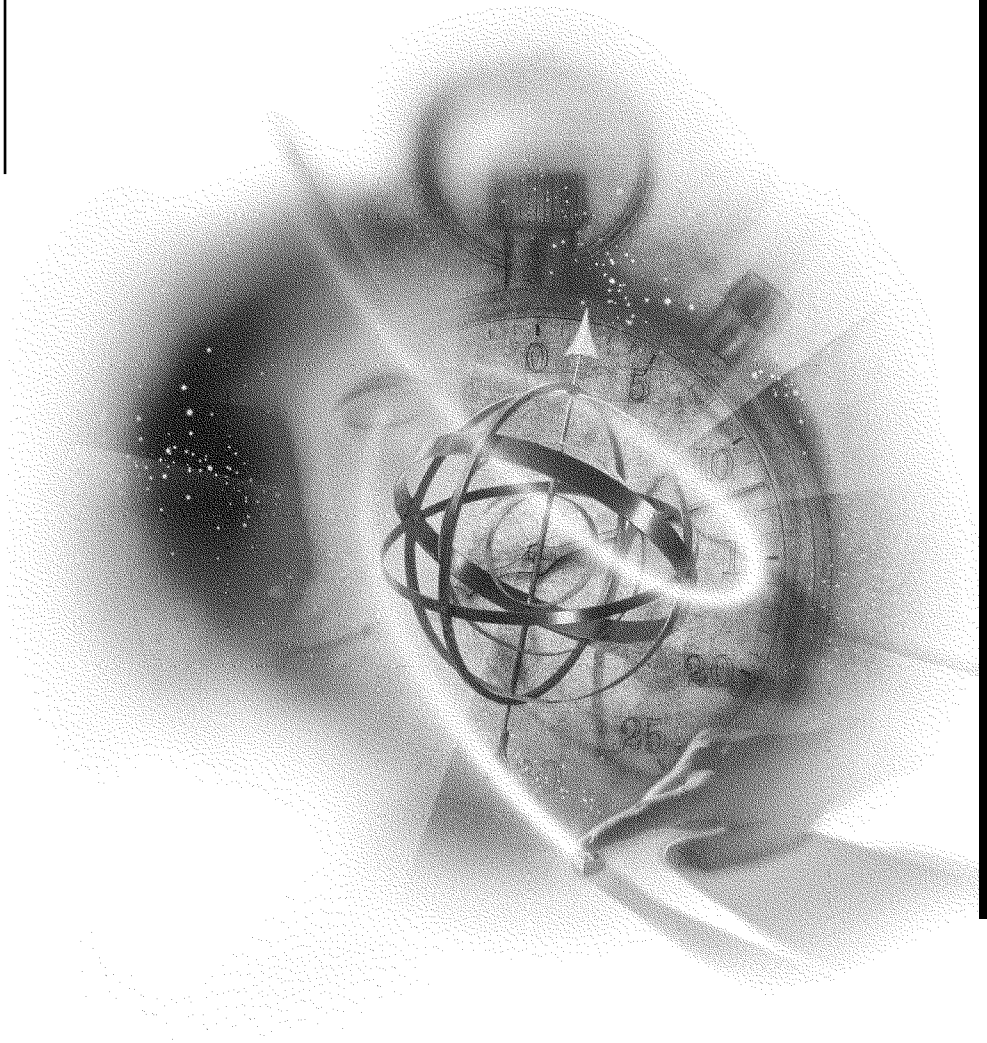
NetWare Overview



NetWare® 3.12

NETWORKING SOFTWARE

Novell®

Legal Notices

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NetWare 3.12 Overview
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Contents

How to Use This Manual

The new features of NetWare v3.12 are explained in Chapter 1. Chapter 2 explains how to use the NetWare shell files (NETX). Use Chapter 2 if you are not using the NetWare DOS Requester and VLMs.

Other Resources for Help

Besides this manual, you may want to use the following resources:

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

  If you are unsure how to use a command line utility, type the utility name and add the /? option for help. For instance, for help with using the RIGHTS utility, type RIGHTS /?.

- *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.

- *Novell online documentation*. The Novell online documentation viewer allows you to read NetWare manuals from your Windows or OS/2 workstation.

  All NetWare v3.12 manuals except the *Quick Access Guide* are available on the NetWare v3.12 CD-ROM.

- *Novell Network Management System (NMS).* This product helps you manage the cabling system, computers, software, and other components of the network. Contact your Novell Authorized Reseller for more information about using NMS on your network based system design, implementation, and management. Application Notes are a collection of technical articles published monthly.

Novell publishes *Research Reports* as the research becomes available.

You may purchase subscriptions and back issues of these publications from within the United States or Canada by calling the Novell Research Order Desk at (800) UPDATE1. From outside the United States or Canada, call (801) 861-5380.

- *Third-party books and periodicals.* A number of books on NetWare, 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® on CompuServe.* A fairly inexpensive way to get up-to-date advice and patches is through NetWire on the CompuServe bulletin board. To open a CompuServe account, call one of the following numbers:
- From within the United States or Canada, call (800) 524-3388.
- From within the United Kingdom, call 0800-289-378.
- From within Germany, call 0130-37-32.
- From the rest of Europe, call 44-272-255-111.
- From outside of the United States, Canada, and Europe, use the appropriate country code for the U.S. to call (614) 457-0802.

  Ask for "Representative 200." This key phrase simply lets the membership representative know that you are a Novell customer.
- *NetWare Support Encyclopedia.* The NSE program gives customers access to regularly-updated information from Novell and other vendors on products and services. In addition, an NSE Professional Volume is available that provides customers with all of the information in the NSE, plus patches, fixes, and more.
- *Troubleshooting hardware and software.* Specialized hardware and software packages, such as Novell's LANalyzer, are available to help you isolate network problems.

1 New Features

NCP Packet Signature

How NCP Packet Signature Works

NCP™ packet signature is an enhanced security feature that protects servers and clients using the NetWare Core Protocol™ (NCP) by preventing packet forgery.

