic of	**PL**	Poland	**UM**	United States Minor Outlying Islands
LV	Latvia	**PT**	Portugal	**UY**	Uruguay
LB	Lebanon	**PR**	Puerto Rico	**UZ**	Uzbekistan
LS	Lesotho	**QA**	Qatar	**VU**	Vanuatu
LR	Liberia	**RE**	Reunion	**VA**	Vatican City State (Holy See)
LY	Libyan Arab Jamahiriya	**RO**	Romania	**VE**	Venezuela
LI	Liechtenstein	**RU**	Russian Federation	**VN**	Vietnam
LT	Lithuania	**RW**	Rwanda	**VG**	Virgin Islands (British)
LU	Luxembourg	**SH**	St. Helena	**VI**	Virgin Islands (U.S.)
MA	Macau	**KN**	St. Kitts-Nevis	**WK**	Wake Islands
MK	Macedonia, The former Yugoslav	**LC**	St. Lucia	**WF**	Wallis and Futuna Islands
	Republic of	**PM**	St. Pierre and Miquelon	**EH**	Western Sahara
MG	Madagascar	**VC**	St. Vincent and the Grenadines	**YE**	Yemen
MW	Malawi	**WS**	Samoa	**YU**	Yugoslavia
MY	Malaysia	**SM**	San Marino	**ZR**	Zaire
MV	Maldives	**ST**	Sao Tome and Principe	**ZM**	Zambia
ML	Mali	**SA**	Saudi Arabia	**ZW**	Zimbabwe

C Install To Boot From Floppy Diskette

Note ▼ NetWare® 4.1 supports booting the server from floppy diskette. However, for ease of installation, we recommend booting the server from an internal hard disk.

To install your NetWare 4.1 server to boot from an internal hard disk, see "Install Server Software," on page 19 if you are installing using the Simple Installation option, or "Install the Server Software," on page 70 if you are using the Custom Installation option.

Overview

Booting a NetWare server from floppy diskette circumvents that part of the NetWare 4.1 installation program that copies files to the DOS partition of your internal hard disk.

The following circumstances call for a floppy diskette boot method for a new installation or upgrade:

◆ You don't want a DOS partition on the NetWare server's internal hard disk.

◆ The computer you want to install NetWare on has no internal hard disk.

Boot Diskette Advantages and Disadvantages

Compared to booting from a hard disk, booting from a floppy diskette has the following advantages:

◆ The entire internal hard disk can be used for a NetWare disk partition.

◆ Boot diskettes can be stored apart from the NetWare server to prevent tampering.

However, consider these disadvantages as well:

◆ Booting from floppy diskette is considerably slower than the hard disk method.

◆ You may run out of diskette space in future upgrades.

◆ This method requires multiple diskettes and is therefore a manual operation.

Installation Procedure Locations

Procedures for installing the server to boot from floppy diskette are documented exclusively in a README file named BOOTDISK.TXT.

If you are installing from CD-ROM, the BOOTDISK.TXT file is located on the *Operating System* CD-ROM in the following directory:

NW410\INSTALL** *LANGUAGE*\README\BOOTDISK.TXT**

Replace *LANGUAGE* with the directory name for the language you are installing (ENGLISH, ITALIANO, etc.).

If you are installing from floppy diskettes, the BOOTDISK.TXT file is located in the README directory on the *README_1* diskette.

The BOOTDISK.TXT file can also be accessed within the installation utility. First type INSTALL, choose your desired server language, and then choose "NetWare Server Installation."

Then choose "Display Information (README) File," and locate and select the "Creating Server Boot Diskettes" README file.

Note ▼ If you want to print the BOOTDISK.TXT file, you must do so from the CD-ROM or diskette.

D Creating Client Diskettes

During installation, the "Other Installation Items" menu allows you to create client diskettes. If you don't create client diskettes at that time, you may do so by following the procedures in this section.

Prerequisites

Format the appropriate number of high-density diskettes using the table below.

For	Format
DOS/MS Windows workstations	Five 3.5-inch or 5.25 inch diskettes.
OS/2* workstations	Six 3.5-inch diskettes (Seven if you want to create an optional VLM boot diskette).
Macintosh workstations	One 800 KB diskette.

Create DOS, MS Windows, and OS/2 Client Diskettes

You can create DOS, MS Windows, and OS/2 client diskettes at the NetWare 4.1 server, or from a DOS, MS Windows, or OS/2 workstation. Procedures for both methods follow.

Create Client Diskettes at the Server

Procedure

Procedure
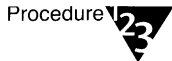
1. **At the server console type**

   LOAD INSTALL <Enter>

   The "Installation Options" menu appears.

2. **Choose "Product Options" and press** <Enter>.

   The "Other Installation Actions" menu appears.

3. **Select "Choose an Item or Product Listed Above" and press** <Enter>.

4. **Choose "Create DOS/MS Windows/OS2 Client Install Diskettes" and press** <Enter>.

   You are prompted to enter the path to the source directory where the NetWare 4.1 files are located.

5. **Verify or change the source path and press** <Enter>.

   A screen appears prompting you for your user name and password.

6. **Enter your user name and password and press** <Enter>.

The following menu appears.

**Select the Client Files You Want to Copy
to Diskette**

```
[X] 3.5 inch   DOS/MS Windows Client Install        (5 diskettes)
[X] 3.5 inch   OS/2 Client Install                  (6 diskettes)
[ ] 5.25 inch  DOS/MS Windows Client Install        (5 diskettes)
```

7. **Select or deselect the file groups you want copied by pressing <Enter>.**

8. **Press <F10> to accept the marked groups and continue.**

9. **Specify the destination to where the client files will be copied.**

   By default, the client files are copied to drive A:. To specify a new path, press <F3> and type the new path.

10. **Press <Enter> to accept the path.**

11. **Insert the formatted diskettes as prompted.**

Create Client Diskettes from a Workstation

You can create client diskettes from a workstation either by using a CD-ROM drive connected directly to the workstation as a DOS device, or by mapping a drive to a server with the NetWare 4 *Operating System* CD-ROM mounted as a NetWare volume.

Procedure

Procedure
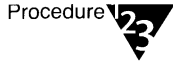
1. (DOS volume only) Install the CD-ROM drive as a DOS device according to manufacturer's instructions.

   1a. Go to the drive corresponding to the CD-ROM.

   1b. Change to the CLIENT directory.

