

Server Disks and Storage Devices

**Novell®
NetWare®**

6.5 SP8

November 9, 2009

www.novell.com



Legal Notices

Novell, Inc., makes no representations or warranties with respect to the contents or use of this documentation, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, Novell, Inc., reserves the right to revise this publication and to make changes to its content, at any time, without obligation to notify any person or entity of such revisions or changes.

Further, Novell, Inc., makes no representations or warranties with respect to any software, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, Novell, Inc., reserves the right to make changes to any and all parts of Novell software, at any time, without any obligation to notify any person or entity of such changes.

Any products or technical information provided under this Agreement may be subject to U.S. export controls and the trade laws of other countries. You agree to comply with all export control regulations and to obtain any required licenses or classification to export, re-export or import deliverables. You agree not to export or re-export to entities on the current U.S. export exclusion lists or to any embargoed or terrorist countries as specified in the U.S. export laws. You agree to not use deliverables for prohibited nuclear, missile, or chemical biological weaponry end uses. See the [Novell International Trade Services Web page \(http://www.novell.com/info/exports/\)](http://www.novell.com/info/exports/) for more information on exporting Novell software. Novell assumes no responsibility for your failure to obtain any necessary export approvals.

Copyright © 2005–2009 Novell, Inc. All rights reserved. No part of this publication may be reproduced, photocopied, stored on a retrieval system, or transmitted without the express written consent of the publisher.

Novell, Inc., has intellectual property rights relating to technology embodied in the product that is described in this document. In particular, and without limitation, these intellectual property rights may include one or more of the U.S. patents listed on the [Novell Legal Patents Web page \(http://www.novell.com/company/legal/patents/\)](http://www.novell.com/company/legal/patents/) and one or more additional patents or pending patent applications in the U.S. and in other countries.

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

Online Documentation: To access the latest online documentation for this and other Novell products, see the [Novell Documentation Web page \(http://www.novell.com/documentation\)](http://www.novell.com/documentation).

Novell Trademarks

For a list of Novell trademarks, see the [Novell Trademark and Service Mark list \(http://www.novell.com/company/legal/trademarks/tmlist.html\)](http://www.novell.com/company/legal/trademarks/tmlist.html).

Third-Party Materials

All third-party trademarks are the property of their respective owners.

Contents

About This Guide	7
1 Overview of Server Disks and Storage Devices for NetWare	9
1.1 Key Concepts	9
1.1.1 Storage and File System Services	9
1.1.2 Maximum Size of Logical or Physical Devices	10
1.1.3 Device Identification	10
1.1.4 Device Drivers	10
1.1.5 Device Configuration and Management	10
1.1.6 File System Management for Directories and Files	11
1.1.7 Software RAID Devices	11
1.2 Partitioning Disks	11
1.3 Partition Numbers and Device Names	13
1.3.1 Object Numbers	13
1.3.2 Device Names	15
1.4 Drivers for Host Adapters and Storage Devices	16
1.5 What's Next	16
2 Managing Adapters and Devices	17
2.1 Viewing a List of Adapters and Devices	17
2.2 Checking Available Disk Space	18
2.3 Adding and Replacing Hard Disks	18
2.3.1 Adding a Hard Disk to the NetWare Server	18
2.3.2 Replacing a Hard Disk	19
2.3.3 Loading Disk Drivers	20
2.3.4 Replacing Disk Drivers	21
2.4 Configuring and Monitoring Devices	21
2.5 Activating and Deactivating a Hard Disk	21
A Documentation Updates	23
A.1 October 2009	23
A.2 December 2008 (NetWare 6.5 SP8, OES 2 SP2 NetWare)	23

About This Guide

This guide contains conceptual information about server disks and storage devices for NetWare® file systems, including Novell® Storage Services™ volumes for NetWare and NetWare Traditional volumes. This guide is divided into the following sections:

- ♦ Chapter 1, “Overview of Server Disks and Storage Devices for NetWare,” on page 9
- ♦ Chapter 2, “Managing Adapters and Devices,” on page 17

Audience

This guide is intended for system administrators of a NetWare server.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with this product. Please use the User Comment feature at the bottom of each page of the online documentation, or go to www.novell.com/documentation/feedback.html (<http://www.novell.com/documentation/feedback.html>) and enter your comments there.

Documentation Updates

For the most recent version of *NW65 SP8: Server Disks and Storage Devices*, see the [NetWare 6.5 SP8 documentation Web site](http://www.novell.com/documentation/nw65/index.html) (<http://www.novell.com/documentation/nw65/index.html>).

