

Novell Open Enterprise Server

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SP2 PLANNING AND
IMPLEMENTATION GUIDE



Novell[®]

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About This Guide

IMPORTANT: The Virtual Office product and associated patches are not included in OES SP2.

References to Virtual Office are retained for those who are updating a previous OES installation to SP2.

This guide

- Describes Novell® Open Enterprise Server (OES) software.
- Provides planning and implementation instructions for each OES service.
- Focuses on getting started with the file services, print services, etc., in OES.

It doesn't contain detailed information about configuring and maintaining OES services, but it does contain helpful links to other service-specific administration guides and documentation.

Audience

This guide is designed to help network administrators

- Understand OES services prior to installing them.
- Make pre-install planning decisions.
- Understand installation options for each platform.
- Implement the services after they are installed.

Feedback

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

Documentation Updates

Changes made to this manual since the initial product release are summarized in [Appendix H, "Documentation Updates," on page 285](#).

Documentation Conventions

In this documentation, a greater-than symbol (>) is used to separate actions within a step and items within 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 forward slash to reflect the Linux* convention. Users of platforms that require a backslash, such as NetWare®, should use backslashes as required by the software.

Start Here

This section contains the following sections:

- [Chapter 1, “What’s New,” on page 19](#)
- [Chapter 2, “Welcome to Open Enterprise Server,” on page 27](#)
- [Chapter 3, “Planning Your OES Implementation,” on page 33](#)
- [Chapter 4, “Getting and Preparing OES Software,” on page 49](#)
- [Chapter 5, “Installing OES,” on page 55](#)
- [Chapter 6, “Upgrading to OES,” on page 61](#)
- [Chapter 7, “Migrating/Consolidating Existing Servers and Data,” on page 63](#)
- [Chapter 8, “Updating/Patching OES Servers,” on page 65](#)
- [Chapter 9, “Adding OES Services to OES Servers,” on page 67](#)
- [Chapter 10, “Implementation Caveats,” on page 69](#)

What's New

1

This section provides the following information:

- Highlights the **major changes and enhancements** to Open Enterprise Server since the initial product release.
- Provides a **comprehensive list of links to What's New sections** in the OES documentation set.

1.1 What's New in This Guide

The following sections have been added or updated.

1.1.1 NetWare/Linux Command Map

This is now located in a separate guide—*Novell OES SP2 Linux Tips for NetWare Administrators*.

1.2 Major Enhancements in the Support Packs

The following sections outline the major enhancements in each support pack.

1.2.1 Support Pack Two

The following enhancements are included in OES SP2.

- “iFolder 3.1” on page 19
- “iPrint” on page 19
- “NCP Server for Linux” on page 20
- “NetWare” on page 20
- “Novell Cluster Services (Linux)” on page 20
- “Novell Cluster Services (NetWare)” on page 20
- “Novell Remote Manager (NRM) (Linux)” on page 20
- “Novell Remote Manager (NRM) (NetWare)” on page 20
- “OES Linux Install” on page 20
- “Storage Management Services (SMS)” on page 20

iFolder 3.1

- **iFolder Client:** Now includes localized help.
- **Login Support:** For common name or e-mail name has been added. The option chosen applies to all users.

iPrint

- **iprintcmd (Linux client) Renamed to iprntcmd:** Options for Linux and Windows are more similar so they can be used more efficiently in login scripts.

- **Low Security Client:** Is now the default on the iPrint Printer List Web page.

NCP Server for Linux

- **DOS Archive Bit:** Can now be set on non-NSS NCP volumes on Linux.
- **Inherit POSIX Permissions:** Is now available on non-NSS NCP volumes on Linux.
- **Cross-Protocol Locking:** Is now supported. For example, users can access files from Samba and an NCP client. Applications that support file sharing modes now work correctly.

NetWare

- **Available Memory Monitoring:** Novell Remote Manager lets you set lower thresholds than were previously supported.

Novell Cluster Services (Linux)

- **Choosing a Device for the SBD Partition:** Is done from a list rather than requiring a manual entry.
- **iManager Cluster Option Names:** Are changed to make cluster configuration and management easier.
- **Direct Cluster Upgrading from NetWare 6.0:** Is now supported.

Novell Cluster Services (NetWare)

- **iManager Cluster Option Names:** Are changed to make cluster configuration and management easier.

Novell Remote Manager (NRM) (Linux)

- **File System Support:** Lets you view the free space on any mounted physical file system, create inventory reports, and perform actions on the files systems.
- **Network Discovery Page:** Lets you scan a host and its ports to discover services.

Novell Remote Manager (NRM) (NetWare)

- **Health Monitoring:** Has been enhanced to include Faulted Address Space Count monitoring and alerts, alert-specific headings in e-mail notifications, and improved Available Memory monitoring.

OES Linux Install

- **SLES 9 SP3:** Is included
- **Red Carpet[®] Graphical User Interface (GUI):** Is supported.

Storage Management Services (SMS)

- **Backup and Restore of Extended Attributes:** Is supported in VFS systems.
- **UTF8-Based Trustee Migration:** Is supported for the Server Consolidation and Migration Toolkit.

1.2.2 Support Pack One

The following enhancements are included in OES SP1 and later.

- “iFolder 2.1” on page 21
- “iFolder 3.1” on page 21
- “iPrint” on page 21
- “Linux User Management (LUM)” on page 21
- “MySQL” on page 22
- “Native File Access Protocols” on page 22
- “NCP Server for Linux” on page 22
- “NetWare” on page 22
- “Novell Client for Linux” on page 23
- “Novell Cluster Services (Linux)” on page 23
- “Novell Remote Manager (NRM)” on page 23
- “Novell Storage Services (NSS) on Linux” on page 23
- “OES Install” on page 23
- “Server Consolidation and Migration Toolkit” on page 23
- “SUSE Linux Enterprise Server 9” on page 24
- “Virtual Office” on page 24

iFolder 2.1

- **Novell Cluster Services:** Now fully supported.

iFolder 3.1

- **The iFolder 3.1 Product:** Now included and integrated with the OES Linux installation. (Novell[®] iFolder[®] 3 is not supported on the NetWare[®] platform.)

iPrint

- **Default Printer:** Now an option when installing an iPrint printer on Windows*.
- **Printer List Web Page:** Can now be sorted.
- **Secure Printing from the Linux Client:** Now available to both OES Linux and OES NetWare servers.
- **Windows Driver Profiles:** Now supported on OES Linux servers.

Linux User Management (LUM)

- **iManager Interface:** Lets you enable multiple users and groups for Linux and perform other management tasks more easily.
- **Enable Users for Linux:** Lets you also enable an existing eDirectory™ group for Linux or create a new Linux-enabled group to which the users are assigned.

- **Enable Groups for Linux:** Lets you enable the group and the users that already belong to it at the same time.
- **User Creation Process Flow:** User creation, Linux-enabling of eDirectory users, and Samba-enabling of Linux users are now three separate processes in iManager. This is required because of the new management capabilities.
- **Associating the UNIX Config Object with a Linux-Enabled Group:** No longer supported because multiple UNIX* Workstation objects can now be associated with Linux-enabled groups.

MySQL

- **Autoclose Option:** Added to MySQL* clients.
- **JDBC Connector and phpMyAdmin:** New versions are added.
- **Version:** Updated to 4.0.24.

Native File Access Protocols

- **SMB Signing:** Support has been added to prevent man-in-the-middle attacks and provide secure communications between clients and servers.

NCP Server for Linux

- **Moving Files:** Now supported between NCP™ volumes. For example, you can move a file from an NCP volume on NSS to an NCP volume on a native Linux file system. Trustee rights to files are maintained. However, file attributes unique to NSS, such as those associated with quotas and salvaging, are lost if the target volume is not NSS.
- **NSS File Attributes:** Can now be set on NSS volumes from an NCP client.
- **Opportunistic Locking Levels 1 and 2:** Now supported

NetWare

- **Clear Console Command History:** Now enabled through the F10 key. This also disables the command history.
- **F1 Help:** Now available on the main server console screen.
- **Installation:** No longer distinguishes OES from Support Packs. iManager 2.5, QuickFinder, and Virtual Office 1.5 are the only version choices available.
- **Module Load Time:** Added to the information displayed by the `modules` console command. You can now see exactly when a given module was loaded. The same information is available in Novell Remote Manager, where you can sort the module list by load time to see which modules were loaded most recently.
- **Programming-Level Support:** Added for `fork()` and `exec()` for use by several cross-platform modules, such as BASH and Perl.
- **Quick-Save Console Buffer:** Can now be saved to a text file. See the F1 help screen at the NetWare console for details.

Novell Client for Linux

- **Novell Client for Linux:** Now available and supports NCP access to OES NetWare and OES Linux (with the NCP server installed and running).

Novell Cluster Services (Linux)

- **Cluster Resource Templates:** Added MySQL and iFolder 2.1x.
- **Encrypted NSS Volumes:** Supported.
- **High Availability Features:** Include improved NIC channel bonding and SAN multipath IO.
- **Maximum Cluster Resource Script Length Limits:** Eliminated.
- **Mirrored SBD Partitions:** Supported.
- **Rolling Cluster Conversion:** Expanded to include both NetWare 6.0 and NetWare 6.5 clusters.
- **STONITH Support:** Added to let you shut down other nodes.

Novell Remote Manager (NRM)

- **Default Settings:** Can now be restored for any given SET parameter by clicking a button in the interface.
- **Language Support on OES Linux:** Modified so that the browser's language is used rather than the server's language.
- **Open File Control:** The main page now includes a list of open files per volume, which links directly to the list of open files.
- **“Remembered” Collapsible Categories:** Lets you display the Novell Remote Manager features you use most often and hide the others.

Novell Storage Services (NSS) on Linux

- **Encrypted Volumes:** Can now be created.
- **Hardlinks:** Now supported.
- **Metadata Migration Utility:** Now available.
- **New Media Format:** Supports enhanced hard link capability.
- **Performance Improvements:** NSS performance is significantly improved. Samba access to an NSS volume is now faster than to traditional Linux volumes, such as EXT3 or Reiser when the number of directories and files is greater than 2,000.
- **Software RAID Support:** Now included.

OES Install

The AutoYaST GUI now includes OES components in the Software > Package Selection page.

Server Consolidation and Migration Toolkit

The Server Consolidation Utility and the Migration Wizard have been combined into a single toolkit. You must now download and run the toolkit to access either the utility or the wizard.

SUSE Linux Enterprise Server 9

- **SP2:** Automatically installed with (and required by) OES Linux.

Virtual Office

- **Team File Size Management:** Lets you restrict the maximum amount of space that any team can use. This can be set per team or globally.
- **Version 1.6:** Now the only version included.

1.3 Links to What's New Sections

The following table provides links to the What's New sections in the documentation for all OES products.

| Product | Link to What's New Section |
|----------------------------------|--|
| Archive and Version Services 2.0 | Administration Guide |
| | User Guide |
| Identity Manager 2 | Administration Guide |
| iFolder 3.x | Administration Guide |
| | User Guide |
| iManager 2.5 | Administration Guide |
| | Install Guide |
| iPrint | OES Linux Administration Guide |
| | OES NetWare Administration Guide |
| Native File Access Protocols | Administration Guide |
| NCP Server for OES Linux | Administration Guide |
| NetStorage | OES Linux Administration Guide |
| | OES NetWare Administration Guide |
| Novell Client™ | Windows Administration Guide |
| Novell Cluster Services | Administration Guide |
| Novell Remote Manager | OES Linux Administration Guide |
| | OES NetWare Administration Guide |
| Novell Storage Services™ (NSS) | Administration Guide |
| Nsure® Audit | Administration Guide |
| OES Linux | Installation Guide |
| OES NetWare | Memory Management Administration Guide |
| | Server OS Administration Guide |
| QuickFinder™ 4.0 | Administration Guide |

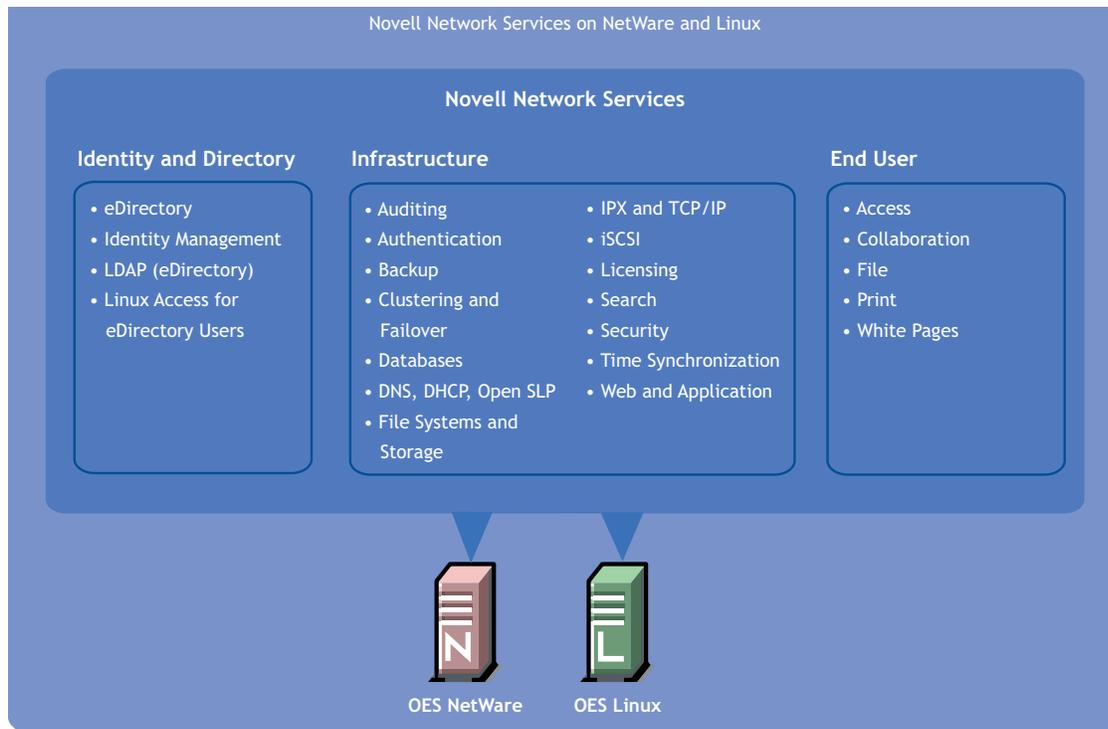
| Product | Link to What's New Section |
|---------------------|--------------------------------------|
| RConsoleJ (NetWare) | Administration Guide |
| Virtual Office | Administration Guide |

Welcome to Open Enterprise Server

2

Novell® Open Enterprise Server (OES) includes all the network services that organizations traditionally expect from Novell.

Figure 2-1 OES Overview



This guide contains brief but crucial information and insights to help you successfully implement OES.

If you want to quickly grasp basic OES concepts, scan through the following overviews:

- [Section 2.1, “Server Platforms,” on page 28](#)
- [Section 2.2, “Management Interfaces and Services,” on page 29](#)
- [Section 2.3, “Identity and Directory Services,” on page 29](#)
- [Section 2.4, “Infrastructure Services,” on page 30](#)
- [Section 2.5, “End User Services,” on page 31](#)

More detailed overviews are contained in the individual service sections in this guide.