   1c. Continue with Step 3.

2. (NetWare volume) If you set up the CD-ROM as a NetWare volume, complete the following steps:

   2a. Map a drive to the following path:

   ```
   NW410:CLIENT
   ```

   2b. Change to the drive letter mapped to CD-ROM volume.

   2c. Continue with Step 3.

3. Change to one of the following subdirectories.

If creating diskettes for	Go to this subdirectory
DOS/MS Windows	DOSWIN
OS/2	OS2

4. Type

MAKEDISK *drive_letter*: *language* <Enter>

Replace *drive_letter* with the letter of the diskette drive you are inserting the empty formatted diskettes into.

Replace *language* with the language you want to install. The following languages are available: English, Francais, Deutsch, Italiano, Español.

For example, type

MAKEDISK A: espanol <Enter>

or

MAKEDISK B: italiano <Enter>

The MAKEDISK utility copies the client installation files from the CD-ROM directory to the diskettes. Follow the prompts to insert new empty formatted diskettes.

5. Attach a label to each diskette and write the following on the corresponding labels.

Table D-1
Client Diskette Labels

Diskette #	Label for DOS/MS Windows	Label for OS/2
1	*NetWare Client for DOS and MS Windows Disk 1*	*WSOS2_1*
2	*NetWare Client for DOS and MS Windows Disk 2*	*WSOS2_2*
3	*NetWare Client for DOS and MS Windows Disk 3*	*WSOS2_3*
4	*NetWare Client for DOS and MS Windows Disk 4*	*OSUTIL1*
5	*NetWare Client for DOS and MS Windows ODI LAN drivers*	*OS2DOC_X* 1 = English 2 = French 3 = German 4 = Italian 5 = Spanish
6		*WSDRV_1*
7		*VLMBOOT (optional)*

6. Refer to Chapter 6, "Install NetWare Clients," on page 265 to install your NetWare client workstations.

Create Macintosh Client Diskettes

Follow the procedures below to create a Macintosh Client installation diskette.

Procedure

Procedure
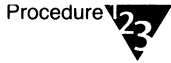
1. **From an existing Macintosh workstation, log in to the server containing the installation files.**

   Before you can install the NetWare for Macintosh client software, you must prepare the files for installation.

   If NetWare for Macintosh was installed on the server, the installation utility copied the client software to the server in the form of a self-extracting archive (MACNDS.SEA) file.

   If you are installing from a NetWare drive after installing NetWare for Macintosh, connect to the server with bindery services enabled. Log in as user SUPERVISOR with bindery services enabled. Next, mount the volume on which you installed the client installation files.

2. **Locate the correct self-extracting archive in the PUBLIC\MAC folder.**

   The MAC folder inside the PUBLIC folder contains at least one language folder. Each language folder is named according to the language in which its user interface is presented

   For example, the archive of the English version of MacNDS is in the following location:

   SYS:PUBLIC\MAC\ENGLISH\MACNDS.SEA

   Likewise, the German archive resides in this location:

   SYS:PUBLIC\MAC\DEUTSCH\MACNDS.SEA

3. **Double-click the MACNDS.SEA file for your language.**

   A file dialog box appears, asking you where you want to put the extracted files. Select the default location to create a MACNDS folder within your language folder, or choose a different location if you want to store the extracted files elsewhere.

4. Copy the files from the server directory in which you extracted the MacNDS files to the 800KB floppy diskette.

5. Rename the floppy diskette.

The diskette should have the same name as the server directory containing the extracted MACNDS files (not the *.SEA files). This is the directory you created in Step 3.

Note If you do not name the diskette correctly, the installer will not work correctly. You will get an error message stating that you need to insert the correct diskette.

E *Install Using RCONSOLE*

The RCONSOLE utility allows network supervisors to perform server console actions from a DOS client, or from a PC using a modem.

You can use the RCONSOLE utility on a DOS client to

♦ Install a NetWare 4™ server remotely through either a LAN, WAN, or modem.

♦ Install several NetWare 4 servers from a single remote location.

Figure E-1
Remote Installation
Using RCONSOLE
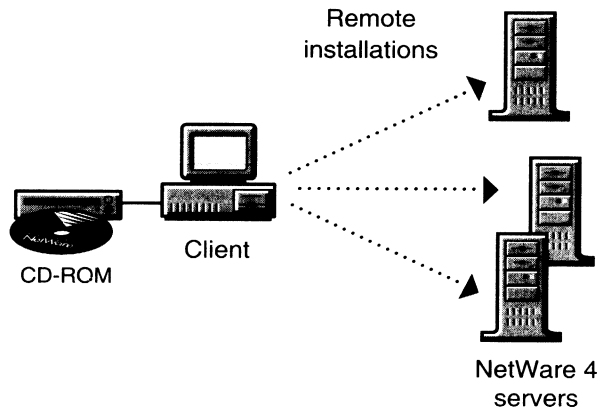
Hardware Configuration Requirements

You must have the following hardware configuration before installing using RCONSOLE:

Checklist ▼
- ❏ An existing DOS client with an installed CD-ROM drive.

- ❏ One or more computers (which will be referred to as "new servers") meeting all of the hardware requirements listed under "Hardware Requirements" on page 2.

- ❏ Each computer connected to the DOS client via a LAN, WAN, or modem.

Prerequisite Tasks

Checklist ▼
- ❏ Plan your Directory tree. See *Introduction to NetWare Directory Services* for guidelines and suggestions.

- ❏ If the new server has never been a server before, complete the tasks explained in Chapter 1, "Prepare Your Site and Equipment," on page 1.

- ❏ Run the new server's Setup program and set its time to the exact local time. (The time synchronization feature in NetWare Directory Services™ uses the computer's time setting.)

- ❏ If necessary, partition and format your hard disk. Boot from the NetWare® *License* diskette; type FDISK and follow the screen prompts to partition the hard disk. Reboot the machine and type FORMAT to format the partition.

Suggestion ▼
We suggest you create a 15MB DOS partition. This will store the NetWare 4.1 server boot files.
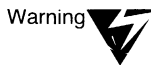
Warning ▼
Reformatting your hard disk erases all stored files. Be sure to back up your hard disk prior to partitioning and formatting.

Necessary Resources

Checklist

❏ The NetWare 4.1 *License* diskette

❏ The NetWare 4.1 Operating System CD-ROM

❏ Two high-density floppy diskettes

Copy Files For the New Server

Follow the procedures below to copy the files needed by the new server.