Additional Documentation

For information about file systems for NetWare, see the following:

- ♦ *OES 2 SPI: NSS File System Administration Guide*
- ♦ *NW65 SP8: Traditional File System Administration Guide*

For information about Linux* POSIX* file systems, see “File Systems in Linux” (http://www.novell.com/documentation/sles10/sles_admin/data/cha_filesystems.html) in the *SUSE® Linux Enterprise Server 10 Installation and Administration Guide* (http://www.novell.com/documentation/sles10/sles_admin/data/sles_admin.html).

For information about controlling access to directories and files, see the *OES 2 SPI: File Systems Management Guide*.

Documentation Conventions

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

A trademark symbol (®, ™, etc.) denotes a Novell trademark. An asterisk (*) denotes a third-party trademark.

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

Overview of Server Disks and Storage Devices for NetWare

1

Storage media for your NetWare® server can be attached directly as local hard drives or externally as storage-area-network (SAN) devices. The media can be server disks, single storage devices, arrays of storage devices, or virtual storage devices. In addition, the NetWare operating system manages remote storage devices such as tape drives and CD drives. It supports third-party solutions for near-line and offline storage.

This section discusses the following:

- ♦ [Section 1.1, “Key Concepts,” on page 9](#)
- ♦ [Section 1.2, “Partitioning Disks,” on page 11](#)
- ♦ [Section 1.3, “Partition Numbers and Device Names,” on page 13](#)
- ♦ [Section 1.4, “Drivers for Host Adapters and Storage Devices,” on page 16](#)
- ♦ [Section 1.5, “What’s Next,” on page 16](#)

1.1 Key Concepts

This section discusses the following key concepts for preparing and using devices on your NetWare server:

- ♦ [Section 1.1.1, “Storage and File System Services,” on page 9](#)
- ♦ [Section 1.1.2, “Maximum Size of Logical or Physical Devices,” on page 10](#)
- ♦ [Section 1.1.3, “Device Identification,” on page 10](#)
- ♦ [Section 1.1.4, “Device Drivers,” on page 10](#)
- ♦ [Section 1.1.5, “Device Configuration and Management,” on page 10](#)
- ♦ [Section 1.1.6, “File System Management for Directories and Files,” on page 11](#)
- ♦ [Section 1.1.7, “Software RAID Devices,” on page 11](#)

1.1.1 Storage and File System Services

Novell® Open Enterprise Server 2 provides two file systems for your NetWare servers: Novell Storage Services™ (NSS) File System and NetWare Traditional File System. NSS is the primary storage solution for NetWare and is the file system used for the NetWare system volume. During installation, NetWare creates an NSS system pool (`sys`) and volume (`sys:`) on your server’s primary hard drive. You must create other NSS pools and volumes before you can use your system effectively. For information, see the *OES 2 SPI: NSS File System Administration Guide*.

The NetWare Traditional File System is a legacy storage technology that preceded NetWare 6, when NSS became the primary file system for NetWare. It does not provide most of the capabilities and conveniences afforded by NSS. A NetWare Traditional volume cannot be used for the system volume in new installs. It is possible to keep an existing Traditional volume as the `sys:` volume if you upgrade from an older version. For information, see the *NW65 SP8: Traditional File System Administration Guide*.

You can use the Traditional file system in combination with the NSS file system, if desired. However, if you are planning to implement Apple* File Protocol (AFP), Network File System (NFS), or Common Internet File System (CIFS) for your NetWare server, you must use the NSS file system, not the Traditional file system, for the system volume and for any data volumes that use these protocols. For information, see the *NW 6.5 SP8: AFP, CIFS, and NFS (NFAP) Administration Guide*.

For a comparison of NSS and Traditional file systems, see “[Comparison of NSS on NetWare and the NetWare Traditional File System](#)” in the *OES 2 SP1: NSS File System Administration Guide*.

1.1.2 Maximum Size of Logical or Physical Devices

NSS and Traditional file systems recognize logical or physical devices up to 2 TB in size. If you have a storage disk larger than 2 TB in size, use the storage device’s management utility to carve the disk into smaller logical devices.

1.1.3 Device Identification

In NetWare, the NSS Media Manager assigns unique identifiers for all storage devices and individual segments on those devices. The identifier represents the same device in all NetWare utilities and console commands. For an explanation of the device numbering system, see [Section 1.3, “Partition Numbers and Device Names,” on page 13](#).