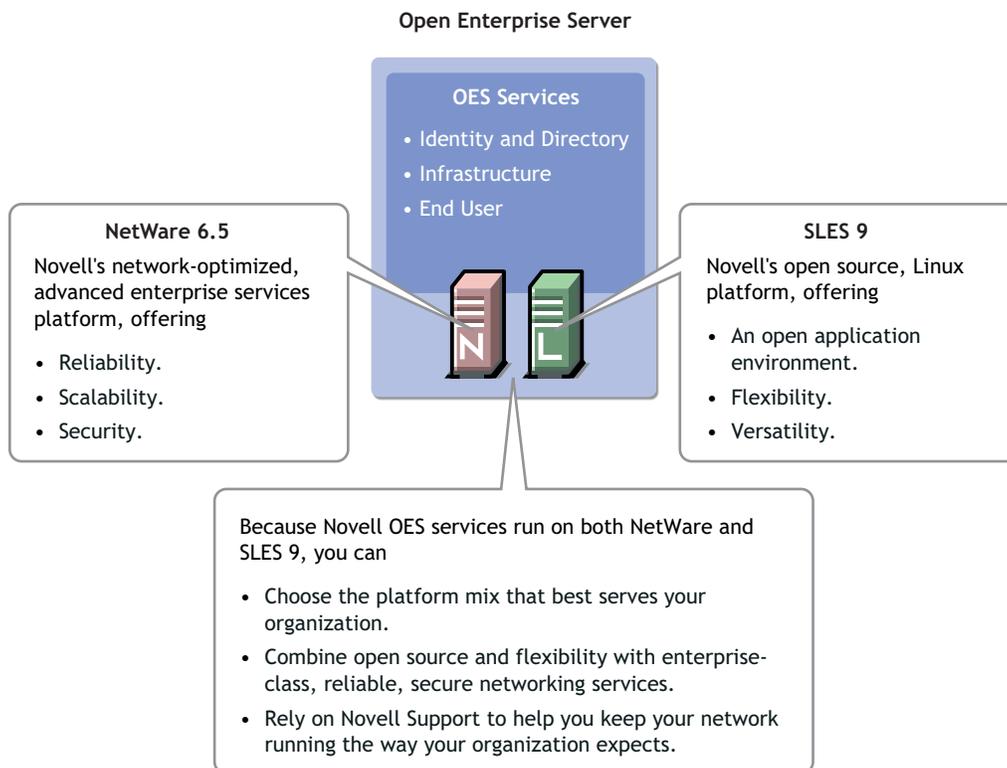
NOTE: For a list of OES services by platform, see “[Services Supported on Each Platform](#)” on [page 251](#).

2.1 Server Platforms

You can deploy OES services on either OES NetWare[®] (NetWare 6.5 SP3 or later) or SUSE[®] Linux Enterprise Server 9 (SLES 9) server. You can choose to install OES on a new server or upgrade an existing NetWare 6.5 or SLES 9 server to run OES services. The OES install automatically upgrades NetWare 6.5 with Support Pack 4 and SLES 9 with Support Pack 2 if the Support Packs were not previously installed.

As stated in [Figure 2-2](#), each platform offers unique strengths. Novell OES offers a range of reliable, proven network services.

Figure 2-2 OES Server Platforms



IMPORTANT: The OES documentation set includes the [SLES 9 Administration Guide](#), which contains valuable information regarding SLES 9 and its standard services. The OES Documentation Web site contains links to much of the information in the SLES 9 guide.

Be aware that some instructions in the SLES 9 guide, such as the installation sections, are for installing and running a standard SLES 9 server but not for installing a SLES 9 server and running OES services.

You should always consult the information in the OES manuals and guides first when working with OES services on SLES 9.

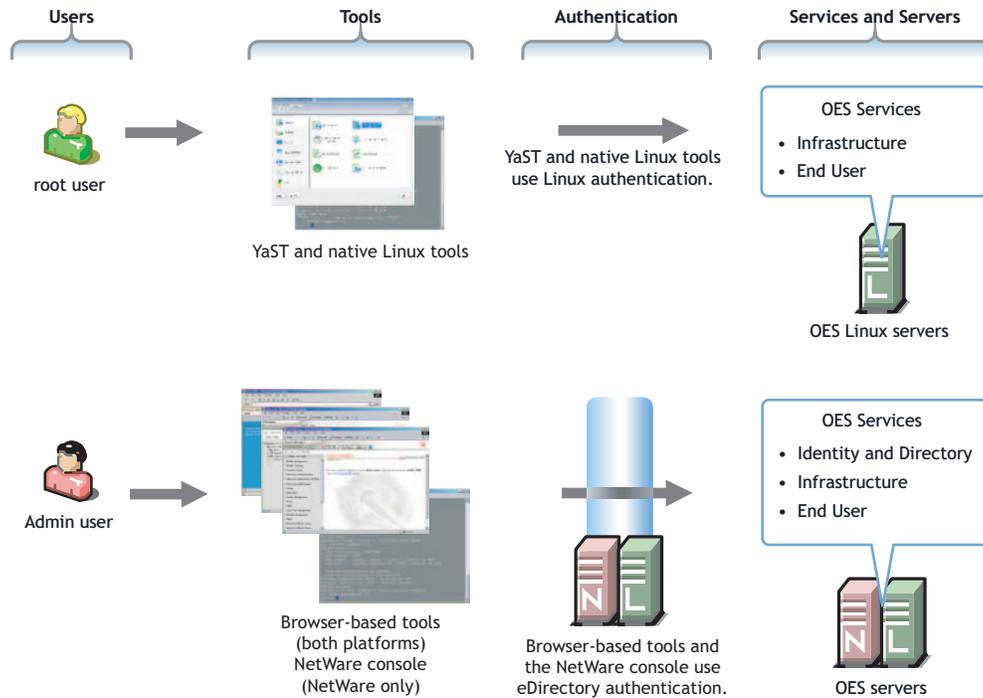
2.2 Management Interfaces and Services

As shown in [Figure 2-3](#), OES provides a rich set of service- and server-management tools, including browser- and server-based interfaces that help you implement and maintain your network.

Access to most of these management interfaces is controlled through eDirectory™. However, a few interfaces, such as YaST on SLES 9 servers, require local authentication.

For more information, see [Chapter 14, “OES Utilities and Tools,”](#) on page 91.

Figure 2-3 Management Interfaces and Services



2.3 Identity and Directory Services

Storing and managing network identities in directory services has become a fundamental expectation for networking.

2.3.1 eDirectory

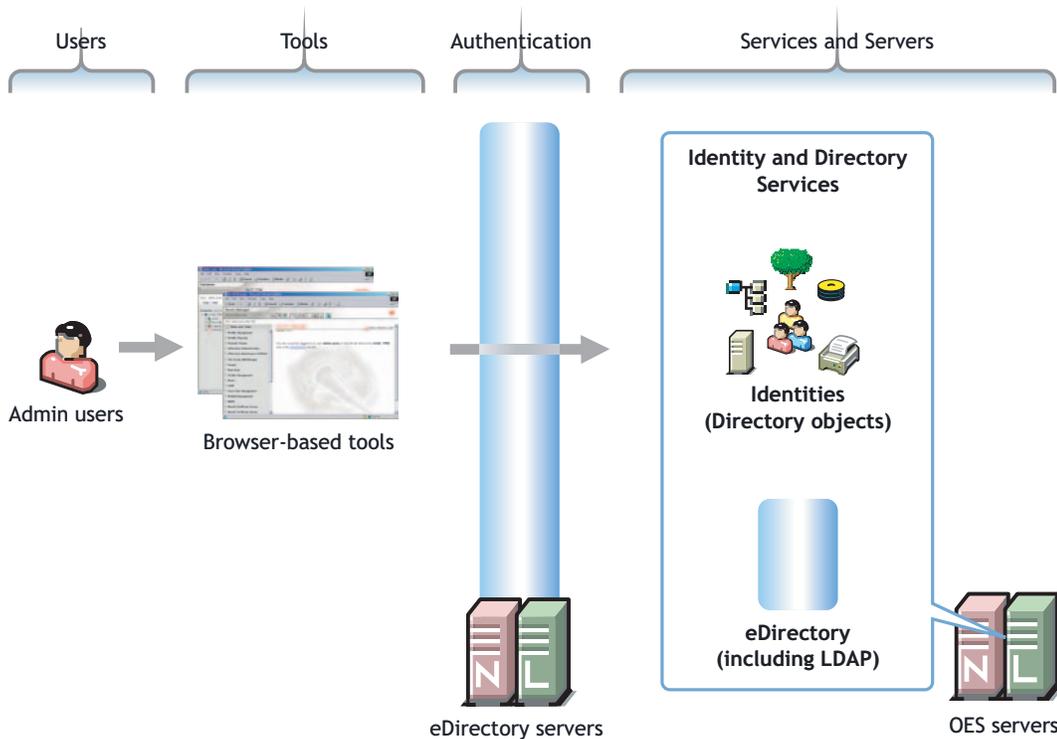
In the simplest terms, Novell eDirectory is a tree structure containing a list of objects (or identities) that represent network resources, such as

- Network users.
- Servers.
- Printers.
- Applications.

eDirectory is designed to provide easy, powerful, and flexible management of network resources (including eDirectory itself) in ways that no other directory service can match. You can administer eDirectory using the same browser-based tools on both OES platforms.

For more information, see [Part IV, “Identity and Directory Services,”](#) on page 105.

Figure 2-4 eDirectory Overview



2.3.2 Identity Manager Bundle Edition

OES includes Identity Manager Bundle Edition with the drivers required to let you synchronize identity information stored in Active Directory* Domains, NT Domains, and eDirectory trees. For more information, see [Section 16.1, “Using the Identity Manager Bundle Edition,”](#) on page 111.

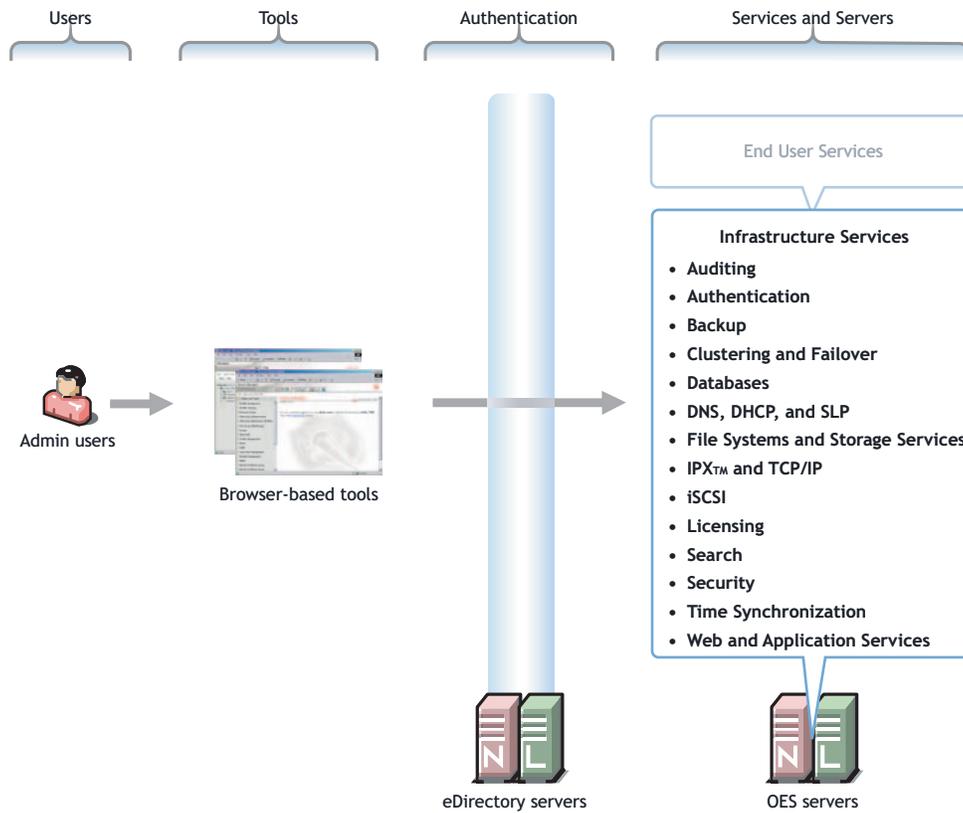
2.4 Infrastructure Services

OES network services require a number of underlying infrastructure services to support such things as

- Authentication of those seeking access to the network and its services.
- Backup services to prevent data loss.
- Network storage of end user files and other critical data.
- Support for and management of all the required network protocols.

Figure 2-5 illustrates that OES includes all the network infrastructure services that are required to meet these and other network service needs.

Figure 2-5 Infrastructure Services



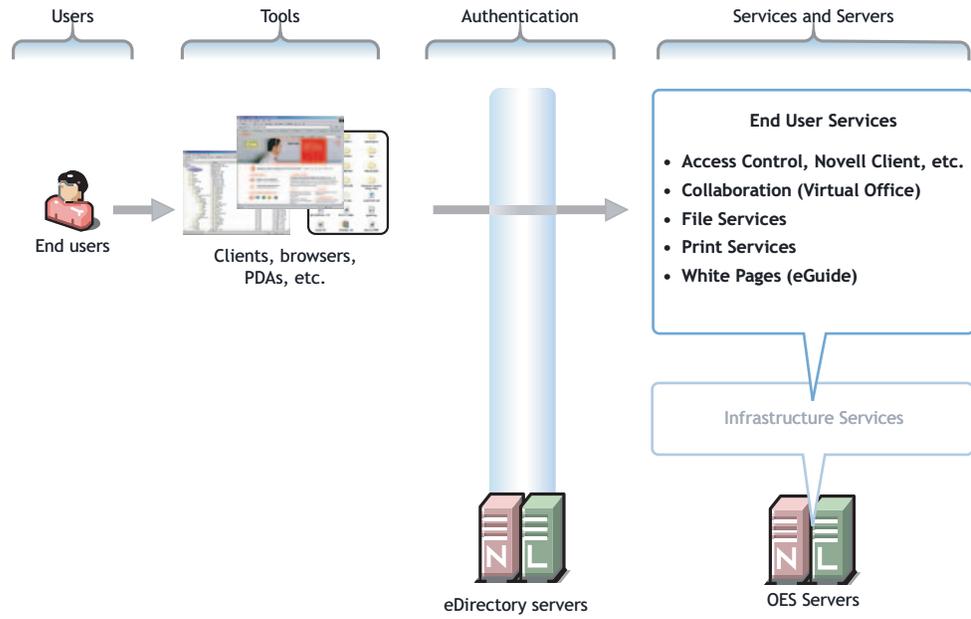
2.5 End User Services

Ultimately, networks exist to provide services to end users, and Novell is best known for the anywhere-accessible end user services it enables you to provide on your network.

Figure 2-6 on page 32 illustrates the services that OES can provide to network users and the methods they can use to access those services. These services are explained in greater detail in the other sections of this guide.

For service access information, see “Quick Reference to OES User Services” on page 249.

Figure 2-6 OES User Services



Planning Your OES Implementation

3

As you plan which services to install on which OES platform, you probably have a number of questions. The following sections are designed to help answer your questions and alert you to planning steps you should follow for a successful OES implementation.

- [Section 3.1, “Technologies Introduced in OES,” on page 33](#)
- [Section 3.2, “What Services Are Included in OES?,” on page 33](#)
- [Section 3.3, “Which Services Do I Need?,” on page 36](#)
- [Section 3.4, “Which OES Platform Is Best for My Services?,” on page 37](#)
- [Section 3.5, “Plan for eDirectory,” on page 42](#)
- [Section 3.6, “Prepare Your Existing eDirectory Tree for OES,” on page 42](#)
- [Section 3.7, “Identify a Purpose for Each Server,” on page 42](#)
- [Section 3.8, “Understand Server Requirements,” on page 43](#)
- [Section 3.9, “Understand User Restrictions and Linux User Management,” on page 43](#)
- [Section 3.10, “Consider Coexistence and Migration Issues,” on page 43](#)
- [Section 3.11, “Understand Your Installation Options Before You Start,” on page 43](#)

3.1 Technologies Introduced in OES

As you prepare to begin using OES, you should know about the following technologies introduced with OES:

- **Linux User Management (LUM):** Technology that lets eDirectory™ users function as local POSIX* users on Linux servers. For more information, see [“Linux Access for eDirectory Users \(LUM\)” on page 119](#).
- **OpenWBEM:** A set of management and Internet standard technologies developed to unify the management of enterprise computing environments. For more information, see the [OpenWBEM Services Administration Guide for OES](#).