Procedure

Procedure
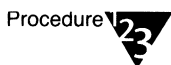
1. **At the DOS workstation, insert the *NetWare 4.1 Operating System* CD-ROM into the CD-ROM drive.**

2. **Change to the BOOT directory of the CD-ROM.**

   For example, if the CD-ROM drive were drive D:, the path would be:

   `D:\NW410\BOOT`

3. **Copy the following files onto the floppy diskettes:**

   ◆ RSPX.NLM (for a remote installation from a workstation) or RS232.NLM (required only for an installation via modem)

   ◆ REMOTE.NLM

   ◆ NWSNUT.NLM

   ◆ INSTALL.NLM

   ◆ CLIB.NLM (required only for an installation using a modem)

   ◆ STREAMS.NLM (required only for an installation using a modem)

4. **Change to the NATIVE subdirectory.**

   For example:

   `D:\NW410\BOOT\NATIVE`

5. **Copy the SERVER.EXE file onto one of the diskettes.**

6. **(Conditional) If you will be installing over a modem, change to the SYSTEM directory.**

   For example, if the CD-ROM drive were drive D:, the path would be:

   `D:\NW410\SYSTEM`

7. **(Conditional) If you will be installing over a modem, copy the AIO.NLM file (and any communications port driver) on one of the floppy diskettes.**

8. **Change to the PREINST subdirectory.**

   For example, if the CD-ROM drive were drive D:, the path would be:

   `D:\NW410\SYSTEM\PREINST`

9. **Copy the ICMD.NLM file onto one of the two diskettes.**

10. **Copy applicable topology files.**

    The remaining files to be copied vary, depending on your topology and network board.

    For example, if you were using an Ethernet topology and an NE2000™ LAN driver, you would copy the following files:

    ◆ NE2000.LAN from the NW410\LANDRV subdirectory

    ◆ MSM.NLM and ETHERTSM.NLM from the NW410\LANDRV\CORE subdirectory

Install Files and Configure the New Server

Follow the procedures below to install the files on the new server, and to prepare the new server for remote installation from the DOS client.

Procedure

Procedure 23
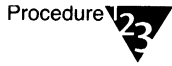
1. **On each new server, create a new directory and name it "NWSERVER."**

2. **Change to the NWSERVER subdirectory.**

3. **Insert the diskettes into the server diskette drive and copy the files that you copied in Step 3 on page 297 to the NWSERVER directory.**

4. **Type**

   SERVER <Enter>

   You are prompted to enter a server name.

5. **Enter a name for this server and press** <Enter>.

   You are prompted for an IPX internal network number.

6. **Enter a an IPX internal network number and press** <Enter>.

7. **(Conditional) If you are installing through an SPX connection (rather than through a modem), load your LAN driver.**

   For example, to load the NE2000 LAN driver, you would type:

   LOAD NE2000 <Enter>

   You are prompted for the I/O port number.

8. **(Conditional) If you are installing through an SPX connection, type the LAN driver I/O port number.**

   For example, if your LAN driver is configured for I/O port 300, you would type:

   300 <Enter>

9. **(Conditional) If you are installing through an SPX connection, type the LAN driver interrupt.**

For example, if your LAN driver is configured for interrupt 3, you would type:

`3` <Enter>

10. **(Conditional) If you are installing through an SPX connection, bind the protocol to the LAN driver.**

For example, for an IPX™ protocol and an NE2000 LAN driver, you would type:

BIND IPX NE2000 NET= *IPX external network number*
    <Enter>

11. **Load the communications protocol.**

For example, if your new server is connected to the DOS client via a LAN, or a WAN fiber optic link, you would load the RSPX communications protocol. Type:

LOAD RSPX <Enter>

If your new server is connected to the DOS client via a a modem, you would load the RS-232 communications protocol. Type:

LOAD RS232 <Enter>

After loading the communications protocol, you are prompted for a remote console password.

12. **Type a remote console password and press** <Enter>**.**

This password will be used by the DOS client to establish a remote connection.

Configure the DOS Client and Install the Server

Follow the procedures below to configure your DOS client to communicate with the new server and then install the NetWare 4.1 server.

Procedure

Procedure

1. **At the DOS client, load the Link Support Layer by typing:**

   LSL <Enter>

2. **Load your LAN driver.**

   For example, to load the NE2000 LAN driver, type:

   NE2000 <Enter>

3. **Load IPXODI by typing:**

   IPXODI <Enter>

4. **Insert the *NetWare 4.1 Operating System* CD-ROM.**

5. **Change to the desired language subdirectory under the INSTALL directory.**

   For example, if the CD-ROM drive were drive D:, the path would be:

   D:\NW410\INSTALL *LANGUAGE*

6. **Type**

   RCONSOLE <Enter>

   The "Connection Type" menu appears.

7. **From the "Connection Type" menu, select the applicable connection type and press <Enter>.**

   For example, if you were connected to the new server via a LAN, you would select "SPX."

   The "Available Servers" menu appears.

8. **Highlight the server name you entered in Step 5 on page 299 and press** <Enter>.

You are prompted for a password.

9. **Enter the remote console password you entered in Step 12 on page 300 and press** <Enter>.

10. **Load INSTALL.NLM by typing**

LOAD INSTALL <Enter>

The following menu appears.

```
╔══════════════════════════════════════════════════════════════╗
║                    Installation Options                        ║
╟────────────────────────────────────────────────────────────────╢
║ Driver options     (load/unload disk and network drivers)     ║
║ Disk options       (configure/mirror/test disk partitions)    ║
║ Volume options     (configure/mount/dismount volumes)         ║
║ License option     (install the server license)               ║
║ Copy files option (install NetWare system files)              ║
║ Directory options (install NetWare Directory Services)        ║
║ NCF files options (create/edit server startup files)          ║
║ Product options    (other optional installation items)        ║
║ Server options     (install/upgrade/this server)              ║
║ Exit                                                           ║
╚══════════════════════════════════════════════════════════════╝
```

11. **Choose "Server Options" and press** <Enter>.

The "Server Installation Options" menu appears.

12. **From the "Server Installation Options" menu, choose "Install a New 4.1 Server" and press** <Enter>.

An information screen appears which, in this case, is not applicable.

13. **Press** <Enter> **to continue.**

A screen appears indicating the default path from which NetWare 4.1 files will be installed.