NCP packet signature prevents packet forgery by requiring the server and the client to "sign" each NCP packet. The packet signature changes with every packet.

When to Use NCP Packet Signature

NCP packet signature is not required for every installation. Some network supervisors may choose not to use NCP packet signature because they can tolerate certain security risks.

For information and instructions on using NCP packet signature, see "SET" in *System Administration* and "Improving Speed and Security on your Workstation" in *Workstation for DOS and Windows*.

NMENU

NMENU can be used to replace the MENU utility included in earlier versions of NetWare. NMENU requires less memory than the old MENU utility.

When you upgrade to NetWare v3.12, you can convert menus created with MENU to NMENU and continue using them.

For information and instructions on using NMENU, see "NMENU" in *Utilities Reference*.

NetWare DOS Requester and VLMs

The NetWare DOS Requester™ consists of a number of files that provide NetWare support for a DOS client. Unlike NETX or other previous versions of the shell, the DOS Requester consists of a number of Virtual Loadable Modules™ (VLMs™).

A VLM is a modular executable program with a set of logically grouped features or APIs. For example, transport-related functions (send packets, receive packets, etc.) fit logically into a VLM.

Features of the NetWare DOS Requester

The NetWare DOS Requester provides several new improvements over NETX. It does the following:

- Supports NetWare Directory Services™.
- Provides a modular architecture that has advantages for current and future applications.
- Takes advantage of memory-swapping technology and DOS redirection capability.
- Includes Packet Burst™ protocol and Large Internet Packet (LIP).
- Supports installed base of NetWare users by providing backward compatibility with NETX.

Novell online documentation

The Novell online documentation viewer allows you to read NetWare user manuals on your computer screen. All of the manuals in the NetWare v3.12 manual set are available online, with the exception of the *Quick Access Guide*.

Novell online documentation can be installed on either a NetWare server or a local hard disk. In addition, you must set up a workstation to view Novell online documentation.

Viewer Features

The Novell online documentation viewer gives you advantages over printed documentation. With it, you can do the following:

- Scroll sequentially through a book.
- Move quickly from one part of the book to another by selecting a section from the table of contents outline.
- Move quickly to another part of the book or a different book to follow a cross-reference.
- Return or step back to sections of the book that you previously viewed.
- Search for specific words or phrases in a library, bookshelf, or book.
- Print book sections on demand.
- Open several books at one time.

New Migration and In-Place Upgrade Utilities

The NetWare Migration Utility, a workstation-based utility, allows you to transfer your network information "across the wire" from a NetWare v2.*x* or v3.*x* server or a LAN Server to an existing NetWare v3.12 server that is on the same network.

The In-Place Upgrade Utility, a server-based utility (NetWare Loadable Module™), allows you to change your network server that is running NetWare v2.1*x* or later into a NetWare v3.12 server without purchasing additional hardware.

For information on the across the wire migration and in-place upgrade utilities, see the "Upgrade an Existing File Server" section in *Installation and Upgrade*.

New NetWare Loadable Modules (NLMs)

CDROM

The CDROM.NLM allows the server to use a CD-ROM disk as a read-only volume. For more information, see "CDROM" in *System Administration*.

KEYB

Use KEYB to change the keyboard type for the file server console. The following keyboard types are available:

English (United States)
French
German
Italian
Spanish

For more information, see "KEYB" in *System Administration.*

NLICLEAR (Not-Logged-In CLEAR)

NLICLEAR is an NLM used with NetWare v3.12 Runtime that periodically deletes or "clears" unauthenticated connections. Unauthenticated user connections cannot be reused until they are cleared.

For more information, see "NLICLEAR" in *System Administration* or "NetWare Runtime" in *Concepts*.

NUT

Use NUT (NLM Utility User Interface) if you have a NetWare v3.11 loadable module (such as v3.11 MONITOR) that requires the NUT library of routines and functions.

For more information, see "NUT" in *System Administration*.

NWSNUT

Use NWSNUT (NLM Utility User Interface) if you have a NetWare v4.0 loadable module that requires the NWSNUT library of routines and functions.

For more information, see "NWSNUT" in *System Administration*.

NetWare Messaging

Your NetWare box includes a messaging starter kit, which contains two products—NetWare Basic MHS™ and FirstMail™. This section explains why you might use messaging and describes both of these products.

Why Use Messaging?

Messaging has become a critical component of the network environment. In fact, messaging has become a core network service, third only to file and print services. It improves communication, increases productivity, and maximizes the use of existing resources.

Improving communications. In an increasingly fast-paced environment, timely and reliable communication is critical. Messaging applications are one type of tool developed to meet communication needs. They allow employees to communicate even when meetings, travel schedules, and geographically dispersed locations prevent them from meeting face to face.

Increasing productivity. Employees often miss phone calls, meetings, etc. Messaging increases productivity by improving the success rate for communications because it does not require all participants in a conversation to be available at the same time.

Maximizing the use of existing resources. Without any additional resources, you can provide your users with all the benefits of a messaging solution.

What is Basic MHS?

NetWare Basic Message Handling Service (MHS) is a product that provides message delivery among users on the same file server.

Users create messages with an electronic mail application that complies with Novell's Standard Message Format (SMF) interface. The application submits the message to Basic MHS, which delivers it to the recipient's mailbox. (For a list of SMF-compatible applications, refer to the *NetWare Messaging Solutions Guide*, available from your Novell Authorized Reseller^{CLM} or sales office.)

Basic MHS is part of Novell's family of messaging products, which also includes NetWare Global MHS™. Global MHS, a scalable, full-featured MHS platform for NetWare v3.11 and later environments, provides message delivery among users at different file servers, across asynchronous and internetwork links. Through optional protocol modules, Global MHS also provides connectivity to SMTP, SNADS, and X.400 environments.

When your need for messaging grows beyond a single server, you can upgrade to the Global MHS product. Basic MHS is fully compatible with Global MHS.