3.2 What Services Are Included in OES?

- Traditional Novell Services on Both OES Platforms

Beginning with the release of Nterprise™ Linux Services and expanding with release of OES, Novell has included Linux versions of many Novell services that have traditionally been available only on NetWare®.

- Critical Open Source Products on both OES Platforms

Novell has previously ported the most well known, network-critical open source products to NetWare—products such as OpenSSH and the Apache Web server. These open source products are, of course, already available on SLES 9. Therefore, a separate Novell port to Linux is unnecessary.

Table 3-1 summarizes the services and technology support available on each platform and the differences in the way these services are provided.

Although extensive, this list is not exhaustive. If you are interested in a service or technology not listed, or for documentation for listed services, see the [A-Z List](#) on the OES Documentation Web site.

Table 3-1 OES Services Available on OES LINUX and OES NetWare

| Service | OES LINUX | OES NetWare |
|--|-----------------------|---|
| AFP (Apple File Protocol) | No | Yes - NFAP |
| Apache Web Server | Yes - Standard Linux | Yes - NetWare port of open source product |
| Archive and Version Services (Novell) | No | Yes |
| Backup (SMS) | Yes | Yes |
| Clustering | Yes | Yes |
| CIFS (Windows File Services) | Yes - Samba | Yes - NFAP |
| DFS (Novell Distributed File Services) | No | Yes |
| DHCP | Yes | Yes |
| DNS | Yes | Yes |
| eDirectory 8.7.3 | Yes | Yes |
| eDirectory Certificate Server | Yes | Yes |
| eGuide (White Pages) | Yes | Yes |
| FTP Server | Yes | Yes |
| Health Monitoring Services | Yes | Yes |
| Identity Manager | Yes | Yes |
| iPrint | Yes | Yes |
| IPX™ (Internetwork Packet Exchange™) from Novell | No | Yes |
| iSCSI | Yes | Yes |
| LDAP Server for eDirectory | Yes | Yes |
| MySQL | Yes - Standard Linux | Yes - NetWare port of open source product |
| NCP™ Server | Yes | Yes |
| NetStorage | Yes | Yes |
| NFS | Yes - Native to Linux | Yes - NFAP |

| Service | OES LINUX | OES NetWare |
|---|--|---|
| NICI (Novell International Cryptography Infrastructure) | Yes | Yes |
| NMAS™ (Novell Modular Authentication Services) | Yes | Yes |
| Novell Client™ for Windows and Linux support | Yes - through NCP Server for Linux or Novell Samba | Yes |
| Novell Cluster Services™ | Yes | Yes |
| Novell iFolder® 2.x | Yes | Yes |
| Novell Licensing Services | No - See Section 28.3, "Licensing on OES Linux," on page 160. | Yes |
| NSS (Novell Storage Services™) | Yes | Yes |
| Nsure® Audit | Not included with OES. However, the Novell Audit 2.0 Starter pack is available for download at no cost on Novell.com (http://www.novell.com/downloads) . | Yes |
| NTPv3 | Yes | Yes |
| OpenSSH | Yes - Standard Linux | Yes - NetWare port of open source product |
| PAM (Pluggable Authentication Modules) | Yes - eDirectory enabled | No - eDirectory authentication is pervasive on NetWare. |
| Pervasive.SQL | No (Available at http://www.pervasive.com) | Yes |
| PKI (Public Key Infrastructure) | Yes - eDirectory | Yes - eDirectory |
| Printing | See iPrint . | See iPrint . |
| QuickFinder™ | Yes | Yes |
| RADIUS | Yes - Novell RADIUS | Yes - Novell RADIUS |
| Samba | Yes - Novell customized | No - See Section 35.1.2, "Native File Access Protocols," on page 208. |
| Search (QuickFinder) | Yes | Yes |
| SLP | Yes - SLES 9 | Yes - Novell |
| Software RAIDS (NSS volumes) | Yes (0 and 1) | Yes (0, 1, 5) |
| Storage Management Services™ (SMS) | Yes | Yes |
| TCP/IP | Yes | Yes |
| Timesync NLM™ | No - See "Time Synchronization" on page 171. | Yes |
| Tomcat | Yes - Standard Linux | Yes - NetWare port |

| Service | OES LINUX | OES NetWare |
|--------------------------------------|-----------|-------------|
| NetWare Traditional File System | No | Yes |
| Virtual Office (Collaboration) | Yes | Yes |
| WAN Traffic Manager (for eDirectory) | No | Yes |

3.3 Which Services Do I Need?

OES probably includes services that you don't know about that could greatly enhance the business value of your network.

You are probably aware of some of the file and print services included in OES, but you might not know that

- OES includes a powerful search engine (QuickFinder) that can index local and Web content, providing you with a search appliance at no additional cost.
- Users running the Novell Client can map drives to locations on an OES Linux server running the NCP Server for Linux.

We recommend that you review the brief service overviews included at the beginning of each service section in this guide to get a full picture of the solutions that OES offers.

3.3.1 End User Services

- [“Access” on page 189](#)
- [“Collaboration \(Virtual Office\)” on page 203](#)
- [“File Services” on page 207](#)
- [“Print Services” on page 235](#)
- [“White Pages \(eGuide\)” on page 241](#)

3.3.2 Identity and Directory Services

- [“eDirectory” on page 107](#)
- [“Identity Management Services” on page 111](#)
- [“LDAP \(eDirectory\)” on page 117](#)
- [“Linux Access for eDirectory Users \(LUM\)” on page 119](#)

3.3.3 Infrastructure Services

- [“Auditing” on page 131](#)
- [“Authentication” on page 133](#)
- [“Backup” on page 137](#)
- [“Clustering and Failover” on page 139](#)
- [“Databases” on page 141](#)

- “DNS, DHCP, and OpenSLP” on page 143
- “File Systems and Storage Services” on page 145
- “IPX and TCP/IP” on page 155
- “iSCSI” on page 157
- “Licensing” on page 159
- “Search” on page 161
- “Security” on page 163
- “Time Synchronization” on page 171
- “Web and Application Services” on page 185

3.3.4 Exploring OES Services

We also recommend that you explore the services by following the step-by-step instructions provided in the OES Lab Guides:

- *Lab Guide for OES SP2 Linux*
- *Lab Guide for OES NetWare*

3.4 Which OES Platform Is Best for My Services?

You have already seen that there are differences in the way OES provides services on SLES 9 and NetWare 6.5 (See [Section 3.2, “What Services Are Included in OES?” on page 33.](#)) To help you better assess which OES platform can best meet your network service needs, you should consider the inherent platform strengths of Linux and NetWare and the differences in the service offerings on each platform.

3.4.1 Platform Strengths

Although both OES platforms provide a full set of network services, there are differences in the NetWare and Linux platforms.

Table 3-2 *Platform Comparison*

| | OES NetWare | SUSE LINUX Enterprise Server 9 |
|-------------------------------|--|--|
| Brief description | Novell's award-winning network-optimized operating system. | Novell's award-winning Linux operating system. |
| Industry-recognized strengths | <ul style="list-style-type: none"> • Reliability • Scalability • Security | <ul style="list-style-type: none"> • Open application environment • Flexibility • Versatility |

| | OES NetWare | SUSE LINUX Enterprise Server 9 |
|-----------------------------|---|---|
| Business value propositions | <p>NetWare excels when the user population and management burden is highly distributed:</p> <ul style="list-style-type: none"> • Increases network availability. • Optimizes manageability. • Enhances user productivity. • Runs Apache, Tomcat, MySQL, and other open source applications. | <p>SLES 9 is well suited as an application server running Linux-based solutions:</p> <ul style="list-style-type: none"> • Runs thousands of programs available from the open source community. • Delivers OES file and print services. • Hosts open source Web servers, proxy servers, and mail servers. |

3.4.2 Service Differences on the OES Platforms

In addition to considering the platform strengths, you should understand the differences in the features available when services are running on Linux or NetWare. The following examples illustrate this point.

- **DHS/DHCP:** NetWare DNS/DHCP services are far richer than the basic DNS/DHCP functionality available in the standard Linux implementation.

Many organizations find Linux DNS/DHCP services to be completely adequate. On the other hand, some organizations—especially those that currently leverage the advanced services available on NetWare—might be frustrated with the Linux implementation of DNS/DHCP and find it inadequate for their needs.

- **Novell Storage Services (NSS):** When deploying NSS, you might want support for Novell Distributed File Services (DFS) so you can move or split NSS volumes. This feature is currently available only on NSS running on NetWare.

You should fully investigate any service differences between platforms before you finalize your service/platform choices.

It is beyond the scope of this guide to explain every point that might be important to you as you plan your network services. For this level of information, you should consult the service-specific manuals and guides provided in the [OES online documentation \(http://www.novell.com/documentation/oes\)](http://www.novell.com/documentation/oes).

To help you, [Table 3-3](#) indicates which services are the same, contains links to documentation sections that discuss service differences, and shows which services are unavailable on a given platform.

Table 3-3 Information on Service Differences between the OES Platforms

| Service | Explanations and Links |
|-------------------|---|
| Apache Web Server | <p>Administration Instance vs. Public Instance on NetWare (http://www.novell.com/documentation/oes/web_apache/data/aipcu6x.html#aipcu6x)</p> <p>What's Different about Apache on NetWare (http://www.novell.com/documentation/oes/web_apache/data/ail8hvj.html#ail8hvj)</p> |

| Service | Explanations and Links |
|------------------------------------|--|
| Archive and Version Services | This Novell product is not supported on Linux. |
| Backup (SMS) | SBCON is not supported on Linux. |
| Clustering | <p>“Product Features” in the <i>OES Novell Cluster Services 1.8.2 Administration Guide for Linux</i></p> <p>“Product Features” in the <i>OES Novell Cluster Services 1.8.2 Administration Guide for NetWare</i></p> |
| DFS (Distributed File Services) | Not supported in NSS for Linux. |
| DHCP | <p>“DHCP” in the <i>SUSE LINUX Enterprise Server 9 Administration Guide</i></p> <p>“Planning a DHCP Strategy” in the <i>Novell DNS/DHCP Services for NetWare Administration Guide for OES</i></p> |
| DNS | <p>“DNS - Domain Name System” in the <i>SUSE LINUX Enterprise Server 9 Administration Guide</i></p> <p>“Planning a DNS Strategy” in the <i>Novell DNS/DHCP Services for NetWare Administration Guide for OES</i></p> |
| eDirectory 8.7.3 | No functional differences. |
| eDirectory Certificate Server | No functional differences. |
| eGuide (White Pages) | No functional differences. |
| FTP Server | “Features of the NetWare FTP Server” in the <i>NetWare FTP Server Administration Guide for OES</i> |
| Health Monitoring services | No functional differences. “Monitoring Server Health” |
| Identity Manager | No functional differences. |
| Novell iFolder 2.x | No functional differences. |
| Novell iFolder 3.x | For OES SP1 Linux and later; not for OES NetWare. |
| iPrint | <p>“Overview” in the <i>OES iPrint Administration Guide for Linux</i></p> <p>“Overview” in the <i>OES iPrint Administration Guide for NetWare</i></p> |
| IPX (Internetwork Packet Exchange) | Novell doesn't provide this on Linux. |
| iSCSI | <p>Linux-iSCSI Project on the Web (http://linux-iscsi.sourceforge.net)</p> <p>“Overview” in the <i>iSCSI 1.1.3 Administration Guide for NetWare 6.5</i></p> |
| LDAP Server for eDirectory | No functional differences. |
| MySQL | <p>MySQL.com on the Web (http://www.mysql.com)</p> <p>“Overview: MySQL” in the <i>MySQL for NetWare Administration Guide for OES</i></p> |
| NCP Server | “Benefits of NCP Server” in the <i>NCP Server for Linux Administration Guide</i> |

| Service | Explanations and Links |
|---|---|
| NetStorage | NetStorage on Linux offers connectivity to storage locations using the CIFS/SMB, NCP, and SSH protocols. NetWare uses only NCP. These and other differences are summarized in “NetStorage” on page 210. |
| NICI (Novell International Cryptography Infrastructure) | No functional differences. |
| NMAS (Novell Modular Authentication Services) | No functional differences. |
| Novell Client support (Linux and Windows) | No functional differences with NCP Server for Linux installed on OES Linux. |
| Novell Cluster Services | “Product Features” in the OES Novell Cluster Services 1.8.2 Administration Guide for Linux “Product Features” in the OES Novell Cluster Services 1.8.2 Administration Guide for NetWare |
| Novell Licensing Services | Not available on Linux. |
| Novell iFolder 2.x | No functional differences. |
| NSS (Novell Storage Services) | “Coexistence and Migration Issues” in the Novell Storage Services File System Administration Guide for OES |
| Nsure Audit | Not available on Linux. |
| NTPv3 | Chapter 31, “Time Synchronization,” on page 171 |
| OpenSSH | “Functions Unique to the NetWare Platform” in the OpenSSH Administration Guide |
| PAM (Pluggable Authentication Modules) | Not available on NetWare. Authentication is fully integrated with eDirectory. |
| Pervasive.SQL | Pervasive.SQL on the Web (http://www.pervasive.com/support/technical/online_manuals.asp) |
| PKI (Public Key Infrastructure) | No functional differences. |
| Printing | See iPrint . |
| RADIUS | No functional differences (NMAS). |
| QuickFinder | See Search . |
| Samba | Linux solution for CIFS file access. NetWare provides CIFS access through the Native File Access Protocol (NFAP) functionality. For more information, see Appendix G, “Samba Support in OES,” on page 261. |

| Service | Explanations and Links |
|---|---|
| Search (QuickFinder) | <p>When indexing a file system, the QuickFinder engine indexes only what it has rights to see.</p> <p>On NetWare, it has full access to all mounted volumes. On Linux, it has rights to only the files that the novlwww user in the www group has rights to see.</p> <p>For more information, see “Security Characteristics” and “Generating an Index For a Linux-mounted NSS Volume” in the <i>QuickFinder Server 4.2 Administration Guide</i>.</p> |
| Server resource management (eDirectory) | <p>eDirectory on NetWare manages server resources. For example, you can view and modify file system information, manage files and folders on NetWare volumes, salvage and purge deleted files, allocate volume space, and create objects to facilitate file management. See “Managing Objects” in the <i>Novell eDirectory 8.7.3 Administration Guide</i>.</p> <p>The current version of eDirectory for Linux does not support management of server resources.</p> |
| SLP (Novell SLP) (OpenSLP) | <p>OpenSLP Services on Linux</p> <p>Implementing the Service Location Protocol (http://www.novell.com/documentation/edir87/edir87/data/a2iimc.html)</p> <p>NetWare uses Novell SLP by default, which provides synchronization between Directory Agents (DAs) that are in the same eDirectory context. This provides service information beyond the local network.</p> <p>Alternatively, you can implement OpenSLP for eDirectory. Be aware, however, that DA synchronization is not supported in OpenSLP.</p> <p>OpenSLP on Linux is not customized to provide DA synchronization.</p> |
| Software RAIDS | Understanding Software RAID Devices |
| Storage Management Services (SMS) | No functional differences. |
| TCP/IP | No functional differences. |
| Timesync | Not available on Linux, but NTPv3 is supported on both OES platforms. |
| Tomcat | Administration Instance vs. Public Instance on NetWare (http://www.novell.com/documentation/oes/web_tomcat/data/ahdyran.html#ahdyran) |
| NetWare Traditional File System | Not available on Linux. |
| Virtual Office (Collaboration) | No functional differences. |
| WAN Traffic Manager | <p>Not supported on Linux.</p> <p>“WAN Traffic Manager” in the <i>Novell eDirectory 8.7.3 Administration Guide</i>.</p> |

3.5 Plan for eDirectory

eDirectory is the heart of OES network services and security.