14. Press <F4> to select a remote client as the source.

A screen appears for you to enter the path to the remote client.

15. Enter the path to the CD-ROM drive of the DOS client.

For example, if the CD-ROM drive were drive D:, the path would be:

D:\NW410\INSTALL *LANGUAGE* <Enter>

16. Continue the installation by following the procedures under "Load the Disk Drivers and CD-ROM Drivers" on page 87 (in Chapter 3 "Custom Installation."

Note Since the LAN driver is already loaded and bound, when prompted for the LAN driver, press <F10> to skip that procedure and continue.

Red Box CD-ROM Drivers

The following list defines the CD-ROM drivers and their load order needed to enable a CD-ROM device to mount a CD-ROM as a NetWare® volume.

The list may or may not be complete, as drivers may have been added to the Novell® Red Box™ (NetWare 4.1 product package) after the list was created.

An updated list can be obtained via Novell's faxback server by calling 1-800-NETWARE and requesting document #1344.

Please note that this list simply defines the load order of drivers included in the Red Box. The configurations listed may not work in every possible hardware configuration. Novell has made every effort to ensure the accuracy of the document and the information contained herein.

Table F-1
Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Adaptec	AHA-1510A	AHA1510.DSK
		ASPITRAN.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Adaptec	AHA-1522A	AHA1520.DSK
		ASPITRAN.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Adaptec	AHA-1542CF	AHA1540.DSK
	AHA-174xAS6*	ASPITRAN.DSK
	AHA-174xAS200*	ASPICD.DSK
	AHA-174xA*	NWPA.NLM
	*Standard Mode	CDROM.NLM
Adaptec	AHA-1640S6	AHA1640.DSK
		ASPITRAN.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Adaptec	AHA-1742AS6*	AHA1740.DSK
	AHA-174xAS6*	ASPITRAN.DSK
	AHA-174xAS200	ASPICD.DSK
	AHA-174xA*	NWPA.NLM
	*Enhanced Mode	CDROM.NLM

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Adaptec	AHA-2742A	AIC7770.DSK
	AHA-2742A-T	ASPITRAN.DSK
	AHA-2742T	ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Always	IN-2000	IN2000.DSK
		ADAASPI.DSK
		NWPA.NLM
		CDROM.NLM
Always	AL-6000	AL6000.DSK
		ADAASPI.DSK
		NWPA.NLM
		CDROM.NLM
Always	AL-7000	AL7000.DSK
		ADAASPI.DSK
		NWPA.NLM
		CDROM.NLM
Buslogic	BT-542/545	BT4X.DSK
	BT-640/646	NWPA.NLM
	BT-742/747	CDROM.NLM
	BT-445S	
	BT-946C	

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
DPT	PM2012B	PM12NW40.DSK
	PM2022/9X	NWPA.NLM
	PM2122/9X	CDROM.NLM
DPT	PM2011B	PM11NW40.DSK
	PM2021/9X	NWPA.NLM
		CDROM.NLM
DTC	DTC 3290	DTC90AS4.DSK
		DTC90HD4.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
DTC	DTC 3280	DTC80AS4.DSK
		DTC80HD4.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM
Future Domain	TMC-16XX	SIM18_4.DSK
	MCS-600/700	FUTXPT.DSK
	TMC3260	FUTD_4.DSK
		NWPA.NLM
		CDROM.NLM

Red Box CD-ROM Drivers and Load Order

Manufacturer	Adapter	Driver load order
Future Domain	TMC-8XX	SIM950_4.DSK
		FUTXPT.DSK
		FUTD_4.DSK
		NWPA.NLM
		CDROM.NLM
Mylex	DAC960-3	DACNET4.DSK
	DAC960-5	ASPIDAC.DSK
		ASPICD.DSK
		NWPA.NLM
		CDROM.NLM

appendix **G** *Troubleshooting*

Server, Hard Disk, and Volume Problems

Server and hard disk problems commonly occur during installation.
Some problems and solutions are explained on the following pages.

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General solutions to try first

If the problem occurred after installation, it may indicate that the network was installed incorrectly.

◆ Check all network boards for possible conflicting address and I/O settings.

Each component should be able to work as a standalone system. Remove all network boards in the server and boot DOS. Add each board one at a time and make sure that DOS still boots after each addition.

◆ Make sure that all cables are fastened securely to all network boards and network connectors, and that terminating resistors are installed correctly.

Console commands cannot be entered at the server console or they do not function correctly

Possible causes

◆ Some SET parameters can only be set in the STARTUP.NCF file.

◆ You are not at the system console.

◆ The server has been brought down.

◆ The server has failed ("hung").

◆ The SERVER.EXE file is corrupted.

◆ The NetWare® operating system has been configured incorrectly.

Possible solutions

◆ Type the SET parameter in the STARTUP.NCF file and then bring the server down and back up.

◆ Make sure all cables are fastened securely to all network boards and network connectors. Check that terminating resistors are installed correctly.

◆ From a backup, or from the *NetWare 4.1 Operating System* CD-ROM, copy a new version of SERVER.EXE to the server boot directory. Have all users close their files and log out.

Bring down the server, if possible. If not, wait a few minutes after all users have logged out; then reboot the server.

◆ Check your server worksheet for network board configurations (see the NetWare 4.1 Server Worksheet on page 179). Then check the actual hardware configuration on each network board in the server to make sure the two match.

If your recorded network board configurations do not agree with the actual hardware configurations, reload the LAN driver with the correct parameters or change the hardware settings to match the LAN driver parameters.

Check all network board settings for possible interrupt and I/O port conflicts. The server can boot up initially even if the interrupt on a network board is set incorrectly.

The most common conflict occurs when a network board is set to interrupt 4 and a printer is connected to the server's serial port, which also uses interrupt 4.

The server "hangs" after mounting the last volume

Possible causes

◆ The server network board is not initializing when the server is brought up because the board is not installed or seated correctly.

◆ The server network board is not configured correctly.

Possible solutions

◆ Run CONFIG at the server console to see what settings appear on the screen. Check the network board configurations of the boards in the server. Make sure the settings match.

◆ Make sure that all server and workstation network boards are seated properly and that cabling and connections are attached securely.

◆ Make sure that the terminators on cables have the right ohm rating and are installed correctly. The IBM* PC Cluster sends a broadcast message during initialization and hangs if the network is not cabled or terminated properly.

◆ Check the network boards in all workstations for correct node address settings.