The following features make Basic MHS easy to use:

- *Full-name user addressing*. Basic MHS simplifies addressing of messages by allowing you to use names as user addresses. For example, John Smith's user address can be "John Smith".
- *Import of users from the NetWare bindery*. The installation program allows you to import users from the NetWare bindery into the Basic MHS database. This minimizes the amount of time required for installation and administration of Basic MHS.

Like the other products in the NetWare MHS family, Basic MHS supports a simple, file-based interface that you can use to write messaging-enabled applications. These applications can use NetWare MHS to send messages to users or to other applications. For example, a message-enabled database program can generate a report and use Basic MHS to distribute it to a group of MHS users.

What Is FirstMail?

FirstMail is a starter electronic mail utility that is available in both DOS and Macintosh versions. It provides such basic electronic mail functionality as the following:

- Create and send messages.
- Read, print, delete, save, reply to, and forward messages.
- Attach files to a message.
- Create and maintain an address directory.
- Organize messages in folders.

FirstMail provides easy-to-use menus and (in FirstMail for DOS) context-sensitive online help.

NetWare v3.12 Ethernet Frame Types

The default Ethernet frame type for NetWare v3.12 is 802.2. The default Ethernet frame type for NetWare v3.11 and earlier is 802.3. Machines running only Ethernet frame type 802.2 cannot see machines running only Ethernet frame type 802.3, and vice versa.

If you are installing NetWare v3.12 in an existing NetWare environment that is using Ethernet 802.3 frame types, you need to either specify both 802.2 and 802.3 frame types in your AUTOEXEC.NCF file and then bind IPX to both, or you must change the Ethernet frame type to 802.3.

IMPORTANT: Binding IPX to both 802.2 and 802.3 frame types can affect network speed and performance. Do not bind to both frame types unless it is necessary.

NetWare v3.12 Patches

The following table describes patches that have been made to the OS since the release of NetWare v3.11. Since these patches are now included in the NetWare v3.12 OS, you do not have to manually load them.

Table 1 Description of NetWare v3.12 patches

Patch name	Description
ASNCRDFX.NLM	Fixes a problem that may occur when multiple threads do asynchronous reads. It was possible for a thread to read data that was written by another thread.
BIGRFIX.NLM	Allows the OS to prevent read requests larger than 512 KB from overrunning the stack. This problem occurred when loading large NLMs.
CLPHFIX.NLM	Fixes the "Clear Phantom called with not primary directory number" problem.
DIAGRFSX.NLM	Fixes two problems with network management. This NLM fixes the problem of the server not responding to requests issued by the network management console. It also fixes the problem of the server not responding to network management requests directed to other networks connected to the server.
DIRLPFIX.NLM	Fixes the infinite loop problem caused when the DOS DIR, FindFirst and FindNext commands were issued in a subdirectory with more than 65,535 files.
DOSUNFIX.NLM	Fixes a problem with NetWare/NFS v1.2. A problem existed if a file was renamed from 99999999.v0 to 99999999.V0.
DOTFIX.NLM	Fixes a problem that allowed multiple directories with the same name to be created at the SYS: (root) level.
EAINFIX.NLM	Fixes a problem that occurred with extended attributes when two or more stations executed XCOPY multiple times.
EVENTFIX.NLM	Fixes a problem that occurred when a "delete bindery object" call was made to the OS.
FATFIX.NLM	Fixes a TurboFAT and FAT corruption problem that occurred when multiple stations randomly accessed large database files.
GETQFIX.NLM	Fixes the problem of .SRV files being deleted in the SYS:SYSTEM queue subdirectories.

Patch name	Description
GETRFIX.NLM	Fixes a problem that occurred when a driver requested a valid linked request that had been changed by another process.
GETSEFIX.NLM	Fixes a problem that occurred when more than 31 security equivalences for a user or group ID were set up.
GNSFIX.NLM	Fixes a problem that occurred when a user on a one-network system tried to reboot and reconnect when all the connections were in use.
HTFXFX.NLM	Fixes a problem that occurred when using disk block and cache buffer sizes larger than 4 KB.
MAXCDCFX.NLM	Changes the maximum limit of the "Maximum Concurrent Disk Cache Writes" SET parameter from 100 to 1000. This limit enables better performance from high throughput disk controller drivers and high throughput EISA drives.
MFIXOPEN.NLM	Fixes a problem that occurred when the MAC gateway was run instead of the AFP NLMs. MAC users were unable to open files flagged Read Only.
MKDIRFIX.NLM	Corrects invalid error codes returned by the "create directory" call or when copying a file to an invalid path.
NCPSPFIX.NLM	Prevents a zero-length WriteToSpool NCP from being processed.
OS2OPNFX.NLM	Allows a user to use the TYPE command to view a file even though SCAN file rights have not been granted.
REMDEVFX.NLM	Fixes a problem that occurred when formatting removable devices.
REQFIX.NLM	Fixes a problem that occurred in PAUDIT when several users used the same workstation to log in. The "requests" value in PAUDIT was not reinitialized for each user. This NLM fixes this problem by reinitializing the number of requests made from a station each time a new user logs in.
SPXFSFIX.NLM	Corrects problems for certain applications that may hang due to lost Event Control Blocks (ECBs).
TRSTFIX.NLM	Fixes a problem that occurred when nine or more trustee directory assignments for individual users or groups were made at the root level of the same volume. This NLM also fixes a problem that occurred when granting trustee rights to an existing group.
TTSFIX.NLM	Fixes a problem that occurred when certain applications executed explicit TTS™ and file locking was also used.

Patch name	Description
UNKFIX.NLM	Fixes a problem that occurred when entering the complete filename of a valid NetWare file at the server console. For example, typing "MONITOR.NLM" instead of "LOAD MONITOR" would previously cause this problem.
WORMROFX.NLM	Fixes a problem that occurred when a new device with the Write Disable tab set was inserted after a read/write device was removed. The OS did not recognize the new device as Read Only.
WSDFIX.NLM	Fixes the problem of APIs allowing users to access files on volumes where they have no rights.

2 Using the NetWare Shell Files

Overview

Novell recently upgraded the NetWare shell to a new architecture referred to as NetWare DOS Requester™, replacing the NETX file series. If you want to upgrade your workstation software to use this new architecture, see Chapter 1, "About the NetWare DOS Requester," in *Workstation for DOS and Windows*.