1.1.4 Device Drivers

All storage devices require drivers. The NetWare Peripheral Architecture™ (NWPA) divides device drivers into two types:

- ♦ **Custom Device Module (CDM):** Drives the device itself.
- ♦ **Host Adapter Module (HAM):** Drives the adapter connected to the device.

For more information, see [Section 1.4, “Drivers for Host Adapters and Storage Devices,” on page 16](#).

1.1.5 Device Configuration and Management

To configure and manage devices for use with NSS for NetWare, use one of the following management tools:

- ♦ Storage plug-in for Novell iManager
- ♦ NSS Management Utility (NSSMU) for NetWare
- ♦ NSS server console commands and utilities

For information, see the *OES 2 SP1: NSS File System Administration Guide*.

To configure and manage devices for the Traditional file system, use the Novell Remote Manager for NetWare. For information, see the *NW 6.5 SP8: Novell Remote Manager Administration Guide*.

1.1.6 File System Management for Directories and Files

Use one of the following management tools to manage directories and files on NSS and NetWare Traditional file systems:

- ♦ Novell NetStorage
- ♦ Novell Client™ for Windows* 2000/XP
- ♦ Novell Remote Manager for NetWare

For example, you can configure file system trustees, trustee rights, and attributes for directories and files. For information, see the *OES 2 SP1: File Systems Management Guide*.

1.1.7 Software RAID Devices

To increase data fault tolerance, on NSS file systems, you can also create a software RAID 0 (striping), RAID 1 (mirroring), and RAID 5 (striping with parity). See “[Managing NSS Software RAID Devices](#)” in the *OES 2 SP1: NSS File System Administration Guide*.

On NetWare Traditional file systems, you can create software RAIDs 0 and 1. See “[Using Software RAID1 Devices for Data Fault Tolerance](#)” and “[Using Software RAID0 Devices to Enhance Disk I/O Performance](#)” in the *NW65 SP8: Traditional File System Administration Guide*.

1.2 Partitioning Disks

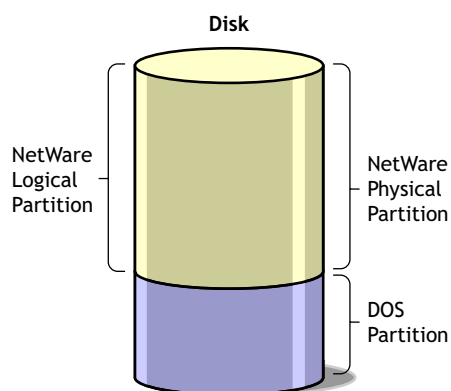
The maximum size of a logical or physical device recognized by NetWare is 2 TB. If a hard disk or storage device is larger than 2 TB, use the device’s or third-party disk management software to carve the device into smaller logical devices so that NetWare can recognize and use the device. For detailed information about the device size limit and device types, see “[Understanding Devices](#)” in the *OES 2 SP1: NSS File System Administration Guide*.

The standard IBM* disk-partitioning scheme allows four physical partitions. To comply with the four-partition limit, NetWare creates logical partitions within physical NetWare partitions. The logical partitions in a NetWare partition combine to appear as a single partition on the master boot record of the device. The logical partitions appear as partition objects to users and can be managed as if they were physical partitions.

NOTE: A NetWare disk partition is not related to a Novell eDirectory™ partition.

The entire NetWare partition is called the *physical partition*. Each NetWare partition contains a data area, where the file system resides. The logical sector 0 of a NetWare partition is the first sector of the data area available to file systems. This data area is referred to as a *logical partition*, as shown in the following figure.

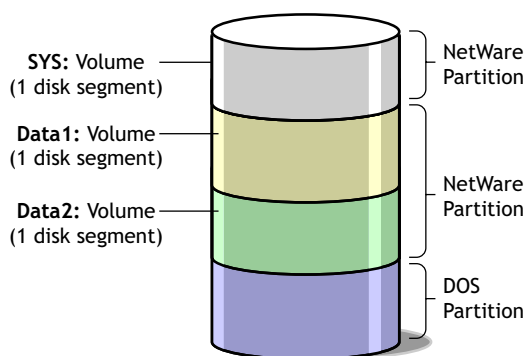
Figure 1-1 *DOS and NetWare Partitions*



Both the NSS and NetWare Traditional file systems comply with the four-partition physical limit. Whenever you select free space on a device to create an NSS file system or a Traditional file system, the management tool automatically creates a logical partition, or *segment*, within a physical NetWare partition. Logical partition types include NSS partitions and Traditional partitions for your file systems and iSCSI partitions and SBD (Split Brain Detector) partitions for Novell Cluster Services™.