A hard disk cannot be accessed

Possible causes

◆ The disk driver has not been loaded.

◆ A hard disk is not installed or cabled correctly.

◆ The communication channel between the controller interface board, the disk coprocessor board, and the hard disk is not functioning.

◆ The hard disk controller board is not terminated or addressed correctly.

Possible solutions

◆ Make sure the disk driver is loaded. At the console, type MODULES to view the loaded disk drivers.

◆ Check the cables between the hard disks and the controller boards. Be sure Pin 1 of each cable is attached to Pin 1 of each connector.

◆ Check the power cables and make sure they are seated correctly in the power sockets on the hard disks.

◆ Check the jumper settings on the disk coprocessor board (DCB), the controller board, and the hard disk. Refer to the hardware documentation for correct jumper settings.

◆ If you are using a DCB, run DISKSET to make sure the hardware configurations contained on the EEPROM chip on the disk coprocessor board match those for the hard disks in your server.

◆ Load INSTALL to check the NetWare disk partition and volume information on the hard disk. For details, see "Maintaining Volumes" in Chapter 7 of *Supervising the Network*.

◆ Make sure that each controller interface board connected to the same disk coprocessor board has its own valid address.

None of the volumes, including SYS:, was mounted

Volume SYS: is the backout volume for TTS™ (Transaction Tracking System™). Volume SYS: also contains the NetWare system files and the NLM™ programs.

If volume SYS: does not mount when the server is booted, the AUTOEXEC.NCF file does not execute, LAN drivers do not load, TTS can't be enabled, and the volume does not become part of the Directory tree.

Possible causes

◆ Volume SYS: is corrupted.

◆ The hard disk containing volume SYS: has failed.

◆ The cable or power to the external hard disks has malfunctioned.

Possible solutions

◆ Run VREPAIR on volume SYS: (VREPAIR autoloads from the DOS partition).

◆ Check the cabling and power to the external hard disks. Replace any faulty components.

◆ Replace the hard disk containing volume SYS:.

    ◆ Load INSTALL to create the partitions and volume SYS:.

    ◆ Restore the data from a backup copy.

Some of the volumes mount, while others won't

Possible cause

◆ The server does not have enough RAM.

◆ The disk driver for external drives may not be loaded.

Possible solution

◆ Add more RAM.

◆ At the server console, type MODULES to see which drivers are loaded.

The operating system reports disk errors when a volume is being mounted

Possible causes

◆ The server does not have enough memory to mount the volume.

◆ The operating system is experiencing directory sector mismatching. This mismatching can be caused if the media is defective or if the server is turned off without the DOWN command.

Possible solutions

◆ Load MONITOR and check the status of the available cache buffers. If the cache buffers are fewer than 20%, add more memory to your server.

◆ Minor errors usually correct themselves through normal network use. For example, if a FAT entry is wrong, the entry is updated and corrected the next time it is written to. If errors do not correct themselves, run VREPAIR.

◆ Some problems may be corrected automatically by TTS.

The operating system reports memory errors when a volume is being mounted

Possible causes

◆ Volumes take more memory to mount than they require after being mounted because the mounting process performs consistency checks (for example, the duplicate copies of all the tables are checked).

◆ Volumes and directory entries grow dynamically. Thus, if your server is using most of the RAM (file cache buffers are close to 20% of the memory) and you dismount a volume, you may not be able to remount the volume unless additional memory is available.

◆ Each additional name space support that you add to a volume increases the size of the FATs and DETs. Adding name space support can cause the tables to grow so large that the server does not have enough RAM to mount the volume.

Possible solutions

◆ Load MONITOR and check the status of the available cache buffers. If the cache buffers are fewer than 20%, add more RAM to your server.

◆ Free up memory by unloading resources.

◆ Streamline the directory structure. Every subdirectory takes at least one directory block (by default, a 4KB block of memory). Thus, subdirectories with only one file require as much memory as directories with 32 files.

If you combine directories so that most directories have about 32 files, and then purge the deleted subdirectories and files, you will free up memory.

◆ Calculate how much memory you need and add memory to the server. View the current volume size with INSTALL. (See "Modifying the Size of a Volume" in Chapter 7 of *Supervising the Network*.)

See Appendix A, "Calculate RAM Requirements," on page 273 for a formula for estimating the total amount of server memory needed.

- For a more accurate assessment of available RAM, load MONITOR, select "Resource Utilization" from the "Available Options" menu, and view the "Cache Buffers" setting in the "Server Memory Statistics" screen.

  If the percentage is below 20%, you should add more memory.

- Remove the recently added name space support.

  Warning
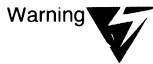
  This is a destructive step that destroys all the extended file information. Before taking this step, try to free up enough memory so that the volume mounts and you can back up the data.

  Have all users log out, and then unload all modules except the volume's disk drivers. Dismount any mounted volumes.

  To remove the name space, load VREPAIR and choose the "Remove Name Space Support From The Volume" and "Write All Directory and FAT Entries Out to Disk" options. Then run VREPAIR on the volume that would not mount.

A volume cannot be mounted because of corrupted Directory Entry tables (DETs) or File Allocation Tables (FATs)

Possible causes

The following can cause mismatches in the duplicate copies of the FAT and DET:

- A power failure occurs and the server is not brought down with the DOWN command.

- A hard disk fails.

- A disk channel error occurs.

- A volume is not dismounted with the DISMOUNT command.

- Directory information in cache is not completely written to disk.

Possible solutions

Complete one or more of the following:

◆ Run VREPAIR.

◆ Add a UPS system so that the server is brought down automatically when a power failure occurs.

◆ Replace faulty disks or controllers.

◆ If the volume resides on mirrored hard disks, use FILER to salvage the data on one of the drives.

   Use INSTALL to unmirror the hard disks (select the hard disk you think is least reliable and delete it from the mirroring list). Then run VREPAIR on the volume and mount the volume.

   If the volume still does not mount or the data shows some corruption, read the next suggestion before remirroring the hard disks.

◆ If the volume resides on mirrored hard disks, salvage the data on both hard disks.

   Use INSTALL to unmirror the hard disks and to salvage the orphaned (Out Of Sync) hard disk as a new volume. Run VREPAIR on both the old and the new volumes.

   Mount both volumes and compare the files. Use INSTALL to delete the volume that has the least useful information; rename the salvaged volume, if necessary. Then use INSTALL to remirror the hard disks.