If you are installing into an existing tree, be sure you understand the information in [Section 15.3, “eDirectory Coexistence and Migration,” on page 107.](#)

If you are creating a new eDirectory tree on your network, you must do some additional planning before you install the first server into the tree. The first server is important for two reasons:

- You create the basic eDirectory tree structure during the first installation
- The first server permanently hosts the Certificate Authority for your organization

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

- **Structure of the eDirectory tree:** A well-designed tree provides containers for servers, users, printers, etc. It is also optimized for efficient data transfer between geographically dispersed locations. For more information, see [“Designing Your Novell eDirectory Network”](#) in the *Novell eDirectory 8.7.3 Administration Guide*.
- **Time synchronization:** eDirectory requires that all OES servers, both NetWare and Linux, be time synchronized. For more information, see [Chapter 31, “Time Synchronization,” on page 171.](#)
- **Partitions and replicas:** eDirectory allows the tree to be partitioned for scalability. Replicas (copies) of the partitions provide fault tolerance within the tree. The first three servers installed into an eDirectory tree automatically receive replicas of the tree’s root partition. You might want to create additional partitions and replicas. For more information, see [“Managing Partitions and Replicas”](#) in the *Novell eDirectory 8.7.3 Administration Guide*.

For information on these and other eDirectory planning tasks, see the *Novell eDirectory 8.7.3 Administration Guide*.

Also be aware that the OES lab guides provide a basic introduction to creating container objects as well as Group and User objects in eDirectory.

3.6 Prepare Your Existing eDirectory Tree for OES

If you are installing OES into an existing tree, you must use Deployment Manager (located on the *NetWare 6.5 SP5 CD 1 (Operating System)* CD to see whether your tree requires any updates.

For instructions on running Deployment Manager, see [“Preparing the Network with Deployment Manager”](#) in the *OES NetWare Installation Guide*.

3.7 Identify a Purpose for Each Server

Large networks usually have one or more servers dedicated to providing a single network service. For example, one or more servers might be designated to provide Novell iFolder file services to network users while other servers provide iPrint printing services for the same users.

For smaller organizations, it is often not practical or cost effective to dedicate servers to providing a single service. For example, the same server might provide both file and print services to network users.

Prior to installing a new server on your network, you should identify the service or services that it will provide.

3.8 Understand Server Requirements

OES Linux and OES NetWare both have specific hardware and software requirements.

Prior to installing OES, make sure your server machine and network environment meet the requirements outlined in the following sections:

- **OES Linux Server:** “[Preparing to Install OES Linux](#)” in the *OES Linux Installation Guide*.
- **OES NetWare Server:** “[Meet Hardware and Software Requirements](#)” in the *OES NetWare Installation Guide*.

3.9 Understand User Restrictions and Linux User Management

If you plan to use Linux User Management, before you accept the default PAM-enabled service settings, be sure you understand the security implications explained in [Section 30.1.3, “User Restriction Limitations,”](#) on page 165.

3.10 Consider Coexistence and Migration Issues

You probably already have a network that is providing services to network users. In many cases, the services you are currently running will influence your approach to implementing OES. In some cases, there are specific paths to follow so that the OES integration process is as smooth as possible.

Novell has invested considerable effort in identifying service coexistence and migration issues you might face. We understand, however, that we can’t anticipate every combination of services that you might have. Therefore, we intend to continue developing coexistence and migration information after each OES product release, and we plan to update the Web-based documentation regularly with the newly developed information.

Some of the most common issues are outlined in [Section 5.1, “Installation/Upgrade/Migration Caveats,”](#) on page 55. For information about coexistence of OES servers with existing NetWare and Linux networks, and for migration instructions, see the *OES Coexistence and Migration Guide*.

3.11 Understand Your Installation Options Before You Start

Before installing OES, you should be aware of the information in the following sections:

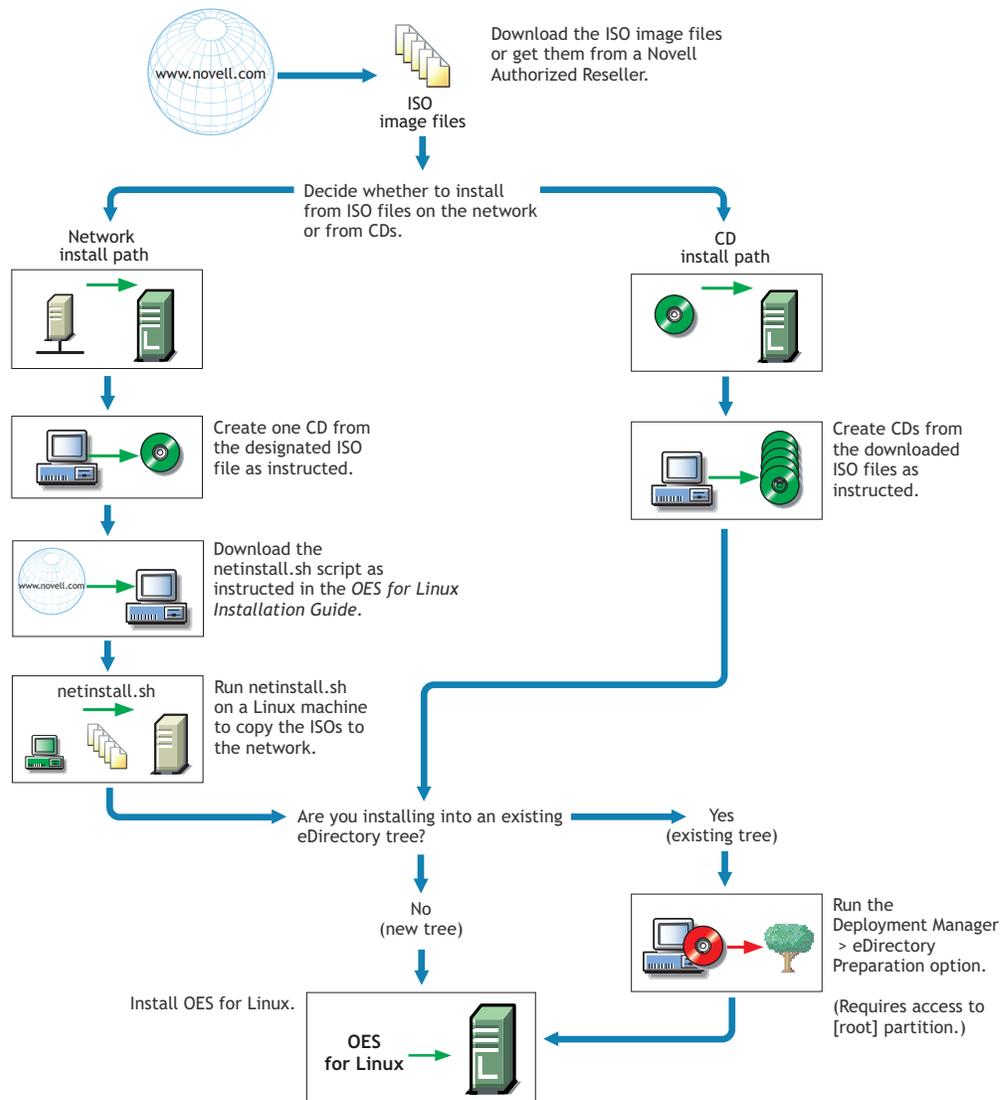
- [Section 3.11.1, “OES Linux Installation Overview,”](#) on page 44
- [Section 3.11.2, “OES NetWare Installation Overview,”](#) on page 44
- [Section 3.11.3, “You Can Install from CDs or from the Network,”](#) on page 45
- [Section 3.11.4, “Use Predefined Server Types \(Patterns\) When Possible,”](#) on page 46
- [Section 3.11.5, “If You Want to Install in a Lab First,”](#) on page 48
- [Section 3.11.6, “If You Want to Install NSS on a Single-Drive Linux Server,”](#) on page 48

3.11.1 OES Linux Installation Overview

The software and network preparation processes required to install OES Linux are outlined in [Figure 3-1](#).

NOTE: [Chapter 4, “Getting and Preparing OES Software,”](#) on page 49 contains instructions for obtaining the ISO image files and the network install script referred to in the following illustration.

Figure 3-1 OES Linux Install Preparation



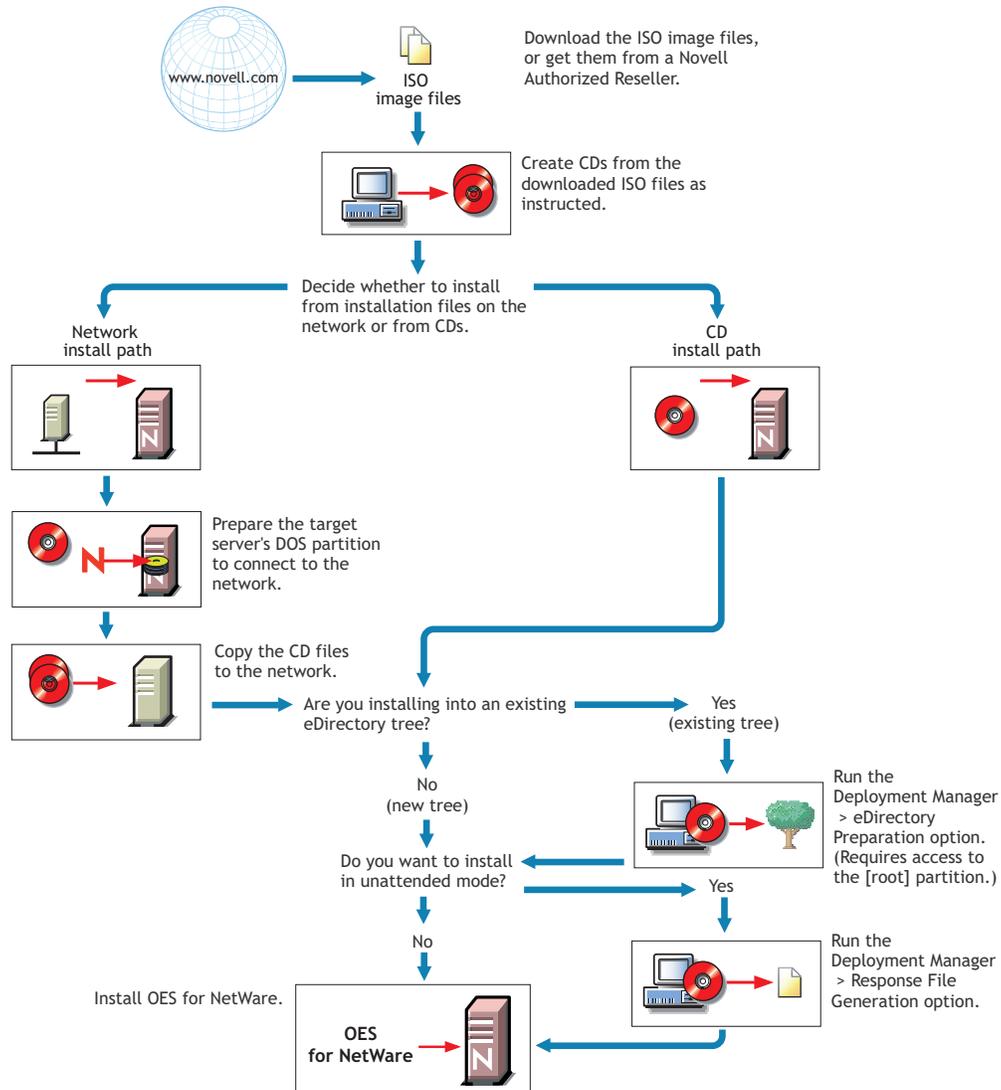
For detailed instructions, see “[Preparing the OES Linux Files for Installation](#)” in the *OES Linux Installation Guide*.

3.11.2 OES NetWare Installation Overview

The software and network preparation processes required to install OES NetWare are outlined in [Figure 3-2](#). Specific instructions for the steps shown are referenced in the sections that follow.

NOTE: Chapter 4, “Getting and Preparing OES Software,” on page 49 contains instructions for obtaining the ISO image files referred to in the following illustration.

Figure 3-2 OES NetWare Install Preparation



For detailed instructions, see “Installing OES NetWare” in the *OES NetWare Installation Guide*.

3.11.3 You Can Install from CDs or from the Network

As illustrated in the two previous sections, both OES Linux and OES NetWare let you install from CDs or from files on the network.

OES Linux Options

OES Linux includes two installation options, both of which are documented in the *OES for Linux Installation Guide*.

- **CD Install:** You can install using CDs obtained from a Novell Authorized Reseller, or you can create CDs from downloaded ISO image files.

See “[Preparing for a CD Installation](#)” in the *OES Linux Installation Guide*.

- **Network Install:** You can install using only the first CD if the remaining ISO files are available on the network.

This option can save you from swapping CDs on the server during the installation.

See “[Preparing for a Network Installation](#)” in the *OES Linux Installation Guide*.

OES NetWare Options

OES NetWare includes two installation options, both of which are documented in the *OES for NetWare Installation Guide*.

- **CD Install:** You can install using CDs obtained from a Novell Authorized Reseller, or you can create CDs from downloaded ISO image files.

See “[Access the Installation Files](#)” in the *OES NetWare Installation Guide*.

- **Network Install:** You can install from the network if you have prepared the DOS partition with Novell Client software and copied the CD files to the network.

This option can save you from swapping CDs on the server during the installation.

See “[Access the Installation Files](#)” in the *OES NetWare Installation Guide*.

3.11.4 Use Predefined Server Types (Patterns) When Possible

Both OES platforms include predefined server installation options that install only the components required to provide a specific set of network services. In the OES NetWare install, these server types are called *patterns*.

For example, if you want to install an OES server that supports a Web-based, user-configurable collaboration environment, you should select the Virtual Office Server server type during the OES installation.

You should always choose a predefined server type if one fits the intended purpose of your server. If not, you can choose to install a customized OES server with the service components you need.