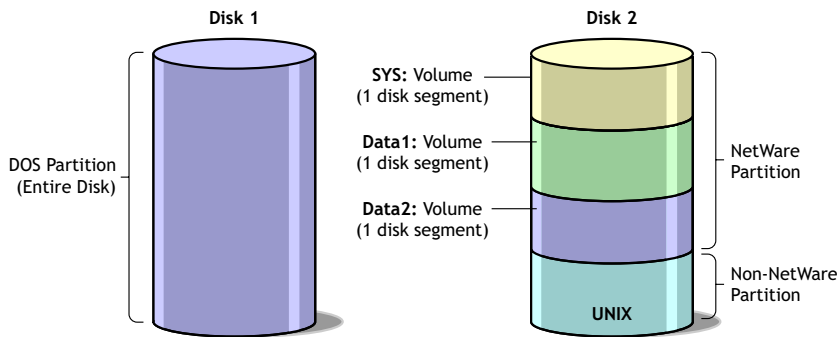
At least one disk on each server includes one DOS partition and at least one NetWare partition for the system (`sys:`) volume, as shown in the following figure. The DOS partition is the primary boot partition where the `server.exe` file is stored; you need only one boot partition per server. The system volume is where the NetWare operating system is installed. The NSS file system creates the `sys:` volume automatically when you install NetWare.

Figure 1-2 *Partitioned Device*



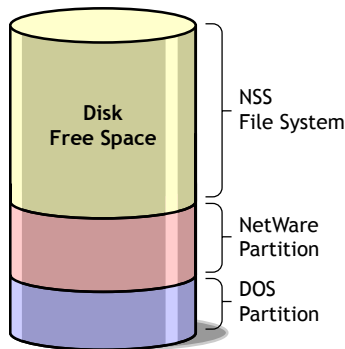
A hard disk can also contain other partitions such as a UNIX partition, as shown in the following figure. The `sys:` volume can reside on the same or different disk than the DOS partition.

Figure 1-3 *Partitioned Devices for Heterogeneous Use*



You can also leave free (unassigned) space on a disk, as shown in the following figure.

Figure 1-4 *Partitioned Device with Free Space*



1.3 Partition Numbers and Device Names

In NetWare, the Media Manager assigns a unique object number to each storage device, disk partition, and logical partition. In addition, the Media Manager assigns device names to physical devices and adapters. These unique object numbers and device names are consistent across all NetWare utilities and console commands so that you can easily identify the objects and devices.

This section discusses the following topics:

- ♦ [Section 1.3.1, “Object Numbers,” on page 13](#)
- ♦ [Section 1.3.2, “Device Names,” on page 15](#)

1.3.1 Object Numbers

Object numbers are hexadecimal numbers assigned to devices, adapters, media, partitions, and divisions of a partition (such as the mirror object area).

If you mirror partitions, each logical partition in the mirrored set has the same object number as the other partitions in the set.

Object Number Examples

Object numbers are not sequential or persistent. New numbers can be assigned when the server is restarted. The same object number represents the same entity in any NetWare utility.

To view a list of storage devices:

- 1 At the system console prompt, enter

```
list devices
```

In the list of devices, the first number in each line is the hexadecimal object number. It is followed with descriptive information about the device. For example:

```
0x0001: [V312-A0-d4:0] iomega jaz 1GB rev:H.72
```

```
0x0003: [V025-A1-D1:0] WDC AC22100H
```

```
0x0002: [V025-A2-D2:0] NEC CD-ROM DRIVE:282 rev:3.07
```

```
0x0006: DOS Partitioned Media
```

```
0x0008: NetWare Partition
```

```
0x000A: Non-Mirrored Partition
```

A physical NetWare partition is identified as `NetWare Partition` and a logical partition is identified either as `Non-Mirrored Partition` or `Mirrored Partition`.

Mirroring messages use the logical partition object number to report that hard disks are being remirrored or unmirrored.

Partition Examples

The following are example partition entries with the device information:

`Unpartitioned-D:0x1-1`

- ♦ `Unpartitioned` indicates that the device is unpartitioned.
- ♦ `D:0x1` is the object ID number, where `D` represents a device and `0x1` is the device number.
- ♦ `1` is the chunk number, which is a unique number indicating that this is the first unpartitioned segment on device 1.