A volume cannot be mounted because a name space module was not loaded first

Possible causes

Once a volume has been configured to support more than the DOS naming convention, the loadable name space module must be loaded before the volume can be mounted. One of the following has probably occurred:

◆ The command to load the name space module is not in the STARTUP.NCF file.

◆ The module to load the name space has not been copied to the boot directory of the server.

Possible solutions

◆ Load the name space module; then mount the volume. Copy the name space module to the server boot directory and add the load command to the STARTUP.NCF file. The module then loads automatically whenever the server is booted.

◆ Delete the name space configuration from the volume.
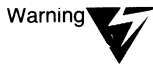
Warning This is a destructive step that destroys all of the extended file information.

◆ Back up all non-DOS files. Then load VREPAIR and choose the "Remove All Name Space Entries" and "Write Changes Immediately To Disk" options. Then run VREPAIR on the volume.

The keyboard locks while copying files from CD-ROM

Possible cause

If you have a CD-ROM device that shares a SCSI bus with a disk subsystem containing volumes to which NetWare installation files are copied (typically volume SYS:), your keyboard may lock up while loading drivers or copying files to the volume.

Figure G-1 shows possible configuration conflicts.

Figure G-1
SCSI Adapter Conflicts
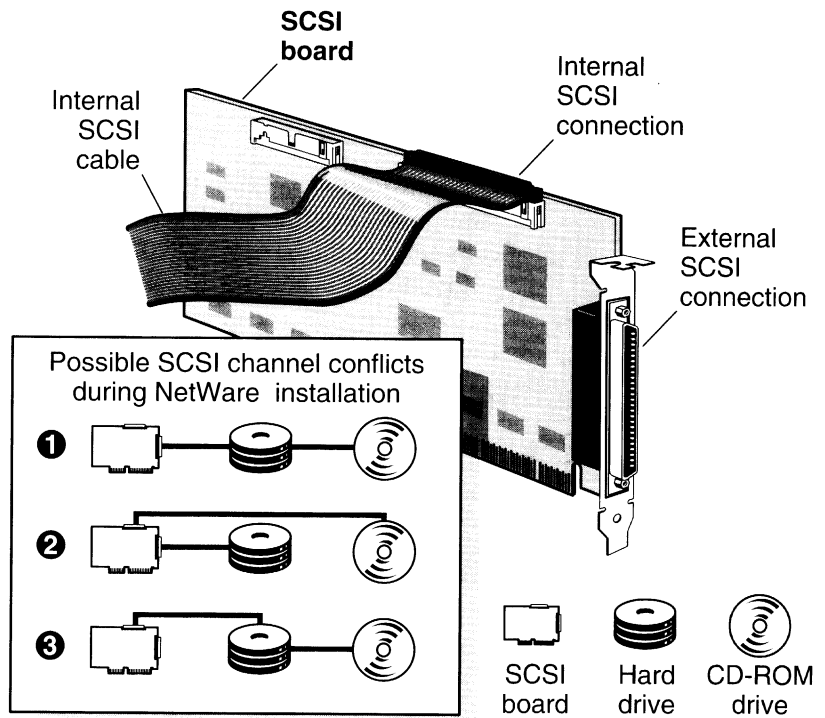
Solution

Remove the CD-ROM device drivers that you used to set up the CD-ROM drive as a DOS device from your CONFIG.SYS file. This will avoid possible conflicts when the NetWare 4.1 *Operating System* CD-ROM is mounted as a NetWare volume.

Procedure

Procedure
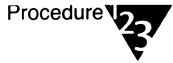
1. **Press <Alt>+<Esc> until you are at the console prompt (:).**

2. **Type**

   DOWN <Enter>

3. **Then type**

   EXIT <Enter>

4. **Using a text editor, remove the CD-ROM device drivers from your CONFIG.SYS file.**

5. **Save the updated CONFIG.SYS file.**

6. **Using a text editor, remove any references to the CD-ROM drivers from your AUTOEXEC.BAT file.**

7. **Save the updated AUTOEXEC.BAT file.**

8. **Reboot the server by pressing <Ctrl>+<Alt>+<Del>.**

9. **(Conditional) If the server doesn't boot automatically from the AUTOEXEC.BAT file, change to the subdirectory with your SERVER.EXE (this is NWSERVER.EXE in the "Simple Installation") and other boot files, and type**

   CD\NWSERVER <Enter>
   SERVER <Enter>

10. (Conditional) If you are using ASPI device drivers (for example, for an Adaptec controller), you need to perform one of the following commands:

    `LOAD AHA1540` <Enter>

    `LOAD ASPICD` <Enter>

    or

    `LOAD CDNASPI` <Enter>

11. At the console, type

    `LOAD NWPA` <Enter>

12. At the console, type the following

    `LOAD CDROM` <Enter>
    `CD MOUNT NW410` <Enter>

13. At the console, type

    `LOAD INSTALL` <Enter>

Communication Problems

Communication problems are related to network boards, LAN drivers, network performance, and server/workstation communications, as well as to internetwork communications. Some problems and solutions are explained on the following pages.

Widespread problems

Probable causes

If a problem occurs simultaneously on several workstations, it is probably a result of one of the following:

◆ The server network board is not seated or configured correctly.

◆ The network board cable from the server is faulty.

◆ Cabling on the network is faulty.

◆ The connector closest to the server is faulty.

◆ The RX-Net™ active hub is off.

◆ The correct Ethernet frame type has not been specified. NetWare 4.1 defaults to frame type 802.2.

◆ The repeater is off or nonfunctional.

◆ The cabling is not terminated properly.

◆ Volume SYS: is not mounted.

◆ ISA disk controller boards installed in EISA machines have not been configured.

Possible solutions

◆ Check all hubs and repeaters to make sure they are on.

◆ Check the cables for proper termination.

◆ Make sure the server network board is seated properly.

◆ Replace the server network board with a board that works correctly. Make sure the new board has the same jumper settings.

◆ Run VOLUMES at the server console. If volume SYS: is not mounted, mount it. The server does not broadcast to the network until volume SYS: is mounted.

◆ Run CONFIG at the server console to check the configuration of the network boards. Then bring down the server, turn off the power, and check the actual network board settings:

  ◆ Make sure all settings agree with the settings used to load the driver. If you load the driver with an interrupt that conflicts with the board's setting, the network board cannot broadcast on the network.