Table 3-4 *Linux Installation Server Types*

| Predefined Server Type | Description and Packages Installed |
|---------------------------|--|
| Novell QuickFinder Server | Installs a search server that lets users find the information they're looking for on Web sites and attached file systems. KDE is not installed. |

| Predefined Server Type | Description and Packages Installed |
|-------------------------------|---|
| Novell iFolder2 Server | Installs a server that lets mobile users access their local files from anywhere—online, offline, all the time. KDE is not installed. |
| Novell Virtual Office Server | Installs a collaboration solution that lets users be self sufficient with their IT needs. KDE is not installed. |
| Novell Management Server | Installs iManager, YaST (text-based), and the basic runtime system. KDE and graphical base system are not installed. |
| Novell Print Server | Installs a printing system that installs workstation print drivers and gives access to local printers and remote printers with Internet connections. KDE is not installed. |
| Novell Open Enterprise Server | The default server pattern installs the SLES 9 Default installation and most OES services. KDE is installed. |

Table 3-5 *NetWare Installation Patterns*

| Server Pattern | Description |
|---|---|
| Customized NetWare Server | Lets you select the optional products you want on the server. |
| Basic NetWare File Server | Installs only basic NetWare with no additional products. |
| Pre-Migration Server | Creates a server that data will be migrated to at a later time using the Netware Migration Wizard. |
| DNS/DHCP Server | Sets up the Novell eDirectory tree for directory-enabled DNS/DHCP services. |
| exteNd™ J2EE* Web Application Server | Installs an optimized configuration of the Novell exteNd Application Server. |
| LDAP Server | Installs Lightweight Directory Access Protocol (LDAP) Services for Novell eDirectory. |
| NetWare AMP (Apache, MySQL, PHP, and Perl) Server | Lets you host open source Web database applications on a NetWare 6.5 server. |
| NetWare Backup Server | Installs the infrastructure for backup and restore services on the NetWare platform. |
| QuickFinder Server | Installs a search server that lets users find the information they're looking for on Web sites and attached file systems. |
| Network Attached Storage (NAS) Server | Installs multiple-file protocol storage for your network. |

| Server Pattern | Description |
|--|--|
| Novell iPrint Server | Installs a printing system that installs workstation print drivers and gives access to local printers and remote printers with Internet connections. |
| Apache/Tomcat Server | Installs Apache Web Server and the Jakarta-Tomcat Servlet Container for use in hosting dynamic, application-driven Web sites. |
| Novell Nsure Audit Starter Pack Server | Installs the centralized auditing service that is built into OES NetWare. |
| iSCSI SAN Storage Server | Turns your OES NetWare server into an iSCSI Storage Server (also known as an iSCSI Target). |
| Novell iFolder Storage Services | Installs a server that lets mobile users access their local files from anywhere—online, offline, all the time. |
| Management Server | Installs Novell iManager 2.5 and Novell ConsoleOne® 1.3.6 network administration software to provide a complete management solution for your server environment. |
| Virtual Office Server | Installs a collaboration solution that lets users be self sufficient with their IT needs. |

3.11.5 If You Want to Install in a Lab First

Many organizations prefer to install products on smaller servers for testing in a lab prior to full deployment. We have created the *Lab Guide for OES SP2 Linux* and the *Lab Guide for OES NetWare* to walk you through the installation and exploration of all the basic OES services.

3.11.6 If You Want to Install NSS on a Single-Drive Linux Server

Many are interested in Novell Storage Services (NSS) running on Linux. If you plan to experiment with NSS on a single-drive server, be sure to follow the instructions in “*Installing Linux with EVMS as the Volume Manager of the System Device*” in the *OES Linux Installation Guide*.

Getting and Preparing OES Software

4

This section contains instructions for getting and preparing OES software and discusses the following topics:

- [Section 4.1, “Do You Have Upgrade Protection?”](#) on page 49
- [Section 4.2, “Do You Want to Purchase OES or Evaluate It First?”](#) on page 49
- [Section 4.3, “Evaluating OES Software,”](#) on page 50

If you have not already done so, we recommend you review the information in [Section 3.11, “Understand Your Installation Options Before You Start,”](#) on page 43.

4.1 Do You Have Upgrade Protection?

If you have Novell® Upgrade Protection, you can upgrade to OES and the latest support pack free of charge. For more information and to start the upgrade process, do the following:

- 1 Using your Novell account information, log in to the [Novell Web Site \(http://www.novell.com/nps\)](http://www.novell.com/nps).
- 2 Click the Customer Care icon to access the Customer Care page.
- 3 Follow the instructions on the Customer Care page to obtain the upgrade to Open Enterprise Server and the latest support pack.

4.2 Do You Want to Purchase OES or Evaluate It First?

If you have decided to purchase OES, visit the Novell [How to Buy OES Web page \(http://www.novell.com/products/openenterpriseserver/howtobuy.html\)](http://www.novell.com/products/openenterpriseserver/howtobuy.html).

With your OES purchase, you receive

- An activation code for enabling your OES Linux servers to receive online updates, including the latest support pack.
- A pair of license files for installing OES NetWare servers.

NOTE: After you purchase OES, OES NetWare support packs are available at no charge on the [Novell Support Web site \(http://support.novell.com/filefinder/\)](http://support.novell.com/filefinder/)

As part of the purchase process, it is important that you understand the OES licensing model. For a brief description, see [Chapter 28, “Licensing,”](#) on page 159.

After completing your purchase, the installation process will go more smoothly if you understand your installation options for each OES platform. If you haven’t already done so, be sure to review the information in [Section 3.11, “Understand Your Installation Options Before You Start,”](#) on page 43 and then skip to [Chapter 5, “Installing OES,”](#) on page 55.

If you want to evaluate OES prior to purchasing it, continue with the information in the next section, [Evaluating OES Software](#).

4.3 Evaluating OES Software

This section walks you through the OES software evaluation process and discusses the following topics:

- [Section 4.3.1, “Understanding OES Software Evaluation Basics,” on page 50](#)
- [Section 4.3.2, “The Evaluation Software Includes the Latest OES Support Pack,” on page 50](#)
- [Section 4.3.3, “Downloading OES Software from the Novell Web Site,” on page 51](#)
- [Section 4.3.4, “Preparing the Installation Media,” on page 52](#)
- [Section 4.3.5, “Installing OES for Evaluation Purposes,” on page 52](#)
- [Section 4.3.6, “Evaluating OES,” on page 52](#)
- [Section 4.3.7, “Installing Standard Activation and License Files after the Evaluation Period Expires,” on page 53](#)

4.3.1 Understanding OES Software Evaluation Basics

You can evaluate the full OES product on both product platforms. The evaluation software is the complete, fully functional OES product with the latest support pack included.

As you install each server, you are required to accept an end user license agreement (EULA). Your rights to evaluate and use the OES product are limited to the rights set forth in the EULA, which are, briefly, the following:

- The evaluation period for OES Linux servers is 30 days. No software updates can be downloaded after the 30-day evaluation period expires.
- The evaluation period for OES NetWare[®] servers is 90 days, after which Novell expects you to either purchase OES or uninstall OES NetWare. Until you do, the OES NetWare servers generate periodic reminders that your evaluation license has expired.

4.3.2 The Evaluation Software Includes the Latest OES Support Pack

The CD image files (.iso files) on the Evaluation Web site include the latest OES support pack.

In contrast, the OES CD image files on the Novell How to Buy Web site are for installing the original OES release. Support packs and other patches are not integrated in the files available on the How to Buy site.

Novell Support recommends that you should download and install the evaluation software if you want the latest support pack. When you purchase OES after evaluating the software, you receive a standard Linux activation code and a pair of standard NetWare license files. You can then apply the code and license files to fully license your servers by following the instructions in [Section 4.3.7, “Installing Standard Activation and License Files after the Evaluation Period Expires,” on page 53](#).

4.3.3 Downloading OES Software from the Novell Web Site

If you already have OES ISO image files, skip to [Section 4.3.4, “Preparing the Installation Media,”](#) on page 52.

If you have OES product CDs, skip to [Section 4.3.5, “Installing OES for Evaluation Purposes,”](#) on page 52.

To download ISO image files from the Web:

- 1 If you don't already have a Novell Account, register for one on the [Web \(https://secure-www.novell.com/selfreg/jsp/createAccount.jsp?\)](https://secure-www.novell.com/selfreg/jsp/createAccount.jsp?).
- 2 Access the [Novell Downloads Web page \(http://download.novell.com\)](http://download.novell.com).
- 3 In the *most popular* list, click *Novell Open Enterprise Server SP2 EVAL*, or search for that exact product name and then click the link.
- 4 Click the *proceed to download* button (upper-right corner of the first table).
- 5 If you are prompted to log in, type your *Novell Account username* and *password*, then click *login*.
- 6 Accept the *Export Agreement* (required for first downloads only) and answer the survey questions about your download (optional).
- 7 Print the Novell Open Enterprise Server SP2 EVAL page. You need the listed MD5 verification numbers to verify your downloads.
- 8 On the Novell Open Enterprise Server SP2 EVAL page, scroll down to the *what to download* section.
- 9 Decide which files you need to download for the platforms you plan to evaluate and mark them on the MD5 verification list for later reference and download tracking.
- 10 Start downloading the files you need by clicking the respective download button for each file.
- 11 In the *evaluating OES with Support Pack 2* section, the *OES Linux* paragraph, click the *Product Registration and Access* link.
- 12 Print the Product Registration and Activation page, or write down the *Novell Open Enterprise Server for SUSE LINUX Enterprise Server 9 Evaluation Activation Code (Serial Number)*.
- 13 Click Back to return to the Novell Open Enterprise Server SP2 EVAL page.
- 14 In the download table at the top of the page, click the *Install Instructions > View* link at the end of the list of files to download, then print the instructions for reference.
- 15 While you wait for the downloads, read through the brief installation instructions, clicking the links for more information.
- 16 Verify the integrity of each downloaded file by running an MD5-based checksum utility on it and comparing the values against the list you printed in [Step 14](#).

For example, on a Linux system you can enter the following command:

```
md5sum filename
```

where *filename* is the name of the `.iso` file you are verifying.

For a Windows system, you need to obtain a Windows-compatible MD5-based checksum utility from the Web and follow its usage instructions.

- 17 (Optional) If you plan to install OES Linux from files on your network, see the install script download instructions in “[Preparing for a Network Installation](#)” in the *OES Linux Installation Guide*.

4.3.4 Preparing the Installation Media

IMPORTANT: If you have downloaded `.iso` image files from the Web, it is critical that you verify the integrity of each file as explained in [Step 16 on page 51](#). Failure to verify file integrity can result in failed installations, especially in errors that report missing files.

Instructions for preparing installation CDs are located in

- “[Preparing the OES Linux Files for Installation](#)” in the *OES Linux Installation Guide*.
- “[Preparing the NetWare Installation Software](#)” in the *OES NetWare Installation Guide*.

4.3.5 Installing OES for Evaluation Purposes

As explained in [Section 4.3.1, “Understanding OES Software Evaluation Basics,” on page 50](#), evaluation installations are enabled through specialized license files for OES NetWare servers and an activation code for OES Linux servers.

The following sections explain when and how you use these files as you install and activate OES servers. Specific instructions are found in the platform-specific installation guides.

OES Linux

When you follow the processes outlined in [Section 4.3.3, “Downloading OES Software from the Novell Web Site,” on page 51](#), you are given an activation code on the Product Registration and Activation page. You must either write this code on a piece of paper or print the Web page so that you have the code for later use.

After your OES Linux server installation is complete, you can use the activation code to enable your server for online updates for the 30-day evaluation period. Instructions for using the activation code are found in “[Patching an OES Linux Server](#)” in the *OES Linux Installation Guide*

Use the same activation code for each OES Linux server you install during the evaluation period.

OES NetWare

Both NetWare CDs contain a `LICENSE` folder with a 90-day evaluation license. You should select this license when you install the first OES NetWare evaluation server in a new tree.

Instructions for installing the evaluation license are contained in “[Licensing the NetWare Server](#)” in the *OES NetWare Installation Guide*.

Use the same license files for all OES NetWare servers installed during the evaluation period.

4.3.6 Evaluating OES

During the evaluation period, we recommend you fully explore the many services available in OES.

To help you get started with the process, we have prepared the following lab guides for each OES platform. These guides introduce eDirectory™, walk you through server installations on both OES platforms, and provide brief exercises you can complete to get started using OES Services.

For more information, see

- *Lab Guide for OES SP2 Linux*
- *Lab Guide for OES NetWare*

After working through the lab guides, we recommend you review the information in this guide to gain a comprehensive overview of OES and the planning and implementation processes you will follow to fully leverage its network services.

4.3.7 Installing Standard Activation and License Files after the Evaluation Period Expires

As part of the purchase process, it is important that you understand the OES licensing model. For a brief description, see [Chapter 28, “Licensing,” on page 159](#).

After purchasing Open Enterprise Server, do the following:

- **OES Linux:** Use the instructions in “[Patching an OES Linux Server](#)” in the *OES Linux Installation Guide* to enter the standard activation code received with your purchase. Complete the steps where you enter the activation code, replacing the evaluation code with the standard code. Deactivating the channel is not required.
- **OES NetWare:** Delete the evaluation license and install the standard license received with your purchase by completing the instructions in “[Installing NetWare Licenses](#)” in the *OES NetWare Installation Guide*.

This section briefly covers the following:

- [Section 5.1, “Installation/Upgrade/Migration Caveats,” on page 55](#)
- [Section 5.2, “Installing OES Linux,” on page 59](#)
- [Section 5.3, “Installing OES NetWare,” on page 59](#)

5.1 Installation/Upgrade/Migration Caveats

This section discusses the following installation/migration caveats:

- [Section 5.1.1, “Adding a Linux Node to NetWare Cluster,” on page 55](#)
- [Section 5.1.2, “Cluster Upgrades Must Be Planned Before Installing OES,” on page 55](#)
- [Section 5.1.3, “Direct Migration of Some File Services from NetWare to Linux Not Provided,” on page 56](#)
- [Section 5.1.4, “Follow the Instructions for Your Chosen Platforms,” on page 56](#)
- [Section 5.1.5, “iFolder 3.x Considerations,” on page 56](#)
- [Section 5.1.6, “Installing into an Existing eDirectory Tree,” on page 56](#)
- [Section 5.1.7, “Installing a NetWare Server into an OES Linux Tree,” on page 57](#)
- [Section 5.1.8, “NetWare 6.5 Servers Must Be Running SP3,” on page 57](#)
- [Section 5.1.9, “Novell Distributed Print Services Cannot Migrate to Linux,” on page 57](#)
- [Section 5.1.10, “NSS Features Not Implemented on OES Linux,” on page 57](#)
- [Section 5.1.11, “Samba Enabling Problems and the Base Context for Samba Users Field,” on page 58](#)

5.1.1 Adding a Linux Node to NetWare Cluster

After you add a Linux node to a cluster, you cannot add more NetWare® nodes. For more information, see [“Converting a NetWare Cluster to Linux”](#) in the *OES Novell Cluster Services 1.8.2 Administration Guide for Linux*.

5.1.2 Cluster Upgrades Must Be Planned Before Installing OES

The only cluster-enabled service that can fail over cross-platform (run on either OES Linux or OES NetWare) is cluster-enabled NSS pools. All other services (iPrint, iFolder, etc.) can only fail over between servers that are the same platform. For example, an iPrint service that is running on an OES Linux server can fail over to another OES Linux server in the cluster, but the service cannot fail over to an OES NetWare server.

5.1.3 Direct Migration of Some File Services from NetWare to Linux Not Provided

Direct migration of CIFS, AFP, and FTP services is not provided in OES. You must carefully plan the manual migration of services prior to installing OES.

For example, if you plan to replace CIFS (Windows) file services on a NetWare server with OES Samba running on OES Linux, you need to plan to have the Samba service in place before shutting down the current CIFS service. For more information on implementing Samba, see [Appendix G, “Samba Support in OES,”](#) on page 261.

5.1.4 Follow the Instructions for Your Chosen Platforms

Although installing OES services on Linux or NetWare is a straightforward process, the installation processes are platform-specific, requiring different sets of media and different installation programs.

Use the links in the following sections to access instructions for installing OES on your chosen platforms.

5.1.5 iFolder 3.x Considerations

For best results, be sure you read and carefully follow the instructions in the *Novell iFolder 3.x Administration Guide*, starting with “Enterprise Server”. This is especially critical if you plan to use NSS for your iFolder 3.x data volume.