`NSS-P:0x15-1`

- ♦ `NSS` indicates that this is an unassigned NSS partition.
- ♦ `P:0x15` is the object ID number, where `P` represents an unmirrored physical partition and `0x15` is the partition number.
- ♦ `1` is the chunk number. It will always be 1 because NSS consumes the entire partition.

`Traditional-P:0x15b-2`

- ♦ `Traditional` indicates that this is a Traditional volume with unassigned space.
- ♦ `P:0x1b` is the object ID number, where `P` represents an unmirrored physical partition and `0x1b` is the partition ID.
- ♦ `2` is the chunk number, indicating that this is the second piece of free space in this unused partition.

Traditional-M:0x14c-2

- ♦ Traditional indicates that this is a Traditional volume with unassigned space.
- ♦ M:0x14c is the object ID number, where M represents a mirrored group of physical partitions and 0x14c is the mirror ID.
- ♦ 2 is the chunk number, indicating that this is the second piece of free space in this unused partition.

1.3.2 Device Names

Devices such as hard disks and adapters are identified not only by a nonpersistent object number (see “Object Numbers” on page 13) but also by a permanent device name. When a hard disk fails, the failure message includes the device name so you can identify the disk or adapter.

To view a list of storage devices or adapters and their names:

- 1 At the system console prompt, enter

```
list storage adapters
```

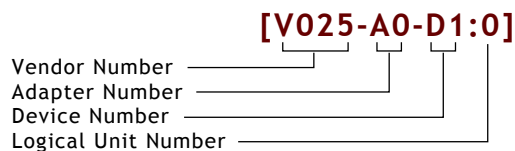
The console screen lists each device adapter, followed by a list of devices driven by that adapter. In the following example, the first line identifies an IDE disk adapter. The second line identifies a hard disk operated by that adapter:

```
[V025-A0] NOVELL IDE HOST ADAPTER MODULE
```

```
[V025-A0-D1:0] QUANTUM FIREBALL_TM3840A
```

The bracketed letters and numbers at the beginning of each line are the device name. The device name identifies the adapter or device, as follows:

Figure 1-5 Device Name and Object Numbers



- ♦ **Vendor Number:** A unique number specific to the device vendor.
- ♦ **Adapter Number:** The instance of the adapter in the server. In the example, A0 identifies the first instance of an adapter installed in the server. Adapter numbers are unique. The second adapter installed in the server has adapter number A1, even if the adapter is of the same type as adapter A0.
- ♦ **Device Number:** The number of the disk or other device. For a SCSI disk, this is the target ID, usually set by a jumper on the hard disk. For an IDE disk, this number represents the bus from the IDE controller. IDE numbers range from D0 through D3, representing the primary, secondary, tertiary, or quaternary bus.
- ♦ **Logical Unit Number (LUN):** The LUN identifies individual devices when more than one device is attached to one bus. For example, one IDE bus might be attached to two disks, a master and a slave. LUN 0 represents the master and LUN 1 represents the slave. However, because disk manufacturers rarely use the logical unit number to identify hard disks, the LUN almost always appears as 0.

The Device name represents the device in all Novell utilities and console commands, including the `list devices` command.

Fault tolerant systems such as mirrored devices use the Device name to report that data blocks on disks have relocated.

1.4 Drivers for Host Adapters and Storage Devices

All storage devices require drivers. The NetWare Peripheral Architecture (NWP) divides device drivers into two kinds: a custom device module (CDM) that drives the device itself and a host adapter module (HAM) that drives the adapter connected to the device.

- ♦ **Custom Device Module (CDM):** CDMs drive storage devices, including autochangers, that are attached to the host adapter bus.

CDMs are device-specific. For example, if there are three different types of storage devices attached to the host adapter (such as a CD drive, a SCSI hard drive, and an autochanger) then a specific CDM for each type of device must be installed.

- ♦ **Host Adapter Module (HAM):** A HAM is the driver component associated with the host adapter hardware. HAMs provide the functionality to route requests to the bus where a specified device is attached.

HAMs are adapter-specific. For example, if a third-party adapter is installed in the server, a HAM developed specifically for that adapter must be installed.

Loading HAMs and CDMs is much like loading other device drivers, but instead of loading one `.dsk` file for both the adapter and device, you load one `.ham` file for the adapter and one `.cdm` file for each type of device attached to that adapter.