  ◆ Make sure the node address on the board is a legal address. (Addresses 0 and FFFFFFFFFFFF are reserved; do not use them.)

◆ Run CONFIG at the server console to make sure each network board has a LAN protocol bound to it. Network boards cannot broadcast without a protocol.

◆ Run NLIST at a workstation, if possible, to check node addresses. Each node address on the network should be unique. Sometimes you can find the problem by turning off all workstations and turning them on one at a time.

◆ Have a user log in to the network from a workstation. Load MONITOR and choose "Connection Information" from the "Available Options" menu.

If the "Active Connections" list shows the user's login name, the server is receiving and responding to the workstation's request.

If the workstation receives a "Server cannot be found" error, make sure the server and workstation are using the same frame type.

◆ Replace segments of cable and cabling connections until communication is restored.

The server does not boot after a network board is installed

Possible causes

◆ The network board is not attached properly to the cable.

◆ The hardware conflicts with other boards, the monitor board, or ports in the server.

◆ The network board is faulty.

Possible solutions

◆ Cable the network board to at least one workstation and check the termination.

◆ Make a list of all I/O ports, interrupts, and memory addresses used by the equipment. Use the NetWare 4.1 Server Worksheet on page 179 to record the information.

Also do the following to identify potential conflicts:

◆ Check the documentation that came with the computer and all installed hardware components.

◆ Make sure no two pieces of hardware are using the same I/O port, interrupt, or memory address.

◆ Make sure that the memory range for the I/O ports and memory addresses do not overlap. If there are conflicts, reconfigure the equipment so that no conflicts exist.

The server cannot be found by the workstations on the network

Possible causes

◆ The server's network board is not initializing when the server is brought up because it is not configured correctly or it has failed.

◆ The server is anticipating the wrong frame type. NetWare 4.1 uses Ethernet 802.2 as the default frame type for Ethernet LAN drivers that were loaded at the system console. Workstations running earlier versions of NetWare may be using Ethernet 802.3.

◆ Address or interrupt conflicts exist between two boards inside the server or between a board and the computer's hardware.

◆ The server does not have enough packet receive buffers.

◆ A protocol (such as IPX™) is not bound to the network board.

◆ The cabling is too close to sources of interference.

◆ Volume SYS: is not mounted.

Possible solutions

◆ Make sure all network connectors (including transceivers and repeaters) are installed and the cable is attached securely.

◆ Make sure all network boards are seated firmly and the cabling connections are in place.

◆ Make sure the network cable is terminated properly. Many network boards send a broadcast message during initialization and will hang if the network is not cabled or terminated properly.

◆ Check cabling for interference from fluorescent lights, microwaves, radar, X rays, and copy machines. Either move the cable or shield it from the source of interference.

◆ Run VOLUMES at the server console to ensure that volume SYS: is mounted. Volume SYS: must be mounted before the server can advertise its name to the network.

◆ Run CONFIG at the server console to see what settings appear on the screen. Then check network board configurations in the server. Be sure the network board configurations match the settings that appear when you run CONFIG.

◆ Check the workstation frame types to see that they match those of the server.

◆ Check node address settings on all server and workstation network boards. Each address should be unique.

◆ Check all IPX internal and external network numbers. Each server and cabling system should have a unique IPX external network number.

◆ Make sure no two boards in the server are using the same I/O port, memory address, or interrupt.

◆ Bind the LAN driver (TRXNET, NE1000™, TOKEN, etc.) to IPX (or another communication protocol).

◆ If you have a lot of network traffic, increase the maximum number of packet receive buffers. (See "SET" in *Utilities Reference*.)

Servers do not recognize each other on the network

Possible causes

◆ The hardware settings in the server are incorrect.

◆ The IPX internal/external network numbers conflict.

◆ The NetWare Directory database is corrupted.

◆ Frame types are different.

◆ The server could have RESTRICT.NLM loaded.

◆ The router could be filtering out the IPX external network number.

Possible solutions

◆ Run CONFIG at the server console to see what settings appear on the screen. Then check network board configurations in the server. Be sure the network board configurations match the settings that appear when you run CONFIG.

◆ Check the IPX internal network number for the server and the IPX external network number for the cabling.

When multiple servers share the same cabling system (called a multiserver network), all servers must have the same IPX external network number. However, the servers must have unique IPX internal network numbers and unique node numbers.

When network cabling systems are connected through routers (internal or external), each cabling system must have a unique IPX external network number. NetWare 4™ servers must also have a unique IPX internal network number apart from the cabling.

The unique IPX external network number is the first item read in a packet sending/receiving interaction.

◆ Reset the router with the RESET ROUTER console command.

◆ Check the cabling system for faulty termination.

◆ Bring down all servers except one. Reset its router with RESET ROUTER. Bring up each server, one at a time, establishing communications with it before bringing up the next one. Run DISPLAY NETWORKS to check for duplicate IPX external network numbers as each server is booted.

◆ Run DSREPAIR.

◆ Add the server to the Restrict list.

◆ Load FILTCFG.NLM at each server and verify that SAP traffic is being routed.

Responses from the server are noticeably slow

Possible causes

◆ The workstation network board is slow or faulty.

◆ Network cabling is faulty.

◆ The server network board is slow or faulty.

◆ Too many users are using the network.

◆ The server speed is not set to the highest speed.

◆ The server hard disk is slow or faulty.

◆ The server is low on memory.

◆ The volume has too many deleted files that have not been purged.

◆ Network traffic is extremely high.

◆ The cabling system is experiencing too much interference.

◆ A hard disk has failed or is failing.

◆ Insufficient directory buffers, cache buffers, or packet receive buffers have been allocated.

◆ An EISA controller board needs to be configured to use interrupts.

Possible solutions

◆ Check the computer's documentation for switch information. Set
  the CPU speed to its highest setting. Use SPEED to verify that the
  CPU is running at the appropriate speed.

◆ If a workstation or the server seems slow, insert a new network
  board into the slow computer to check performance. If the speed is
  still below normal, reinstall the original network board and replace
  the cable attaching the workstation or server to the network.

◆ Load MONITOR to check the status of packet receive buffers and
  service processes. Compare their values to the maximum allowable.

  Use SET to increase the values for the following parameters if your
  system is at the maximum value: Maximum Service Processes and
  Maximum Packet Receive Buffers.

  (For additional ideas, see "Assessing Server RAM" in Chapter 7 of
  Supervising the Network.)