5.1.6 Installing into an Existing eDirectory Tree

Novell Support has reported a significant number of installation incidents related to eDirectory™ health and time synchronization. To avoid such problems, do the following prior to installing OES:

- [“Consider Coexistence and Migration Issues”](#) on page 56
- [“Be Sure That eDirectory Is Healthy”](#) on page 56
- [“Be Sure That Network Time Is Synchronized”](#) on page 56

Consider Coexistence and Migration Issues

If you are installing a new OES server into an existing eDirectory tree, be sure to read and follow the instructions in “Installing OES Servers into an Existing Tree” in the *OES Coexistence and Migration Guide*.

Be Sure That eDirectory Is Healthy

Review and follow the guidelines in “Keeping eDirectory Healthy” in the *Novell eDirectory 8.7.3 Administration Guide*.

Be Sure That Network Time Is Synchronized

OES Linux and OES NetWare servers can receive network time from either an existing eDirectory server or from an NTP time source. The critical point is that the entire tree must be synchronized to the same time sources. For example, do not set your new OES server to receive time from an NTP source unless the whole tree is synchronized to the same NTP source.

For an in-depth explanation of OES time synchronization, see [Chapter 31, “Time Synchronization,”](#) on page 171.

5.1.7 Installing a NetWare Server into an OES Linux Tree

If you have an eDirectory tree that was created on an OES Linux server, and you want to install an OES NetWare server into the tree, you must ensure that you have at least three OES Linux servers with replicas running in the tree prior to installing the NetWare server. Otherwise, the required license containers are not created in the tree and you cannot install a NetWare license.

5.1.8 NetWare 6.5 Servers Must Be Running SP3

If you are installing OES Linux servers into a tree containing NetWare 6.5 servers, be sure that the following servers have been updated to SP3 prior to installing OES Linux.:

- **SLP Directory Agents:** If the SLP Directory Agents on your network are not running NetWare 6.5 SP3, installing an OES Linux server into the tree can cause the DA servers to abend.
- **LDAP Servers:** If the LDAP servers referenced in your installation are not running NetWare 6.5 SP3, the servers might abend during a schema extension operation.

5.1.9 Novell Distributed Print Services Cannot Migrate to Linux

NDPS[®] clients are not supported on Linux. You must therefore migrate any NDPS clients to iPrint before you migrate your print services to OES Linux. For more information, see [“Migrating NDPS Printers to iPrint”](#) in the *OES iPrint Administration Guide for NetWare*.

5.1.10 NSS Features Not Implemented on OES Linux

The following features are not implemented in OES Linux:

- Archive and Version Services
- DFS junctions are not implemented. However, NSS volumes can be targets of a junction on a NetWare server. For more information, see [“Prerequisites for Pointing DFS Junctions at an NSS Volume on OES Linux”](#) in the *Novell Storage Services File System Administration Guide for OES*.
- Pool snapshots
- The new NSS media format is not supported. NSS volumes that use the new format cannot be mounted on OES Linux servers nor used in clusters with OES Linux servers. For more information, see [“Which NSS Volumes to Upgrade”](#) in the *Novell Storage Services File System Administration Guide for OES*.
- New NSS hard links are not supported. The new NSS media format supports new NSS hard links. Because the new media format is not supported on OES Linux, these new hard links are also not supported.

Hard links are available on NSS for Linux, but they use the old format. For more information, see [“Old Metadata Structure Supports Limited Hard Links for a File”](#) in the *Novell Storage Services File System Administration Guide for OES*.

- Multipath IO support. Use Linux traditional services multipath IO instead.

- CD and DVD media and image files cannot be mounted as NSS volumes on Linux; instead they are mounted as Linux traditional file systems.

For more details about NSS compatibility, see “[Compatibility Issues for Using NSS Cross-Platform](#)” in the *Novell Storage Services File System Administration Guide for OES*.

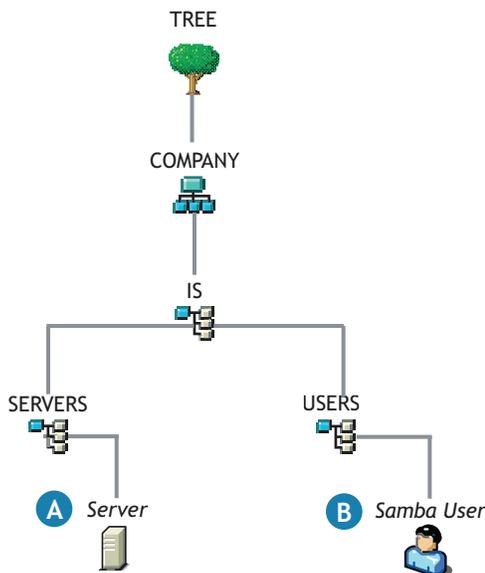
5.1.11 Samba Enabling Problems and the Base Context for Samba Users Field

When you install Samba services on OES Linux, the default value for the Base Context for Samba Users field is the eDirectory context where the server is installed.

If your User objects reside in the same context as the server or in a sub-context of the server’s parent container, the objects can be enabled for Samba. However, many organizations choose to place User objects in a sibling container to the one where servers are located, or in some other context separate from the server context.

To ensure that your users can be Samba enabled, you must change the Base Context for Samba Users field at install time to a context that includes (either directly or as a sub-context) both the Samba users and the servers they will access.

For example



The server (A) is in ou=SERVERS.ou=IS.o=COMPANY and the user (B) is in ou=USERS.ou=IS.o=COMPANY

By default at install time, the Base Context for all Samba users will be set to ou=SERVERS.ou=IS.o=COMPANY, the base context for the server.

If you accept the default, you won’t be able to enable users for Samba because no users exist in the SERVERS container. To remedy this configuration problem, you must change the Base Context field value to ou=IS.o=COMPANY or simply o=COMPANY because those are the contexts that the server and the user have in common.

For more Samba information, see [Appendix G, “Samba Support in OES,”](#) on page 261.

5.2 Installing OES Linux

The OES Linux installation leverages the SUSE® LINUX YaST graphical user interface, making the installation of SLES 9 and OES services a seamless process.

To ensure a successful installation:

1. Read and follow any instructions in [OES for Linux Installation \(http://www.novell.com/documentation/oes/oes_readme/data/oes_readme.html#bsen7me\)](http://www.novell.com/documentation/oes/oes_readme/data/oes_readme.html#bsen7me) in the *Open Enterprise Server Readme*.
2. Carefully follow the instructions in the *OES Linux Installation Guide*, especially those found in
 - “Preparing to Install OES Linux”.
 - “Installing Open Enterprise Server (OES) Linux”.
3. During the installation, you have the option of configuring the services at install time or later. If you choose to configure later, you can access the YaST management tool and click each service icon to configure the service. We recommend you configure eDirectory™ first.

For more information, see “Installing or Configuring OES Components on an Existing Server” in the *OES Linux Installation Guide*.

5.2.1 What's Next

After installing OES and before starting to use your new OES Linux server, be sure to review the information in [Chapter 10, “Implementation Caveats,”](#) on page 69.

The various service sections in this guide contain information about completing your OES services implementation. See the sections for the services you have installed, beginning with [Chapter 13, “Using the OES Welcome Web Site,”](#) on page 87.

5.3 Installing OES NetWare

OES NetWare utilizes the NetWare graphical user interface.

To ensure a successful installation:

1. Read and follow any instructions in [OES for NetWare Installation and Upgrade \(http://www.novell.com/documentation/oes/oes_readme/data/oes_readme.html#bsfugt4\)](http://www.novell.com/documentation/oes/oes_readme/data/oes_readme.html#bsfugt4) in the *Open Enterprise Server Readme*.
2. Carefully follow the instructions in the *OES NetWare Installation Guide*, especially those found in
 - “Installing OES NetWare”.
 - “Upgrading to OES NetWare”.

5.3.1 What's Next

After installing OES and before starting to use your new OES NetWare server, be sure to follow the instructions in [Chapter 10, “Implementation Caveats,”](#) on page 69.

The various service sections in this guide contain information about completing your OES services implementation. See the sections for the services you have installed, beginning with [Chapter 13, “Using the OES Welcome Web Site,”](#) on page 87.

Upgrading to OES

6

This section provides information and links for upgrading to Open Enterprise Server.

- [Section 6.1, “OES Linux,” on page 61](#)
- [Section 6.2, “OES NetWare,” on page 61](#)

6.1 OES Linux

You can upgrade to OES Linux from SUSE[®] LINUX Enterprise Server (SLES) 9, SLES 9 SP1, or SLES 9 SP2. You cannot upgrade to OES Linux from Novell[®] Nterprise[®] Linux Services.

Complete upgrade instructions are found in “[Upgrading to OES Linux](#)” in the *OES Linux Installation Guide*.

6.2 OES NetWare

You can upgrade to OES NetWare[®] from NetWare 5.1, NetWare 6.0, or NetWare 6.5. Complete instructions as well as software and hardware requirements are found in “[Upgrading to OES NetWare](#)” in the *OES NetWare Installation Guide*.

6.2.1 Caveats

Be aware of the following caveats when upgrade a NetWare server.

Virtual Office from NetWare 6.5 to OES NetWare

OES NetWare includes an upgraded version of Virtual Office. In OES SP1 and later this is version 1.6.

When you upgrade a NetWare 6.5 server to OES NetWare (NetWare 6.5 SP3 and later), any Virtual Office installations are automatically upgraded to version 1.6.

All data, teams, configurations, etc. are retained with the following exceptions:

- User Bookmarks are lost
- E-mail notifications might need to be reconfigured
- Team File Share credentials might need to be re-created.

Migrating/Consolidating Existing Servers and Data

7

OES includes the Novell[®] Server Consolidation and Migration Toolkit to help you migrate data and services from existing servers to OES servers. The toolkit contains the following two utilities.

- [Section 7.1, “NetWare Migration Wizard,” on page 63](#)
- [Section 7.2, “Server Consolidation Utility,” on page 63](#)

7.1 NetWare Migration Wizard

The primary purpose of the Novell NetWare[®] Migration Wizard is to migrate NetWare servers to new hardware.

When the migration is complete, the new server replaces and assumes the identity of the old server on the network.

The wizard supports migrations to OES NetWare from

- NetWare 4.x
- NetWare 5.x
- NetWare 6.0
- NetWare 6.5
- OES NetWare

NOTE: If you are migrating data to OES Linux, you should use the server consolidation utility instead.

For more information, see “[About NetWare Migration Wizard](#)” in the *Novell Server Consolidation and Migration Toolkit Administration Guide*.

7.2 Server Consolidation Utility

The primary purpose of the Server Consolidation Utility is to migrate and consolidate

- Users
- File permissions
- Password
- File Systems
- Active Directory domains

from existing NetWare or Microsoft* Windows servers to OES Linux or OES NetWare servers.

NOTE: If you are moving a NetWare server to new hardware, use the NetWare Migration Wizard instead.

For more information, see “[Server Consolidation and Migration Overview](#)” in the *Novell Server Consolidation and Migration Toolkit Administration Guide*.

Updating/Patching OES Servers

8

OES support packs are distributed as product updates (or *patches* in the case of OES Linux). The following sections briefly explain update availability for each platform and link you to specific instructions.

- [Section 8.1, “OES Linux,” on page 65](#)
- [Section 8.2, “OES NetWare,” on page 65](#)

8.1 OES Linux

To update an OES Linux server to an OES support pack release, you must use the patch process described in the *OES Linux Installation Guide*. You can also install product updates as they are made available through the ZLM update channel.

For instructions on setting up the ZLM update channel for each OES Linux server and running the patch process, see “[Patching an OES Linux Server](#)” in the *OES Linux Installation Guide*.

8.2 OES NetWare

To update an OES NetWare® server to an OES support pack release, you must use the update process described in the *OES NetWare Installation Guide*. You can also install product updates as they are made available on the Novell Support Web site.

Complete information and instructions are in “[Installing Products and Updates](#)” in the *OES NetWare Installation Guide*.

Adding OES Services to OES Servers

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You can add services to OES servers after they are installed by following the instructions outlined in the following sections.

- [Section 9.1, “OES Linux,” on page 67](#)
- [Section 9.2, “OES NetWare,” on page 67](#)

9.1 OES Linux

Do not use the Add/Remove Software option in the YaST Control Center to install additional OES products. Instead, select the option specific to the service you want to add.

For example, if you want to add NetStorage as a service on an OES Linux server, the option to use is Network Service > NetStorage. This option not only installs all the required packages, but lets you configure the service as well.

For more information on the location of service-specific options in the YaST Control Center, see [“Installing or Configuring OES Components on an Existing Server”](#) in the *OES Linux Installation Guide*.

9.2 OES NetWare

Some products such as Novell[®] Cluster Services[™] can be installed only after completing the server installation.

You can install additional products using Novell Deployment Manager (remotely) or from the GUI server console page (locally). For more information, see [“Installing Additional Products”](#) in the *OES NetWare Installation Guide*.

After installing Novell® Open Enterprise Server, make sure you understand the instructions in the following sections:

- [Section 10.1, “Always Check for an nssid.sh File,” on page 69](#)
- [Section 10.2, “Implementing OES Services,” on page 71](#)
- [Section 10.3, “Avoiding Common Implementation Problems,” on page 71](#)
- [Section 10.4, “Samba,” on page 77](#)

10.1 Always Check for an nssid.sh File

If you use Novell Storage Services™ (NSS) on OES Linux, after installing the first OES Linux server in a tree, you should check every subsequent server to see whether the `/opt/novell/oes_install/nssid.sh` file exists.

If this script file exists, you must run it on the server to synchronize the file ownership information for specific system users.

The following sections explain why.

10.1.1 System Users, eDirectory, NSS, and Linux User Management

As explained in [Appendix F, “OES System Users and Groups,” on page 257](#), having NSS volumes on OES Linux servers requires certain system-level modifications, most of which are automatic. The following logic applies.

- By default, Web services, such as Apache and Tomcat, and certain OES services, such as NetStorage, run on an OES Linux server as system-created POSIX users.
- These system-created users must be able to read data on all volume types that exist on the OES Linux server.
- Data on NSS volumes can be accessed only by eDirectory™ users.
- Therefore, when NSS volumes are created on the server, the system-created users must be enabled for Linux User Management (LUM) so that they can function as both POSIX and eDirectory users.

For more information on LUM, see [“Linux Access for eDirectory Users \(LUM\)” on page 119](#).

10.1.2 System-Created Users Are Automatically Enabled for LUM

When NSS is installed on an OES Linux server, the system-created users that must be able to access NSS data are automatically created as LUM-enabled eDirectory users and then removed from the local server. For more information, see [Section F.1, “System Users Created on Linux,” on page 257](#) and [Section F.3, “System Groups Created on Linux,” on page 258](#).

For example, the Apache Web server runs on all OES Linux servers as user `wwwrun`. If you install the first server in an eDirectory tree, the system-created `wwwrun` user might be assigned a UID of 6.

If you install NSS on the server, either during the initial install or later, the `wwwrun` user is automatically created in eDirectory with its UID (6) stored as an attribute, and the local `wwwrun` user is removed from the server.

Each time the Apache Web server starts, it runs as the `wwwrun` user account that is actually stored in eDirectory but also functions as a local user due to LUM. All files created and used by the `wwwrun` user show that the file owner has a UID of 6. Because `wwwrun` in eDirectory has a UID of 6, the Apache Web server can start and run.

10.1.3 The OES Install Checks for UID Conflicts

For each additional OES Linux server installed into the tree, when NSS is installed (either initially or later), the installation checks to see whether the system-created user UIDs match the information stored for each user in eDirectory. If subsequent servers are installed in the same way as the first server, the UIDs usually match. However, this is not guaranteed, and when OES services are added to an existing SLES 9 server, the UIDs usually do not match.