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, and assuming a compatible adapter is installed).

1.5 What's Next

To manage devices:

Task	Reference
To understand the differences between the NSS and Traditional file systems on NetWare	"Comparison of NSS on NetWare and the NetWare Traditional File System" in the <i>OES 2 SP1: NSS File System Administration Guide</i>
To manage devices for the NSS file system	"Managing Devices" in the <i>OES 2 SP1: NSS File System Administration Guide</i>
To manage devices for the Traditional file system	"Managing Disk Partitions" in the <i>NW 6.5 SP8: Novell Remote Manager Administration Guide</i>

Managing Adapters and Devices

2

This section describes the following:

- ♦ [Section 2.1, “Viewing a List of Adapters and Devices,” on page 17](#)
- ♦ [Section 2.2, “Checking Available Disk Space,” on page 18](#)
- ♦ [Section 2.3, “Adding and Replacing Hard Disks,” on page 18](#)
- ♦ [Section 2.4, “Configuring and Monitoring Devices,” on page 21](#)
- ♦ [Section 2.5, “Activating and Deactivating a Hard Disk,” on page 21](#)

2.1 Viewing a List of Adapters and Devices

In iManager

- 1 Log in to iManager by entering the following URL in a Web browser:

`http://server.example.com/nps/iManager.html`

Replace *server.example.com* with the actual DNS name or IP address of your iManager server.

- 2 In *Roles and Tasks*, click *Storage > Devices*.

- 3 Click the *Object Browser* icon, then select the server you want to manage.

When the page refreshes, a list of devices on the selected server appears in the *Devices* list.

- 4 Select a device, then do one of the following:

- ♦ If a single adapter is available, view adapter information in the *Details* area.
- ♦ If multiple host bus adapters are available, click *Multipath*.

When the page refreshes, list of adapters appears in the *Adapters* list.

For details, see “[Managing Devices](#)” in the *OES 2 SP1: NSS File System Administration Guide*.

In Novell Remote Manager for NetWare

Log in to Novell® Remote Manager for NetWare®, then click *Manage Hardware > Disk/LAN Adapters*.

For information, see “[Viewing Storage and Network Adapter Information](#)” in the *NW 6.5 SP8: Novell Remote Manager Administration Guide*.

At Your Server Console

Depending on what task you want to perform, use one of these methods:

- ♦ To see a list of server hardware devices: At the server console prompt, enter

```
list devices
```

- ♦ To see a list of storage adapters and the devices they drive: At the server console prompt, enter

```
list storage adapters
```

The screen lists each adapter, followed by a list of devices driven by that adapter.

- ♦ To see a list of CDMs bound to a particular device: At the server console prompt, enter

```
list storage device bindings object_number
```

 Replace `object-number` with the actual object number of the device. You can find the object number by executing the `list devices` command. The object number is the first number on each line in the list. Do not enter the `0x000` prefix.
 For example, if the device ID is `0x0001`, list the CDMs by entering

```
list storage device bindings 1
```

2.2 Checking Available Disk Space

You should monitor available disk space regularly and keep a log so you can track disk usage over time. This information helps you make the best use of your disk space management options, such as adding a new hard disk, compressing files, and migrating data to an offline system such as an optical disc library.

Current Available Volume Space

- 1 In Novell Remote Manager for NetWare, click *Health Monitor > Statistic Trend Graphs*.
- 2 Select the *Last Minute* time period for *Available Volume Space*, then click *Draw Selected Graphs*.

Statistic Trend Graphs of Available Volume Space

- 1 In Novell Remote Manager for NetWare, click *Health Monitor > Statistic Trend Graphs*.
- 2 Specify the time period you want to review for *Available Volume Space*, then click *Draw Selected Graphs*.

Additional Information

For information, see “[Viewing Information about Volumes and Performing Specific Actions on Them](#)” in the *NW 6.5 SP8: Novell Remote Manager Administration Guide*.

2.3 Adding and Replacing Hard Disks

The following procedures explain how to add or replace conventional hard disks in the NetWare server and how to load or replace disk drivers.

- ♦ [Section 2.3.1, “Adding a Hard Disk to the NetWare Server,” on page 18](#)
- ♦ [Section 2.3.2, “Replacing a Hard Disk,” on page 19](#)
- ♦ [Section 2.3.3, “Loading Disk Drivers,” on page 20](#)
- ♦ [Section 2.3.4, “Replacing Disk Drivers,” on page 21](#)

2.3.1 Adding a Hard Disk to the NetWare Server

Use the following procedure to install an additional hard disk in a functioning NetWare server.