◆ Load MONITOR and check the Hot Fix™ status of all hard disks.
  Verify that all mirrored disks are still mirrored.

◆ Run the FILER text utility or the NetWare Administrator graphical
  utility to purge deleted files. Or set the "Purge" attribute on files
  you want to be purged immediately after being deleted.

  For more information, see Chapter 2, "Managing Directories, Files
  and Applications," in *Supervising the Network*.

◆ Load MONITOR and check the LAN driver statistics. If you have
  more than one network board, compare the boards' "Total packets
  sent" statistics. If one board is receiving most of the traffic, re-cable
  the network so that the boards have equal loads.

◆ If you are on a multiserver network or an internetwork, re-cable the
  system with a backbone to reduce network traffic. See "Network
  backbone" in *Concepts* for a description of a backbone.

◆ Check the cabling for interference from fluorescent lights,
  microwaves, radar, X rays, and copy machines. Either move the
  cable or shield it from the source of interference.

Users can log in, but workstations periodically lose their connections to the server

Possible causes

◆ A network board in either the server or a workstation is faulty.

◆ A user on the network is using an old shell file (for example NETX.COM).

◆ Two workstations have the same node number.

◆ The cabling system is not terminated properly.

Possible solutions

◆ Run NLIST to make sure all node numbers are unique. At a DOS workstation, type

   NLIST *USER* **/A** <Enter>

◆ Check all boot files. Make sure all users are using the latest version of the workstation software.

◆ Check the cabling for improper termination, loose connections, and faulty components.

◆ Use a LAN analyzer product to check the network boards, cables, and packets. (NetWare Care™ and LANalyzer® are available from your Novell Authorized Reseller[CLM].) Replace faulty boards and cables.

◆ Refer to your network hardware's documentation to review the cabling specifications for your cabling system. Make sure your system is in compliance with all the specifications.

◆ Set the console to display all workstation connections cleared by the watchdog. (See "SET" in *Utilities Reference*.)

   If workstations are being cleared by the watchdog, check all network boards and the entire cabling system between the workstations and the server. Check for faulty cables, improper termination, and faulty hubs.

ARCnet-specific problems

Possible software-related causes

◆ The LAN driver being used is not specifically designed for the ARCnet* network board.

◆ The LAN driver is outdated.

◆ Receive buffer sizes conflict.

◆ Node numbers are illegal or conflicting.

◆ The monitor board settings conflict with the network board settings.

Possible software solutions

◆ Load the LAN driver that matches the network board installed.

◆ Contact the vendor for an updated version of the LAN driver.

◆ Run NLIST. Make sure that all client workstation addresses are unique and that no station uses 0. At a DOS workstation, type

NLIST *USER* **/A** <Enter>

◆ If the monitor is blank when the network board is in the workstation, the monitor could be using interrupt 2. Try setting the network board to an option that does not use interrupt 2; then edit the NET.CFG file to reconfigure the workstation's IPXODI.COM file.

(See the hardware documentation for a list of supported options for your board.)

Possible hardware-related causes

◆ The passive or active hubs are faulty.

◆ The network boards are faulty.

◆ Improper cable lengths connect to passive or active hubs.

◆ Two passive hubs are connected together.

◆ A passive hub is terminated improperly.

Possible hardware solutions

◆ Check the fuses in all active hubs. Replace faulty fuses.

◆ If active hub lights blink, bad packets are being sent on the network. Check for conflicting node addresses, bad network boards, and improperly terminated passive hubs.

◆ Check all passive hubs for proper termination.

◆ Check the lengths of the cables connecting active and passive hubs to make sure they are within specifications. (See the hardware documentation to review the cabling specifications for your network board.)

◆ Check the cabling system for loopbacks, such as a cable from an active hub that attaches back to the active hub rather than to a workstation. Make sure that two passive hubs are not cabled to each other.

Ethernet-specific problems

Possible software-related causes

◆ The workstation and the server are using two different Ethernet frame types.

◆ The monitor board settings conflict with the network board settings.

Possible software solutions

◆ Make sure that the server LAN drivers and the workstation LAN drivers have been configured for the same Ethernet frame type. (See "Frame" in *Concepts* for information on frame types.) Configure the workstations for the appropriate frame type.

　◆ For instructions on configuring workstation LAN drivers, see *NetWare Client for DOS and Windows User Guide*.

　◆ See "LOAD" in *Utilities Reference* for the parameter you need to configure the Ethernet LAN driver in the NetWare server.

◆ Some VGA boards use interrupt 2. If the monitor is blank when the network board is installed, set the network board to an option that does not use interrupt 2; then edit the NET.CFG file to reconfigure the workstation software.

(See the appropriate hardware documentation for a list of supported options for your network board.)

◆ For workstation LAN drivers or specialized software that sets the node address for the client workstation's network board, run NLIST to make sure that each network board has a unique node number. At a DOS workstation, type

NLIST *USER* **/A** <Enter>

Possible hardware-related causes

◆ T-connectors are not terminated properly.

◆ The network board is set up for one type of cabling, but it is connected to a different type (such as thick Ethernet instead of thin Ethernet).

◆ Hardware conflicts exist between the workstation and the network board.

Possible hardware solutions

◆ Check for faulty termination. Each T-connector that has only one cable attached to it must be terminated. Each trunk must be terminated with a grounded terminator.

◆ Check the network boards. Make sure that the board is set for the type of cabling (thick or thin Ethernet) you are using.

◆ Check terminators with an ohmmeter for a resistance of 48 to 52 ohms. Replace any terminators that do not fall within the specified range.

Token ring-specific problems

Possible software-related cause

◆ IBM *LAN Support* has not been loaded at the workstations.

Possible software solutions

◆ Check for duplicate client workstation addresses if you have used DOS ODI™ drivers or specialized software to set the node addresses.

◆ Run DXMAID at each workstation, and set *LAN Support* to load automatically when the workstation is booted. The DXMAID program is on the IBM *LAN Support Program* diskette.

Possible hardware-related causes

◆ A MAU (Medium Attachment Unit) is faulty or a MAU has been set improperly.

◆ A faulty token ring adapter has been installed in a workstation or server.

Possible hardware solutions

◆ Reset the MAU.

◆ Check the MAU for faulty fuses, power problems, and bad ports.

◆ Check for faulty token ring adapters by running the DXMAID program found on the IBM *LAN Support Program* diskette.

◆ Check for breaks in the daisy-chained MAUs.

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