For example, the `wwwrun` user created on a subsequently installed OES Linux server might have a UID of 7. As long as the `wwwrun` user exists on the local system, Apache is able to run because the `wwwrun` user's UID matches the owner information for each Apache file. However, when NSS is installed and the local users are removed, the affected services must run using the information stored in eDirectory.

If the UID of the user that is removed doesn't match the UID stored in eDirectory, then the eDirectory user can't access the files on the server and the affected services (Apache, Tomcat, NetStorage) do not load.

For example, if the `wwwrun` user that has a UID of 7 is removed and the `wwwrun` user in eDirectory that has a UID of 6 is supposed to replace it, then Apache cannot load and run on the server because the Apache files on the server are expecting their owner to have 7 as its UID.

10.1.4 `nssid.sh` Is Created to Synchronize the UIDs for All Affected Server Files

The OES Linux installation checks for conflicts between the UID of the local system-created user and the same user stored in eDirectory. When it discovers a conflict, it creates a shell script file in `/opt/novell/oes_install` named `nssid.sh` for the express purpose of synchronizing all system files on the server that have mismatched UIDs.

The installation analyzes each system-created user separately and places an entry in the script only when a conflict exists.

Because there are four system-created users that could be affected, the script file can potentially contain four lines.

The installation program doesn't run the `nssid.sh` automatically, because it can take from 10 minutes to a number of hours (if the file system is very large) to synchronize the file UIDs for each affected user.

Also, the installation program does not warn that a potential UID conflict exists.

For this reason, if you use NSS on your OES Linux servers, it is imperative that you complete the instructions in the following section for each second, third, etc., OES Linux server that you install.

10.1.5 Synchronizing File UID Information

If you install NSS volumes on your OES Linux servers, then for each additional OES Linux server (after the first) installed into a tree, you must do the following:

- 1 Log in to the server as the root user.
- 2 Check to see whether the following file exists:
`/opt/novell/oes_install/nssid.sh`
- 3 If the file exists, run it from a shell prompt on the server to synchronize UID information in system files by entering the following command:
`/opt/novell/oes_install/nssid.sh`
If the file doesn't exist, no action is required.

10.2 Implementing OES Services

Some OES products require additional configuration before they can be effectively used. Additionally, some products (such as Novell Cluster Services™ for NetWare®) can be set up only after completing the server installation.

To ensure your OES network is fully configured to provide the services you expect, be sure to check the implementation information in the service sections of this guide that apply to the components you have installed.

10.3 Avoiding Common Implementation Problems

This section presents a few pointers for avoiding common implementation problems.

Keep in mind that the list of issues presented here is not comprehensive. Rather, it simply outlines some of the more common problems reported by network administrators. To ensure successful service implementations, you should always follow the instructions in the documentation for the services you are implementing.

The various service sections of this guide touch on common implementation tips as well. But again, there is no substitute for following the documentation prepared by the teams responsible for building and maintaining the service components.

The following components have implementation caveats:

- [Section 10.3.1, “Novell iFolder 2 \(OES Linux\),” on page 72](#)
- [Section 10.3.2, “iManager 2.5,” on page 73](#)
- [Section 10.3.3, “iPrint,” on page 74](#)
- [Section 10.3.4, “NCP Server \(OES Linux\),” on page 75](#)
- [Section 10.3.5, “NSS \(OES Linux\),” on page 75](#)

10.3.1 Novell iFolder 2 (OES Linux)

You will want to be aware of the following when using Novell iFolder[®] 2 on OES Linux.

Novell iFolder 2 on Linux Requires a Dedicated IP Address

When you install Novell iFolder 2 on Linux, the installation program checks to see whether there are other Web services running on the server.

If there are no other services, you have the option to install Novell iFolder as either

- A standalone Novell iFolder server, meaning that you don't plan to add other Web applications to the server in the future.
- or
- a Novell iFolder server running with other Web applications, meaning that you might choose to add other Web applications later.

If there are other services running, you do not have the option to install Novell iFolder in standalone mode.

Adding Other Web Services to a Standalone Novell iFolder Server

If you have installed a standalone Novell iFolder server and later decide to install other Web applications on the same server, you must reconfigure the Novell iFolder installation after adding the other Web services.

The simplest way to do this is using YaST:

1 Start YaST.

If you installed Novell iFolder without KDE (the default), run YaST in text mode by entering `yast` at a shell prompt:

2 Select *Network Services > iFolder 2.x*.

3 Answer *Yes* to the warning that Novell iFolder is already installed.

4 Tab to the *Admin Password* field and type the *eDirectory Admin password*, then go to the next screen by tabbing to *Next* and pressing Enter.

5 Select the *iFolder 2.x and Other Web Applications Will Run on This Server* option.

6 In the *iFolder 2.x Server IP Address* field, type a unique IP address that is on the same subnet as the primary IP address specified for the server.

7 Type the same netmask as specified for the primary IP address.

8 Type a hostname for the IP address assigned in [Step 6](#).

9 Click *Next* twice.

The new iFolder configuration is written to the system configuration files.

Adding a Novell iFolder Server to an Existing OES Linux Server

If you have installed an OES Linux server Web applications, such as NetStorage, and later decide to install Novell iFolder on the same server, you must specify the unique IP address information and hostname that Novell iFolder requires as you add the service.

The simplest way to do this is using YaST:

1 Start YaST.

If you installed Novell iFolder without KDE (the default), run YaST in text mode by entering `yast` at a shell prompt:

2 Select *Network Services > iFolder 2.x*.

3 Tab to the *Admin Password* field and type the *eDirectory Admin password*, then go to the next screen by tabbing to *Next* and pressing Enter.

4 Select the *iFolder 2.x and Other Web Applications Will Run on This Server* option.

5 In the *iFolder 2.x Server IP Address* field, type a unique IP address that is on the same subnet as the primary IP address specified for the server when it was installed.

6 Type the same netmask as specified for the primary IP address.

7 Type a hostname for the IP address assigned in **Step 6**.

8 Do not change the *User Data Path*.

9 Click *Next* twice.

The Novell iFolder configuration is written to the system configuration files.

10.3.2 iManager 2.5

iManager 2.5 has the following implementation caveats.

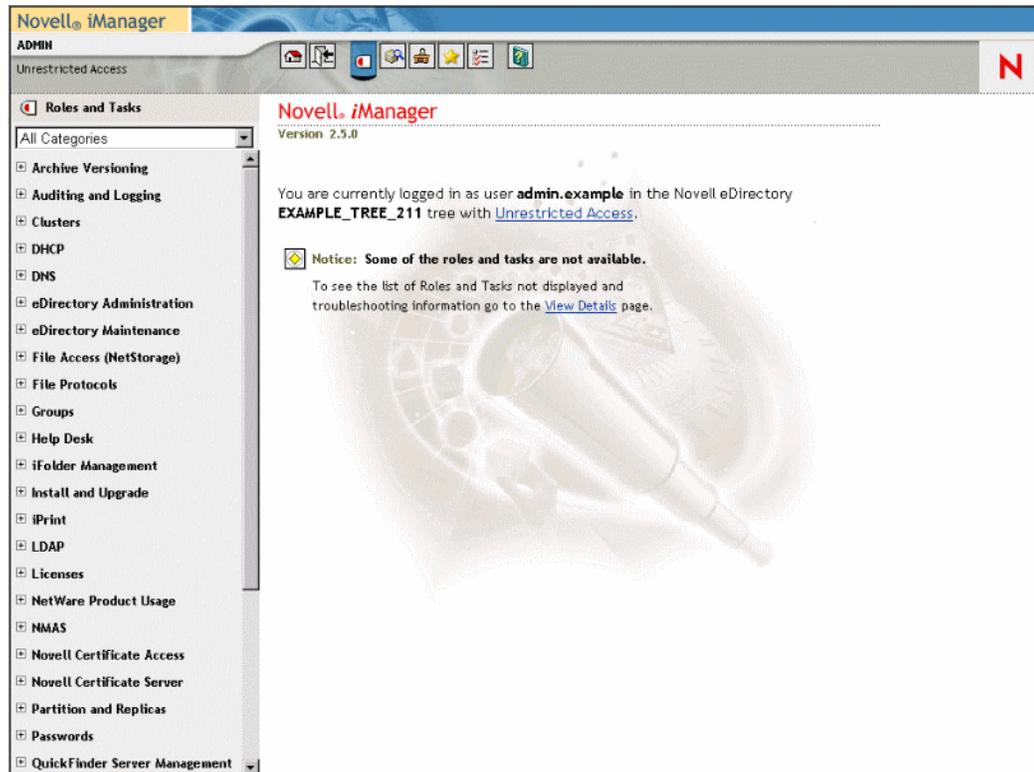
Be Sure to Run the iManager Configuration Wizard

In “**Installing RBS**” in the *Novell iManager 2.5 Administration Guide*, you are instructed to run the iManager Configuration Wizard before using iManager.

When iManager is installed in connection with OES, various roles and tasks are configured, as shown in **Figure 10-1**.

These roles and tasks are available to all the users you create until you run the configuration wizard. After that, the roles and tasks are available only to the Admin user and other users or groups you specifically designate.

Figure 10-1 *iManager Roles and Tasks*



For more information on iManager, see the *Novell iManager 2.5 Administration Guide*.

10.3.3 iPrint

iPrint has the following implementation caveats.

iManager Plug-Ins Are Platform-Specific

The iManager plug-ins are different for each server platform. Therefore, if you have both OES Linux and OES NetWare servers running iPrint services, you need two instances of iManager to manage iPrint—one on each platform.

No Cluster Failover between Platforms

Clustered iPrint services can only fail over to the same OES platform (Linux or NetWare).

iPrint on OES Linux

You should be aware of the following when using iPrint on OES Linux.

Uploading Print Drivers for iPrint

From a Linux workstation running iManager, only the From System button works to upload drivers through a Mozilla-based browser. This means that the following will not work:

- Uploading Windows drivers from Linux
- Uploading from Konqueror or other non-Mozilla-based browsers

Uploading Might Require a CUPS Administrator Credential

A PPD is the Linux equivalent of a printer driver on Windows.

There are two versions of the iPrint client: high-security and low security. By default, end users and administrators install the high-security client when using the iPrint Printer List Web page.

This means that administrators are prompted for a CUPS administrator credential when uploading PPDs. However, the prompt doesn't specify that a CUPS administrator credential is needed and the root user credential does not work.

iPrint Disables Printing on the Server

iPrint uses CUPS to render print jobs before sending the print job to the Print Manager. For performance and scalability, printing from the server itself is disabled during the OES installation of iPrint.

iPrint Client for Linux Doesn't Install Automatically

Users who are used to installing the Windows iPrint client expect to choose an Open option and have the client install automatically. However, installing the client on Linux workstations requires saving the RPM package and then installing it manually if a package manager is not already installed and configured as it is in Novell Linux Desktop. For more information, see "[Linux: iPrint Client](#)" in the *OES iPrint Administration Guide for Linux*.

10.3.4 NCP Server (OES Linux)

NSS file attributes and NCP™ services tend to get mixed together in the minds of NetWare administrators. It is important to remember that file and directory attributes are supported and enforced by the file system that underlies an NCP volume, not by the NCP server.

For example, even though Rename Inhibit attribute appears to be settable in the NCP client interface, if the underlying file system is traditional Linux (Reiser, etc.) there is no support for the attribute and it cannot be set.

Some administrators assume they can provide NSS attribute support by copying or migrating files, directories, and metadata from an NSS volume to a defined NCP volume on a traditional Linux partition. However, this doesn't work, because NSS file attributes are only supported on NSS volumes.

10.3.5 NSS (OES Linux)

NSS on Linux has the following implementation caveats.

Only EVMS Is Supported

For this release, NSS recognizes only drives that are managed by EVMS. If your hard drive is managed by Linux Volume Management, it cannot be managed by EVMS and NSS does not recognize it.

For example, administrators are sometimes stumped when trying to create NSS pools and partitions on a drive using the Novell Storage Services™ Management Utility (NSSMU), because the utility doesn't recognize the drive.

If you experience this problem, use the YaST Partitioner to delete everything from the drive. You might then need to reboot the machine for NSSMU to recognize the drive.

User Quota Enforcement Always Requires Linux-Enabled Users

If you use User Quotas to limit the amount of disk space available to network users, you must ensure that users are enabled for Linux access using the iManager Linux User Management (LUM) plug-in.

This requirement extends to access through services that don't require LUM for general access, such as Web-based services like NetStorage and NCP clients accessing NCP/NSS volumes.

Background Information

The basic reason for this requirement is that NSS requires LUM to map file ownership between POSIX* and eDirectory. If users are not enabled for Linux access, directories and files that they create on NSS volumes are actually owned by the root user and not counted against any quotas you have set for them. For more information, see “[Enforcing File Ownership and User Space Restrictions](#)” in the *Novell Storage Services File System Administration Guide for OES*.

Moving an NSS Volume from NetWare to OES Linux

Some organizations are moving drives that contain NSS volumes from NetWare servers to OES Linux servers. The process is very straightforward and completely reliable, provided you follow the instructions in the “[Coexistence and Migration Issues](#)” section in the *Novell Storage Services File System Administration Guide for OES*.

The key point to remember is that you must enable volume users for Linux access before activating the moved volume for user access. For details, see the information in “[Access Control Issues for NSS on OES Linux](#)” in the *Novell Storage Services File System Administration Guide for OES*.

Setting User Quotas On Volumes that Are Being Used

Users who are not enabled for Linux access can work on NSS volumes through NCP clients and Web-based file services, such as NetStorage and iFolder. However, files created by these users are not counted against User Quotas because the system can't map file ownership between POSIX and eDirectory, so all newly created files are owned by the root user.

If you have created an NSS volume on an OES Linux server or moved a volume from NetWare to OES Linux, and you didn't enable volume users for Linux prior to allowing volume access, you can set quotas by following the instructions in “[Setting Quotas for Users Who Were Not Initially Enabled for Linux Access \(Linux\)](#)” in the *Novell Storage Services File System Administration Guide for OES*.

10.4 Samba

The Samba distribution included in OES has the following implementation caveats:

- [Section 10.4.1, “File Trustee Rights Changes Do Not Affect Current Samba Connections,” on page 77](#)
- [Section 10.4.2, “LDAP Search Delays and Samba,” on page 77](#)
- [Section 10.4.3, “The Samba Proxy User Password Must Be Managed Separately,” on page 78](#)
- [Section 10.4.4, “Windows XP SP2 Wrongly Reports File Deletion,” on page 78](#)
- [Section 10.4.5, “Home Directory Creation Is Not Automatic,” on page 78](#)

10.4.1 File Trustee Rights Changes Do Not Affect Current Samba Connections

NetWare file services handle file trustee rights changes dynamically. If you grant or revoke access privileges, the impact on connected users is immediate. This behavior is also reflected in the NFAP (Native File Access Protocols) product that provides Windows (CIFS) access to NetWare servers.

On the other hand, file trustee rights for Windows file services are set when the Windows (CIFS) connections are established and are unaffected by subsequent changes.

Because Samba provides Windows file services on Linux servers, changes to trustee rights (granting or revoking) have no effect while a session is in progress. For example, if you revoke the Write right for a Samba user connected to an NSS file system, the change you make will not take effect until the user disconnects and logs in again.

This difference between the way NetWare and Windows handle rights changes is especially important to NetWare administrators who are used to working with NFAP on NetWare and plan to convert their file services to Samba on OES Linux.

10.4.2 LDAP Search Delays and Samba

When the number of objects in a tree is very large (greater than 100,000), users can experience substantial LDAP authentication delays when accessing Samba on an OES server.