Prerequisites

- ❑ All users logged out of the server

- ☐ Access to the documentation that came with the hard disk
- ☐ Access to the documentation that came with the computer

Procedure

- 1** Follow the instructions that came with your hard disk to install the disk and associated hardware, such as a disk adapter and cable.
Refer to the documentation that came with the computer for more information about configuration methods and requirements.
- 2** Start the server.
- 3** If you have installed a new disk adapter along with the hard disk, install the driver for the adapter. For instructions on loading drivers, see [“Loading Disk Drivers” on page 20](#).
- 4** If the disk is larger than 2 TB, use a third-party disk manager to carve the device into logical disks of less than 2 TB each, which is the largest disk size that NetWare recognizes.
- 5** Log in to iManager by entering the following URL in a Web browser:
`http://server.example.com/nps/iManager.html`
Replace *server.example.com* with the actual DNS name or IP address of your iManager server.
- 6** In *Roles and Tasks*, click *Storage > Scan for Devices*, then select the server you want to manage.
Scanning for new devices can take a several seconds, depending on the number of disks on the server.
- 7** When the scan is complete, new devices should be listed under *Devices*.
For more information about configuring the disk, see [“Managing Devices”](#) in the *OES 2 SPI: NSS File System Administration Guide*.

2.3.2 Replacing a Hard Disk

If a hard disk becomes unreliable or unusable, follow this procedure to remove the disk from the network.

- 1** If the bad disk was part of a software RAID 1 (mirror), check the `sys$log.err` file to see which disk in the mirrored set failed.
The error log contains a message stating that a device has been deactivated due to a device error. It includes the device name, which is a series of letters and numbers within brackets. See [“Device Names” on page 15](#).
- 2** If possible, make a backup copy of the data on the hard disk.
Make sure the backup copy contains uncorrupted versions of all files and directories on the hard disk. If you have been backing up your data consistently and verifying its integrity, you can reload data for the volumes affected by the disk failure.
- 3** Log in to iManager by entering the following URL in a Web browser:
`http://server.example.com/nps/iManager.html`
Replace *server.example.com* with the actual DNS name or IP address of your iManager server.
- 4** Dismount volumes on the disk you are replacing.
 - 4a** In *Roles and Tasks*, click *Storage > Volumes*, then select the server you want to manage.

- 4b** For each volume on the disk you are replacing, select the volume, then click *Dismount*.
To dismount multiple volumes at a time, press and hold the Ctrl key while selecting multiple volumes from the list, release the Ctrl key, then click *Dismount*.
- 5** Remove the segment from the mirror group.
- 5a** In *Roles and Tasks*, click *Storage > Software RAID*, then select the RAID device you want to manage.
When the page refreshes, it lists segments on the specified RAID device.
- 5b** Select the segment of the device on the disk you are replacing, then click *Remove*.
- 5c** Repeat these steps for each segment that is on the disk you are replacing.
- 6** Stop the server. If the server does not support hot-replacement of devices, shut down the server.
- 7** Remove the problem hard disk and install its replacement.
Use the instructions that came with the hard disk.
- 8** Restart the server. If the server was shut down, turn on the power to start the server.
- 9** If the disk is larger than 2 TB, use a third-party disk manager to carve the device into logical disks of less than 2 TB each, which is the largest disk size that NetWare recognizes.
- 10** After you install the new hard disk, use iManager to scan and configure the disk.
For more information about configuring the disk, see “**Managing Devices**” in the *OES 2 SPI: NSS File System Administration Guide*.
- 11** Restore the data by doing one or more of the following:
- ♦ If the failed disk contained the only copy of the server operating system, refer to your backup software to determine whether you can restore NetWare and the file system from a backup or whether you must reinstall NetWare.
 - ♦ If you use Storage Management Services™ (SMS) as your backup application, you must reinstall NetWare, then restore files from a backup. See “**Restore Options**” in the *Open Enterprise Server SBCON Administration Guide*.
 - ♦ For an unmirrored disk failure, if you have been backing up your data consistently and verifying its integrity, you can reload data for the volumes affected by the disk failure.
 - ♦ If this was a segment of a mirrored group, you can simply add the segment back into the mirror and let the data gradually be mirrored to the segment.

2.3.3 Loading Disk Drivers

If you add or replace a hard disk adapter on your NetWare server, you must load the corresponding disk driver.