If you choose to use the previous architecture, this chapter provides you with a basic overview of the NetWare shell files and with the procedures for using them with your DOS and Windows workstations.

Topic	See
The NetWare shell workstation environment	“The Netware Shell Workstation Environment” on page 22
Decompressing the LSL, network board driver, and IPXfiles	“Decompressing the LSL, Network Board Driver, and IPXODI Files” on page 22
Updating the Netware shell files from the LOGIN directory	“Updating the NetWare Shell Files from the LOGIN Directory” on page 24
Updating the NetWare Shell files from Diskette	“Updating the NetWare Shell Files from Diskette” on page 25
Loading the workstation files	“Loading the Workstation Files” on page 26
Understanding the NET.CFG file for the NetWare shell	“Understanding the NET.CFG File for the NetWare Shell” on page 27
Understanding NetWare shell file command options and concepts	“Understanding NetWare Shell File Command Options and Concepts” on page 37

Topic	See
NETX.EXE (NetWare conventional memory shell)	“NETX.EXE (NetWare Conventional Memory Shell)” on page 37
EMSNETX.EXE (NetWare expanded memory shell)	“EMSNETX.EXE (NetWare Expanded Memory Shell)” on page 40
XMSNETX.EXE (NetWare extended memory shell)	“XMSNETX.EXE (NetWare Extended Memory Shell)” on page 42

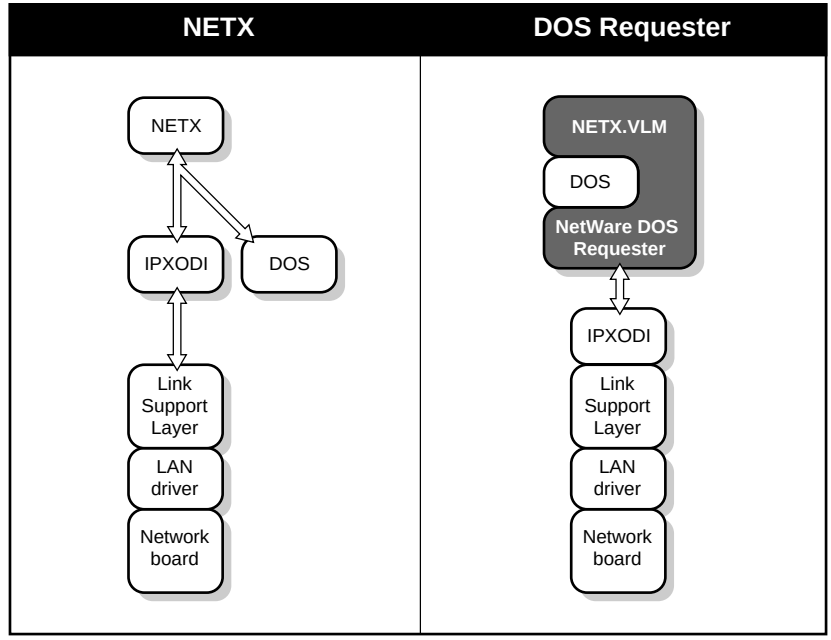
Advantages of Using the NetWare DOS Requester

The NetWare DOS Requester provides several new improvements over NETX:

- Supports NetWare Directory Services™ provided with NetWare v4.0.
- Provides a modular architecture that allows for more efficient use of memory and gives developers a more flexible platform.
- Takes advantage of memory-swapping technology and DOS redirection capability.
- Includes Packet Burst™ protocol and Large Internet Packet.
- Supports installed base of NetWare users by providing backward compatibility with NETX.

Figure 1 shows the difference between NETX and the NetWare DOS Requester architectures.

Figure 1 Comparison of NETX and NetWare DOS Requester architectures



The NetWare DOS Requester file replaces NETX.COM. It is recommended that you upgrade your workstation to use the new workstation files. Complete installation of the new workstation files by referencing *Workstation Basics and Installation* for information and procedures.

If you chose to not upgrade your workstation to use the NetWare DOS Requester, continue reading the following sections.

The Netware Shell Workstation Environment

The key components of the NetWare shell workstation environment are four terminate-and stay-resident (TSR) programs:

- LSL™ (Link Support Layer™)
- A network board driver (example: NE2000)
- IPXODI (Internetwork Packet Exchange Open Data-Link Interface)
- NETX (the network shell)

If an ODI™-compliant board driver is not available, your workstation environment will consist of two terminate-and-stay-resident (TSR) programs:

- IPX™ dedicated IPX driver (non-ODI)
- NETX (the network shell)

The LSL.COM, *network board driver*.COM and IPXODI.COM files replace IPX.COM. It is recommended that you upgrade your workstation to use the new workstation files. See Chapter 3, "Installing a NetWare Workstation," of *Workstation Basics and Installation* for information and procedures on using a program-based installation, or install the files manually by using the procedure in the following section.

Decompressing the LSL, Network Board Driver, and IPXODI Files

The following workstation files are in compressed format on the *WSDOS_1* and *WSDRV_1* diskettes.

- LSL.COM
- *network board driver*.COM
- IPXODI.COM

You must decompress these files to use them on your workstation. If your workstation software is on CD-ROM, go to "Creating Workstation Installation Diskettes from CD-ROM" in Chapter 2 of *Workstation Basics and Installation*.

Procedure

1. Decompress and copy the LSL.COM and IPXODI.COM files from the *WSDOS_1* diskette to your workstation directory.

   To decompress a file, type

   NLUNPACK *<filename>* [*destination_directory*:] <Enter>

   For example, to expand LSL.COM, type

   NLUNPACK A:LSL.CO_ C:\NWCLIENT <Enter>

2. Decompress and copy the appropriate *network board driver*.COM file from the *WSDRV_1* diskette to your workstation directory.

   To decompress a file, type

   NLUNPACK *<filename>* [*destination_directory*:] <Enter>

   To expand NE2000.COM for example, type

   NLUNPACK A:\DOS\NE2000.CO_ C:\NWCLIENT <Enter>

3. Ensure that a NET.CFG file exists in the same directory as your workstation files.

   For information on how to create a NET.CFG file, see Chapter 2, "Configuring Your Workstation," of *Workstation for DOS and Windows*.

4. Update your workstation's NetWare shell files.

   If you want to update the workstation NetWare shell file from your login directory, go to "Updating the NetWare Shell Files from the LOGIN Directory" on page 24.

   If you want to update the workstation NetWare shell file from from diskette, go to "Updating the NetWare Shell Files from Diskette" on page 25.

Updating the NetWare Shell Files from the LOGIN Directory

This section applies only to workstations that already have a previous version of NetWare shell files installed. If you are installing a new NetWare workstation, go to "Updating the NetWare Shell Files from Diskette" on page 25.

The following checklists and procedures will help you set up your workstation for updating NetWare shell files from the LOGIN directory.

Prerequisites

- Ensure that the server you log in to is upgraded and running NetWare v3.12
- Ensure that a previous version of the NetWare shell files are loaded on your workstation.
- Ensure that a copy of the following NetWare shell files exist in your LOGIN directory:
  - EMSNETX.EXE
  - NETX.EXE
  - XMSNETX.EXE

Procedure

1. Change to the LOGIN directory.
2. Copy the appropriate NetWare shell file for your workstation to your boot diskette or workstation directory.

   For example, to copy NETX.EXE, you would type

   COPY NETX.EXE *drive_letter*:*client_directory* <Enter>

   Replace *drive_letter* and *client_directory* with the drive letter and directory containing your workstation files. For example, if your workstation files are copied to the NWCLIENT directory on drive C:, you would type

   COPY NETX.EXE C:\NWCLIENT <Enter>

   or, for a boot diskette, you might type

   COPY NETX.EXE A: <Enter>

If your workstation is capable of extended or expanded memory support, replace NETX.EXE with the file which corresponds to the type of memory support you have:

- XMSNETX.EXE (for extended memory)
- EMSNETX.EXE (for expanded memory)

3. Reboot your workstation.
4. Load the new NetWare shell file.

   Commonly, the workstation files are loaded automatically from a batch file. If you want to load the files manually, go to "Loading the Workstation Files" on page 26.

Updating the NetWare Shell Files from Diskette

To copy files directly from diskettes, follow these steps.

Procedure

1. Format a DOS diskette.
2. Copy all the files in the LOGIN subdirectory on the NetWare v3.12 *SYSTEM_3* diskette to the formatted diskette by typing

   COPY *source_directory*:*wild_card* *destination_directory*: <Enter>

   For example, type

   COPY A:LOGIN*.* B: <Enter>
3. Label the formatted diskette "NetWare Shell Files."
4. Insert the "NetWare Shell Files" diskette into a floppy disk drive and change to that drive.

   For example, if you have inserted the diskette into drive A:, type

   A: <Enter>
5. Copy the appropriate NetWare shell file for your workstation to your boot diskette or workstation directory.

   For example, to copy NETX.EXE, you would type

   COPY NETX.EXE *drive_letter*:*client_directory* <Enter>

Replace *drive_letter* and *client_directory* with the drive letter and directory containing your workstation files. For example, if your workstation files are copied to the NWCLIENT directory on drive C:, you would type

COPY NETX.EXE C:\NWCLIENT <Enter>

or, for a boot diskette, you might type

COPY NETX.EXE A: <Enter>

If your workstation is capable of extended or expanded memory support, replace NETX.EXE with the file which corresponds to the type of memory support you have:

- XMSNETX.EXE (for extended memory)
- EMSNETX.EXE (for expanded memory)

6. Reboot your workstation.
7. Load the new NetWare shell file.

   Commonly, the workstation files are loaded automatically from a batch file. If you want to load the files manually, go to "Loading the Workstation Files" on page 26.

Loading the Workstation Files

You can load the NetWare workstation files from the command line or from a batch file.

Loading from the Command Line

Procedure

1. Change to your workstation directory by typing

   CD*workstation_directory* <Enter>

2. Load the workstation files in the following order:

   LSL <Enter>
   ***network board driver*.COM** <Enter>
   IPXODI <Enter>
   NETX <Enter>

Loading from a Batch File

An example of a batch file using a NE2000 network board driver is as follows:

```
@ECHO OFF
C:
CD \NWCLIENT
LSL
NE2000.COM
IPXODI
NETX
CD \
```

For command options and concepts, see “Understanding NetWare Shell File Command Options and Concepts” on page 37.

Understanding the NET.CFG File for the NetWare Shell

The NET.CFG file is a specialized text file that you create with any ASCII text editor and include in your workstaion directory or on a workstation boot diskette with any other necessary boot files.

Like the DOS CONFIG.SYS file, the NET.CFG file contains configuration values that are read and interpreted when your workstation starts up. These values adjust the default operating parameter settings of the NetWare shell, IPX, or other workstation files.

NOTE: The NET.CFG file replaces the previous shell configuration file named SHELL.CFG. See Chapter 2, "Configuring Your Workstation," of *Workstation for DOS and Windows* for information on the NET.CFG file.

Using a NET.CFG File

Use entries in the NET.CFG file to change the workstation's network environment or configuration. For example, you might want to change the configuration in these cases:

- You changed the default hardware settings on the network board.
- You are using multiple protocols.
- You are using Novell's LAN Workplace.

Creating and Modifying the NET.CFG File

Procedure

1. Use a DOS text editor to type section headings and options in in an existing NET.CFG file or a NET.CFG file which you create to set up your workstation configuration.

   See "NET.CFG Options for NetWare Shell Parameter Settings" on page 29 for descriptions of these settings.

   Use the following conventions to create or modify a NET.CFG file:

   - Type one heading or option per line.

     Headings and options are not case-sensitive. Blank lines are ignored, but they can be helpful in separating the section headings or options to make the NET.CFG file easier to read.