Loading a disk driver enables communication between the disk controller and the server's CPU.

Load the disk driver once for each disk adapter you want to support.

Follow the instructions that accompany the driver. Most NetWare disk drivers have a help file that appears on the screen as you select the driver. Refer to these descriptions to determine which driver to load.

IMPORTANT: Some drivers do not have a description file (a configuration file that is appended to the driver). These drivers must be loaded manually at the system console. To load these drivers, follow the screen prompts or press F1 for help.

For general information about `.cdm` and `.ham` modules, see [Section 1.4, “Drivers for Host Adapters and Storage Devices,” on page 16](#).

2.3.4 Replacing Disk Drivers

The conventional way to replace a disk driver is to unload the driver, thus dismounting all the volumes, then load the new driver and remount the volumes. If you are following this process, be sure you replace a driver only when users do not need to access the volumes.

You can replace one instance of a driver that has been loaded multiple times by using the `remove storage adapter` command at the server console.

NetWare also supports hot replace disk drivers that can be replaced without dismounting volumes or otherwise interrupting the server’s operation. If you are replacing such a driver, simply load the new driver at the system console prompt. The server loads the new driver immediately and unloads the old driver without dismounting volumes or otherwise interrupting service.

If you are not sure whether your disk driver is a hot replace driver, try loading the new driver without unloading the existing driver. You will receive an error message if the driver cannot be replaced without first unloading the old driver and dismounting volumes.

2.4 Configuring and Monitoring Devices

To install and configure the server disk or storage media:

- ♦ For information about creating NSS storage pools and volumes, see the *OES 2 SP1: NSS File System Administration Guide*.
- ♦ For information about creating NetWare Traditional volumes, see the following:
 - ♦ *NW65 SP8: Traditional File System Administration Guide*
 - ♦ “Creating a Volume and Mounting a Volume” in the *NW 6.5 SP8: Novell Remote Manager Administration Guide*.

2.5 Activating and Deactivating a Hard Disk

Use this procedure to determine the operating status of your disk subsystem components and to activate or deactivate a storage device. (When you deactivate a disk, its volumes are dismounted.)

- 1 From the Monitor utility, select *Available Options > Storage Devices*.

For instructions, see “**MONITOR**” in the *NW 6.5 SP8: Utilities Reference*.

This reports a list of *Registered Storage Objects*. The device information associated with a selected storage device appears in the upper window. You can verify the type of storage device in the *Device Type* field.

Storage devices are listed in hierarchical order to reflect each object’s dependencies. In descending order, each object is indented to indicate that it is a child to the object above it. In ascending order, parent objects appear immediately above the selected object.

- 2** Select the appropriate hard disk from the list.

The *Drive Status* window appears. The *Operating Status* field indicates whether the device is activated or deactivated.

- 3** Press Enter to access the *Operating Status* options.

- 4** To change the operating status of the disk, select either *Activate* or *Deactivate*, then press *Enter*.

If you attempt to deactivate a disk that has mounted volumes, you receive a confirmation prompt. If you confirm that you want to deactivate the disk, the volumes are dismounted.

- 5** Press Esc until you return to *Available Options*.

Documentation Updates

A

This section contains information about documentation content changes made to the *Server Disks and Storage Devices for OES NetWare* since the initial release of Novell® Open Enterprise Server 2. If you are an existing user, review the change entries to readily identify modified content. If you are a new user, simply read the guide in its current state.

Refer to the publication date, which appears on the front cover and the Legal Notices page, to determine the release date of this guide. For the most recent version of the *Server Disks and Storage Devices for OES NetWare*, see the [Novell documentation Web site \(http://www.novell.com/documentation/nw65/stor_devices_nw/data/front.html\)](http://www.novell.com/documentation/nw65/stor_devices_nw/data/front.html).

In this section, content changes appear in reverse chronological order, according to the publication date. Within a dated entry, changes are grouped by section and listed alphabetically. Each change entry provides a link to the related topic and a brief description of the change.

This document was updated on the following dates:

- ♦ [Section A.1, “October 2009,” on page 23](#)
- ♦ [Section A.2, “December 2008 \(NetWare 6.5 SP8, OES 2 SP2 NetWare\),” on page 23](#)

A.1 October 2009

The front cover was modified for NetWare 6.5 SP8.

A.2 December 2008 (NetWare 6.5 SP8, OES 2 SP2 NetWare)

This guide was updated to current documentation standards.