   - Enter section headings at the left margin of the file with no spaces before or after them.

     Each NET.CFG section heading may have several options.

   - Enter options, one per line, below the section heading to which they apply, and indent each one.

     Use <Spacebar> or <Tab> to indent options. Options *must* be indented at least one space.

   - Place a hard return at the end of every line in the file, *including the last line*.

     If you don't put a return at the end of the last line, the line is ignored.

   - Precede comment lines with a semicolon.

2. Copy the NET.CFG file to the workstation boot diskette or directory.

   If all workstations use the same NET.CFG file, you can save time by copying the NET.CFG file onto a master workstation diskette. Then copy the files on the master workstation diskette to each workstation.

   If each workstation requires a unique NET.CFG file, you must copy a unique NET.CFG file to each workstation boot diskette or boot directory.

Sample NET.CFG File

Following is a sample NET.CFG file that

- Changes the IRQ on the link driver to 4
- Changes the port to 340
- Sets up F: as the first network drive when you log in to the network

```
LINK DRIVER NE2000
    ; Change the interrupt (IRQ) to 4
    INT #1 4
    ; Change the port to 340 (hex)
    PORT #1 340

NETX
    ; Set up F: as the first drive on network
    First Network Drive = F
```

You can also specify command line parameters for NETX. See "Understanding NetWare Shell File Command Options and Concepts" on page 37 for these parameters.

NET.CFG Options for NetWare Shell Parameter Settings

These NET.CFG parameter settings are for all three types of NetWare shell files:

- NETX.EXE (for conventional memory)
- EMSNETX.EXE (for expanded memory)
- XMSNETX.EXE (for extended memory)

Figure 2 shows the various parameter settings that you can use. Description of the settings immediately follow the figure.

Figure 2 NET.CFG options for NetWare Shell files

NetWare NETX Configuration Options	
Options and Settings	**Defaults**
netx	
all servers [on|off]	*off*
cache buffers *number*	*5* (cache blocks)
checksum [on|off]	*off*
dos name *name*	*ms_dos*
entry stack size *number*	*10*
environment pad *number*	*17*
eoj [on|off]	*on*
file handles *number*	*40* (open files)
get local target stacks *number*	*1* (stack)
hold [on|off]	*off*
lipackets [on|off]	*off*
local printers *number*	(# of ports)
lock delay *number*	*1* (≈0.5 seconds)
lock retries *number*	*3*
long machine type *name*	*ibm_pc*
max cur dir length *number*	*64*
max path length *number*	*255*
max tasks *number*	*31*
patch *byte_offset value*	
pb buffers *number*	
preferred server *server_name*	
print header *number*	*64* (bytes)
print tail *number*	*16* (bytes)
read only compatibility [on|off]	*off*
continued ►	

NetWare NETX Configuration Options *(continued)*	
Options and Settings	**Defaults**
netx	
search mode *number*	*1*
set station time [on|off]	*on*
share [on|off]	*on*
short machine type *name*	*ibm*
show dots [on|off]	*off*
sign 386 mode	*1*
signature level	*1*
special uppercase [on|off]	*off*
task mode *number*	*2*
temp drive detection [on|off]	*on*

ALL SERVERS [ON | OFF]

Determines whether the End of Task is sent to all connected servers or only to those servers interacting with the task.

If this option is set to ON, End of Task is sent to all connected servers.

If this option is set to OFF, End of Task is sent to only those servers the current process has interacted with.

Default: OFF

ENTRY STACK SIZE *number*

Ensures that the code residing in expanded memory is visible in the memory page frame.

Many TSRs and other programs using expanded memory may need this parameter increased.

Default: 10

Range: 5 to 40

This parameter is used only by EMSNETX.EXE.

ENVIRONMENT PAD *number*

Defines the number of bytes that are added to a program's environment space before executing the program. Increasing this parameter allows NetWare utilities to update the path environment variable of the current environment when adding search paths.

Default: 17 bytes

Range: 17 to 512 bytes

EOJ [ON | OFF]

Specifies whether files, locks, semaphores, etc. are closed automatically at the end of a job.

Default: ON

FILE HANDLES *number*

Sets how many files a workstation can have open on the network at one time.

The setting for local files is handled through the DOS CONFIG.SYS file.

Some applications ask for more than the default of 40 open files. If you receive many error messages that indicate no available files, increase the value.

Default: 40 open files

GET LOCAL TARGET STACKS *number*

Specifies the number of stacks that should be allocated for use by IPX when processing Get Local Target requests from IPX applications. Each additional allocated stack increases IPX memory usage by 384 bytes.

The default value is normally adequate for most users. However, if you are using a multitasking DOS product—such as DR DOS 6.0—and you are running more than one IPX application in different DOS sessions, you may have to increase the number of stacks. If you experience problems getting an IPX application to communicate with another node on the network, increasing the number of stacks may alleviate the problem.

Default: 1 stack

Range: 1 to 10

HOLD [ON | OFF]

Determines whether workstation files should be held open if they have been accessed and then closed.

If this parameter is set to ON, all files opened by a program are held open until the program exits.

Older versions of certain applications that use FCB_IO may need this parameter set to ON.

Default: OFF

LIPACKETS [ON | OFF]

In the past, NetWare communicated across routers and bridges with a 576-byte maximum packet size. However, Ethernet and Token- Ring are capable of using larger packets for communication.

With this parameter set to ON, the maximum packet size negotiated between the NetWare server and the workstation, is used across routers and bridges.

Default: ON

NOTE: Some routers and bridges have been hardcoded to use 576-byte packets. In this case, the NetWare shell can use only 576-byte packets, regardless of this parameter.

LOCK DELAY *number*

Determines the amount of time (in ticks) the shell waits before trying to get a lock.

When many users access the same file at the same time, the shell may be unable to gain access before its allotted wait time.

Use this parameter if a workstation frequently receives error messages when a file is requested.

NOTE: This number is used for lock types that do not have a wait ability. For locks that have a wait ability, the wait time is calculated by multiplying this parameter number by the LOCK RETRIES number and then multiplying by 2. The resulting number is the time, in ticks, that the workstation waits for a lock.

Default: 1 tick (about 0.5 seconds)

LOCK RETRIES *number*

Specifies the number of times the shell attempts to get a lock on the network.

It is part of an equation that determines the total time the shell waits when attempting to access a locked file. If a workstation frequently receives error messages when a file is requested, increase the value of this parameter.

Default: 3 retries

MAX CUR DIR LENGTH *number*

Allows the number of bytes returned to be specified. DOS defines the Get Current Directory call to return 64 bytes of path.

In the past, the shell allowed 128 bytes to be returned. This parameter is now configured.

Default: 64 bytes

Range: 64 to 255 bytes

MAX PATH LENGTH *number*

Allows users to specify maximum path length, up to 255 characters. This path doesn't include NetWare server names or filenames.

Default: 255 bytes

Range: 64 to 255

PATCH *byte_offset value*

Allows any address in the shell to be patched with any specified value.

Use this parameter if a shell problem is announced and the solution is easily accomplished through changing some bytes within the programming. PATCH specifies the location of the bytes and inserts the correct values.

Default: None

SHARE [ON | OFF]

Allows a child process to inherit all the resources of its parent process.

Default: ON

SIGN 386 MODE = *number*

Allows NCP™ packet signature for workstations that load Windows from the network and run in enhanced (386) mode.

The number values are as follows

0 = enables interrupts

1 = disables interrupts and preserves 386 32-bit characters

2 = forces 16-bit signing

Default: 1

SPECIAL UPPERCASE [ON | OFF]

Used for foreign language and special characters. The shell does not translate uppercase ASCII characters above 128. Set this parameter to ON to cause the shell to call DOS for this translation.

Default: OFF

TASK MODE *number*

Determines the way the shell handles virtual machine task management.

The default works with Windows 3.0. If you are using an earlier version of Windows or a third-party multitasking program, use 1. If you are not using a multitasking program and want a little extra speed, use 0.

Default: 2

TEMP DRIVE DETECTION [ON | OFF]

Recognizes if a temporary drive is available for file-swapping.

Default: ON

Other NET.CFG Options for NetWare Shells

You can use the following NET.CFG options for your workstation. These options are not specific to the NetWare shell files.

See Appendix B, "NET.CFG File Parameters," of *Workstation for DOS and Windows* for a description of the following parameters:

CACHE BUFFERS *number*
CHECKSUM [ON | OFF]
DOS NAME *name*
LOCAL PRINTERS *number*
LONG MACHINE TYPE *name*
MAX TASKS *number*
PB BUFFERS *number*
PREFFERED SERVER *server_name*
PRINT HEADER *number*
PRINT TAIL *number*
READ ONLY COMPATIBILITY [ON | OFF]
SEARCH MODE *number*
SET STATION TIME [ON | OFF]
SHORT MACHINE TYPE *name*
SHOW DOTS [ON | OFF]
SIGNATURE LEVEL *number*

Understanding NetWare Shell File Command Options and Concepts

An application makes requests of the operating system through predefined function calls. The NetWare shell intercepts these requests and determines if the request is for the local operating system (DR-DOS, MS-DOS, PC-DOS) or the network operating system (NetWare).

If the request should be handled by DOS, the shell hands the request off to DOS. If the request should be handled by NetWare, the shell packages the request for IPX. IPX takes the package to the destination and returns the requested information back to the shell, which then gives the information to the application.

There is a NetWare shell file for each type of DOS memory available:

- NETX.EXE (for conventional memory)
- EMSNETX.EXE (for expanded memory)
- XMSNETX.EXE (for extended memory)

You load only the shell file best suited for your particular workstation environment.

NETX.EXE (NetWare Conventional Memory Shell)

Use NETX to load the network shell, view the version of the shell, or unload the shell. This shell is for use with DOS 3.0 through 6.0.

Prerequsites

- You must load the following NetWare shell files before loading the NETX.EXE file:
  - LSL.COM
  - *network board driver*.COM (NE2000.COM)
  - IPXODI.COM
- If you are using dedicated IPX, you must load the IPX.COM file before loading the NETX.EXE file.

  NOTE: IPX.COM is generated with the WSGEN.EXE utility. The WSGEN.EXE utility is not included with NetWare versions later than v3.11.

Command Format

NETX [/?] | [PS = *server name*] | [/U] | [/F] | [/C=*pathfilename.ext*]**

Command Options

[/?]

Displays help screens.

[PS = *server name*]

Specifies a preferred server.

[/C=*pathfilename.ext*]**

Specifies a configuration file for NETX to use. The default configuration file is NET.CFG.

[/U]

Unloads resident NETX from memory. When you execute this option, a screen similar to the following appears:

```
You are being logged out of all servers . . .

Memory for resident shell has been released.

The NetWare shell has been unloaded.
```

[/F]

Forces the resident NETX to unload. This option is useful for unloading NETX when other programs are loaded after NETX.

WARNING: Using this option may cause your system to fail if programs are still accessing NETX.

The NetWare shell file NETX.EXE captures network commands given to the workstation and redirects them to the network; if the messages were not redirected, DOS would attempt to execute them.

The NetWare shell, NETX, intercepts requests by trapping software interrupts. Trapping means that the shell takes all requests made by the application before those requests get to DOS. The interrupts trapped are the following:

- Interrupt 20h, now a seldom-used way of exiting an application
- Interrupt 21h, used to call standard DOS functions
- Interrupt 24h, used to handle critical errors
- Interrupt 27h, now a seldom-used means of making an application a TSR
- Interrupt 17h, used to send data to local printer ports

The most used of these interrupts is 21h, the interrupt that DOS uses to service applications.

After a request is inspected, the shell either passes it to the regular DOS interrupt routine, or it translates it into a request that is understood by the NetWare server and hands it to IPX for transmission to the NetWare server. When data returns from the server, the conversion of requests is handled in the same fashion but in reverse order.

Whether the request is handled by local DOS or the network server is transparent to the application and the user.

EMSNETX.EXE (NetWare Expanded Memory Shell)

Use EMSNETX to load the network shell, view the version of the shell, or unload the shell. This shell is for use with DOS 3.0 through 6.0.

Prerequsites

- You must load the following NetWare shell files before loading the EMSNETX.EXE file:
  - LSL.COM
  - *network board driver*.COM (NE2000.COM)
  - IPXODI.COM
- If you are using dedicated IPX, you must load the IPX.COM file before loading the NETX.EXE file.

  NOTE: IPX.COM is generated with the WSGEN.EXE utility. The WSGEN.EXE utility is not included with NetWare versions later than v3.11.

Command Format

EMSNETX [/?] | [PS = *server name*] | [/U] | [/F] | [/C=*pathfilename.ext*]**

Command Options

[/?]

Displays help screens.

[PS = *server name*]

Specifies a preferred server.

[/C=*pathfilename.ext*]**

Specifies a configuration file for EMSNETX to use. The default configuration file is NET.CFG.

[/U]

Unloads resident EMSNETX from memory. When you execute this option, a screen similar to the following appears:

```
You are being logged out of all servers . . .

Memory for resident shell has been released.

The NetWare shell has been unloaded.
```

[/F]

Forces the resident EMSNETX to unload. This option is useful for unloading EMSNETX when other programs are loaded after EMSNETX.

WARNING: Using this option may cause your system to fail if programs are still accessing EMSNETX.

Concepts

Expanded memory refers to memory in addition to the 640KB limit of conventional memory. An expanded memory manager swaps memory that exists between the 640KB and the 1MB range into a window, or memory page. This allows DOS applications to access up to 32 KB of expanded memory.

The NetWare Expanded Memory shell moves most of the shell out of conventional DOS memory and puts it in expanded memory. This frees up 35 KB of conventional memory. The remaining 8 KB of the shell must remain in conventional memory to handle interrupts and some data.

The NetWare Expanded Memory shell was written to the specifications of LIM/EMS (Lotus/Intel/Microsoft Expanded Memory Specification) v4.0 memory manager.

Expanded memory manufacturers provide expanded memory Specification (EMS)-compatible driver programs. You must load an EMS-compatible driver before loading the NetWare Expanded Memory shell.

To install the NetWare Expanded Memory shell, you need to

- Load a third-party EMS-compatible driver
- Copy the NetWare Expanded Memory shell file, EMSNETX.EXE, to the workstation directory or boot diskette
- Include the filename EMSNETX.EXE in the AUTOEXEC.BAT file

Because this shell operates in expanded memory, larger applications can run in the conventional memory space. This approach is faster than disk swapping and overlays.

The NetWare Expanded Memory shell works with NetWare v2.15 and later.

All the shell configuration (NET.CFG) parameters work with the NetWare Expanded Memory shell.

NOTE: EMSNETX.EXE can be used only with DOS 3.0 and later. Do not use the expanded memory shell on a nondedicated file server.

XMSNETX.EXE (NetWare Extended Memory Shell)

Use XMSNETX to load the network shell into extended memory, view the shell version, or unload the shell. This shell is for use with DOS 3.0 through 6.0.

Prerequsites

- You must load the following NetWare shell files before loading the XMSNETX.EXE file:
  - LSL.COM
  - *network board driver*.COM (NE2000.COM)
  - IPXODI.COM
- If you are using dedicated IPX, you must load the IPX.COM file before loading the NETX.EXE file.

  NOTE: IPX.COM is generated with the WSGEN.EXE utility. The WSGEN.EXE utility is not included with NetWare versions later than v3.11.

Command Format

XMSNETX [/?] | [PS = *server name*] | [/U] | [/F] | [/C=(*path*\)*filename.ext*]

Command Options

[/?]

Displays help screens.

[PS = *server name*]

Specifies a preferred server.

[/C=(*path*\)*filename.ext*]

Specifies a configuration file for XMSNETX to use. The default configuration file is NET.CFG.

[/U]

Unloads resident XMSNETX from memory. When you execute this option, a screen similar to the following appears:

```
You are being logged out of all servers . . .

Memory for resident shell has been released.

The NetWare shell has been unloaded.
```

[/F]

Forces the resident XMSNETX to unload. This option is useful for unloading XMSNETX when other programs are loaded after XMSNETX.

WARNING: Using this option may cause your system to fail if programs are still accessing XMSNETX.

Concepts

Extended memory refers to memory above the 1MB range. Up to 15 MB of extended memory are addressable.

The NetWare Extended Memory shell moves most of the shell out of conventional DOS memory and puts it in extended memory. This frees up 35 KB of conventional memory. The remaining 8 KB of the shell must remain in conventional memory to handle interrupts and some data.

The Extended Memory shell requires the support of an XMS (Extended Memory Specification) v2.0 memory manager (or compatible), such as Microsoft's HIMEM.SYS. The memory manager makes the first 6 KB (beginning at the 1 MB address) of extended memory directly available to any one DOS-based application.

To install the NetWare Extended Memory shell, you need to

- Install a third-party extended memory manager
- Copy the NetWare Extended Memory shell file, XMSNETX.EXE, to the workstation boot disk
- Include the filename XMSNETX.EXE in the AUTOEXEC.BAT file

Because this shell operates in extended memory, larger applications can run in the conventional memory space. This approach is faster than disk swapping and overlays. The NetWare Extended Memory shell works with all versions of NetWare v2.15 and later.

All the shell configuration (NET.CFG) parameters work with the NetWare extended memory shell except Entry Stack Size.

IMPORTANT: XMSNETX.EXE can be used only with DOS 3.0 and later. The current VDISK.SYS from IBM is not compatible with HIMEM.SYS, so do not use the extended memory shell with VDISK.SYS. Do not use the extended memory shell on a nondedicated file server.

Only one DOS application can be loaded in the HMA. If you are using the DOS 5 DOS=HIGH command, you cannot load XMSNETX.EXE.

This shell requires a high degree of IBM compatibility. Depending on the brand of IBM compatible you are using, you may experience keyboard sluggishness or other hardware problems.