To reduce the search time, you have the following options:

- Set the object cache high enough that all the objects being searched are cached in memory. For more information, see [“Tuning LDAP for eDirectory”](#) in the *Novell eDirectory 8.7.3 Administration Guide*.
- Index the objectClass attribute (the attribute that is compared during the LDAP search). For more information, see [“Index Manager”](#) in the *Novell eDirectory 8.7.3 Administration Guide*.
- Add an eDirectory replica to the server where the search is taking place. For more information, see [“Adding a Replica”](#) in the *Novell eDirectory 8.7.3 Administration Guide*.

10.4.3 The Samba Proxy User Password Must Be Managed Separately

If you install Novell Samba, you are asked to specify a Samba proxy user for LDAP authentication through eDirectory.

By default, the eDirectory Admin user is designated as the Samba proxy user.

If the Admin user's password is changed in eDirectory, you must also change the password on the OES Linux server by entering the following at a shell prompt:

```
smbpasswd -w new_password
```

where *new_password* is the newly specified password for the Admin user in eDirectory.

For more Samba information, see [Appendix G, "Samba Support in OES," on page 261](#).

10.4.4 Windows XP SP2 Wrongly Reports File Deletion

Windows XP SP2 wrongly reports file deletions to Samba users under specific conditions as follows:

1. The files are on an NSS volume.
2. Users don't have the Erase right to the files.
3. Users try to delete the files.
4. The system reports that the files were deleted.
5. Refreshing the window shows that the files still exist.

Windows XP SP1 and earlier correctly reports that the files cannot be deleted.

10.4.5 Home Directory Creation Is Not Automatic

Unlike many Samba implementations, the Samba configuration in OES does not support automatic creation of home directories. For more information, see [Section G.6.4, "Methods for Creating Home Directories and Enabling Access to them for Samba Users," on page 278](#).

Server Platforms



This section introduces the two OES server platforms:

- [Chapter 11, “SUSE LINUX Enterprise Server 9,” on page 81](#)
- [Chapter 12, “OES NetWare,” on page 83](#)

SUSE® LINUX Enterprise Server 9 (SLES 9) is the Novell® Linux platform for Open Enterprise Server (OES) services. OES Linux lets you combine Novell’s industry-leading network services with open source applications on the same server.

This section contains the following sections to help you get started with running OES services on SLES 9:

- [Section 11.1, “Planning Your OES Linux Implementation,” on page 81](#)
- [Section 11.2, “Coexistence and Migration,” on page 81](#)
- [Section 11.3, “Implementation Suggestions for OES Linux,” on page 81](#)
- [Section 11.4, “Maintenance Suggestions for OES Linux,” on page 82](#)

11.1 Planning Your OES Linux Implementation

As you plan to install OES on the SLES 9 platform, you should review the information in [Chapter 3, “Planning Your OES Implementation,” on page 33](#). That and other sections in this guide can help to answer such questions as

- Which OES services are available for Linux.

You can learn which OES services run on Linux by reviewing the summary information in [Table 3-1 on page 34](#).

- What differences exist in the way services function on Linux compared with NetWare.

See [Section 3.4, “Which OES Platform Is Best for My Services?,” on page 37](#) and the specific service sections in this guide.

We also recommend you also use the information in “[Preparing to Install OES Linux](#)” in the *OES Linux Installation Guide* to plan your installation.

11.2 Coexistence and Migration

Coexistence and migration tools for OES are summarized in [Chapter 7, “Migrating/Consolidating Existing Servers and Data,” on page 63](#).

For more information, see the *OES Coexistence and Migration Guide*.

11.3 Implementation Suggestions for OES Linux

To help you become acquainted with basic OES services on the Linux platform, we provide a [Lab Guide for OES Linux](#) with step-by-step instructions designed to introduce OES services in a lab environment.

To install OES Linux, see the *OES Linux Installation Guide*.

For help implementing specific OES services on SLES 9, see the implementation sections for those services in the subsequent sections of this guide.

IMPORTANT: The OES documentation set includes the *SUSE LINUX Enterprise Server 9 Administration Guide* which contains valuable information regarding SLES 9 and its standard services. The OES Documentation Web site contains links to this guide.

Be aware that some instructions in this guide, such as the installation sections, are for installing and running a standard SLES 9 server but not for installing a SLES 9 server and running OES services.

You should always consult the information in the OES manuals and guides first when working with OES services on SLES 9.

11.4 Maintenance Suggestions for OES Linux

For help maintaining OES services on SLES 9, see the maintenance sections for the services in the subsequent sections of this guide.

NetWare® is the Novell® special-purpose network operating system that is squarely focused on running and managing your network. NetWare security, scalability, and performance have long set the bench mark for network operating systems.

This section contains the following sections to help you get started with running OES services on OES NetWare:

- [Section 12.1, “Planning Your OES NetWare Implementation,” on page 83](#)
- [Section 12.2, “Coexistence and Migration of NetWare Services,” on page 83](#)
- [Section 12.3, “Implementation Suggestions for OES NetWare,” on page 83](#)
- [Section 12.4, “Maintenance Suggestions for OES NetWare,” on page 84](#)

12.1 Planning Your OES NetWare Implementation

As you plan to install OES NetWare, you should probably review the information in [Chapter 3, “Planning Your OES Implementation,” on page 33](#). That and other sections in this guide will help to answer questions, such as

- Which OES services are available for NetWare.

You can learn which OES services run on NetWare by reviewing the summary information in [Table 3-1 on page 34](#).

- What differences exist in the way services function on NetWare compared with Linux.

See [Section 3.4, “Which OES Platform Is Best for My Services?,” on page 37](#), and the specific service sections in this guide.

We recommend that you use the planning information found in [“Installing OES NetWare”](#) in the *OES NetWare Installation Guide* to plan your installation.

12.2 Coexistence and Migration of NetWare Services

Coexistence and migration tools for OES are summarized in [Chapter 7, “Migrating/Consolidating Existing Servers and Data,” on page 63](#).

For a discussion of NetWare coexistence and migration issues, see the *OES Coexistence and Migration Guide*.

12.3 Implementation Suggestions for OES NetWare

To help you become acquainted with basic OES services on the NetWare platform, we provide a [Lab Guide for OES NetWare](#) with step-by-step instructions designed to introduce OES services.

To install OES NetWare, see the *OES NetWare Installation Guide*.

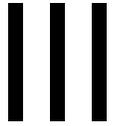
For help implementing specific OES services on NetWare, see the implementation sections for those services in the sections that follow in this guide.

12.4 Maintenance Suggestions for OES NetWare

For a list of common NetWare maintenance topics and tasks, see the [Links for NetWare](#) in the OES documentation front pages.

For help maintaining OES services on NetWare, see the maintenance sections for the services in the sections that follow in this guide.

Management Interfaces and Services



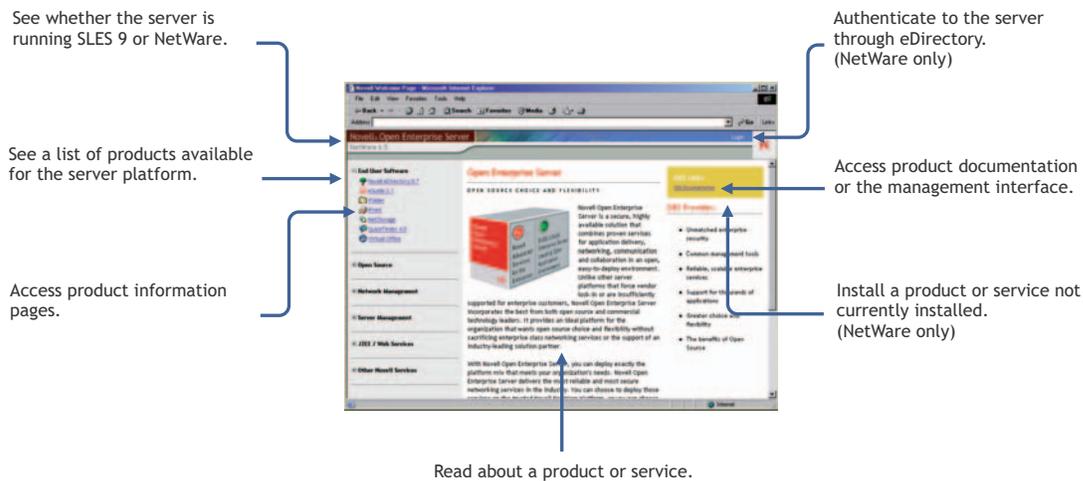
- [Chapter 13, “Using the OES Welcome Web Site,” on page 87](#)
- [Chapter 14, “OES Utilities and Tools,” on page 91](#)

Using the OES Welcome Web Site

13

After you install an OES server, anyone with browser access to the server can access its Welcome Web site—a collection of dynamic Web pages that provides the features illustrated and explained in [Figure 13-1](#).

Figure 13-1 The Default OES Welcome Page



This section explains OES Welcome Web Site features, and discusses:

- [Section 13.1, “The Welcome Site Requires Apache and Tomcat,”](#) on page 87
- [Section 13.2, “Accessing the Welcome Web Site,”](#) on page 88
- [Section 13.3, “The Welcome Web Site Is Available to All Users,”](#) on page 88
- [Section 13.4, “Administrative Features of the Welcome Pages,”](#) on page 88
- [Section 13.5, “Where’s eGuide in OES Linux?,”](#) on page 90

13.1 The Welcome Site Requires Apache and Tomcat

It is possible to install OES on either supported platform without including the Apache Web Server or the Tomcat Servlet Container. For example, if you install OES NetWare[®] using the Customized NetWare Server option, neither of these components is selected by default.

If you are unable to access the Welcome Web site, your server is probably missing one or both of these required components. To make the site available, you need to add the components to the OES server.

13.2 Accessing the Welcome Web Site

Anyone with browser access to an OES server can access the Welcome Web site by doing the following:

- 1 Open a **supported Web browser** that has a TCP connection to the network where the OES server is installed.
- 2 Enter the URL to the server using http.

For example:

```
http://server.example.com
```

or

```
http://192.168.1.206
```

13.3 The Welcome Web Site Is Available to All Users

Although the Welcome Web site is designed primarily for administrators, it can also be accessed and used by end users. For example, if iPrint is installed on the server, users can install the iPrint Client from a link on the iPrint product page.

Figure 13-2 *The iPrint Product Page*

iPrint for Linux OES

Linux, Macintosh*, and Windows users can install the iPrint Client for their platform from the iPrint Welcome page.

iPrint Links

- [iPrint Overview](#)
- [iPrint Client for Linux](#)
- [iPrint Client for Mac](#)
- [iPrint Client for Windows](#)
- [Install Printers](#)
- [iPrint Map Designer](#)
- [iPrint OES Linux Documentation](#)
- [iPrint OES NetWare Documentation](#)

Did you know

- iPrint automatically generates dynamic web pages for printer install.
- Administrators can create custom maps using floor plans of their building to help users find the closest printer.
- When Users install printers the correct printer driver or PPD file is installed automatically.

Novell® iPrint lets employees, partners, and customers access printers from a variety of locations across their network and the Internet. From a web browser users can easily install any printer on the network from any location.

13.4 Administrative Features of the Welcome Pages

The administrative features on the OES Welcome pages differ slightly between OES Linux and OES NetWare servers.

NetWare exposes the administrative links only after the user authenticates to eDirectory™.

Because the Linux pages don't support eDirectory authentication, the link box on Linux is static. In some cases, both end user and administrative links appear. In other cases, no administrative links are available. Link availability is determined by the product team responsible for the page.

Table 13-1 compares Welcome page functionality on Linux and NetWare.

Table 13-1 *Welcome Pages on Linux and NetWare*

| Feature | OES Linux Servers | OES Netware Servers |
|--|--|--|
| Accessing the administrative Welcome pages | There is only one set of Welcome pages. Most Linux pages include the administrative links. | Administrators have two options for authenticating to eDirectory: <ul style="list-style-type: none"> • Click the Login link in the site banner • Specify HTTPS and port 2200 when accessing the server. For example, they might enter the following URL: https:// server.example.com:2200 |
| Linking to administrative tools | Administrators can access most administrative tools from links on the product pages. | Administrators can access most administrative tools from links on the product pages. Authentication is not required in some cases because the connection is already authenticated to eDirectory. iManager 2.5 is a notable exception to this. |
| Installing products | Not available. | Many products that aren't installed include an installation link in their link box. When clicked, this link launches iManager 2.5, which lets you install the product. NOTE: In some cases, the Welcome Web site is not updated to reflect product installation. For some products this is solved by restarting the Web server. For information about how to restart the Web server, see the <i>Apache Web Server for NetWare Administration Guide for OES</i> . |

| Feature | OES Linux Servers | OES Netware Servers |
|----------------------------------|--|---|
| Setting Welcome page preferences | <p>You can set an alternate default Welcome page by selecting from the list of installed products at the bottom of the main panel (on the initial page).</p> <p>For example, if the server is an iPrint server, you might set the default page to iPrint. Users accessing the page can then download and install the iPrint client for their workstation type.</p> | <p>Authenticated administrators can set an alternate default Welcome page by selecting from the list of installed products at the bottom of the main panel (on the initial page).</p> <p>For example, if the server is an iPrint server, you might set the default page to iPrint. All users accessing the page can then download and install the iPrint client for their workstation type. Admin users accessing the page can immediately install printers and create or modify iPrint maps.</p> |

13.5 Where's eGuide in OES Linux?

eGuide does not have a Welcome page on OES Linux servers.

To access the eGuide Administration utility in Linux, specify the following (case-sensitive) URL:

```
http://ip_or_dns/eGuide/admin/index.html
```

Replace *ip_or_dns* with the hostname or IP address of the Web server where you installed eGuide. Depending on how your Web server and Web application server are configured, you might need to include the port number the server listens on with the hostname or IP address (for example, *ip_or_dns:80*).

To access the eGuide client, specify the following (case-sensitive) URL:

```
http://ip_or_dns/eGuide
```

Replace *ip_or_dns* with the hostname or IP address of the Web server where you installed eGuide.

Novell® OES includes several administration utilities that let you manage everything in your network, from configuring and managing eDirectory™ to setting up network services and open source software. This section lists and briefly explains the most common utilities.

NOTE: Some of the utilities are for managing only OES NetWare® or OES Linux servers but not both.

- [Section 14.1, “Overview of Management Tools and Interfaces,” on page 91](#)

14.1 Overview of Management Tools and Interfaces

Whenever possible, we recommend that all OES management be performed using browser-based tools. This ensures that all the system commands required to execute various tasks are performed in proper order and that none of them is overlooked.

[Table 14-1](#) is a quick reference for accessing information about the OES management tools.

Specific instructions for the tasks listed are located in the administration guides and other documentation for the services each tool manages.

Table 14-1 OES Management Tool Quick Reference

| Tool | Tasks | Access Method or URL/ Username | Notes |
|----------------|--|---|---|
| Apache Manager | <ul style="list-style-type: none"> Control one or many Apache Web servers on any platform from a single management interface. Greatly reduce the risk of configuration errors. | <p>To access Apache Manager from the Welcome Web site:</p> <ol style="list-style-type: none"> Open the Welcome Web site on an OES NetWare server using your server's URL. For example, <code>http://myserver.example.com</code>. Log in as the eDirectory Admin user. In the left frame, click the  icon next to Open Source, then click Apache 2.0. After the Apache 2.0 Welcome page loads, in the upper right link box, click either <i>Administer Single Apache Server</i> or <i>Administer Multiple Apache Servers</i>. | <p>Runs only from NetWare, but can configure Apache Web servers on multiple platforms.</p> <p>For more information on using Apache Manager, see the Apache Web Server for NetWare Administration Guide for OES.</p> |
| bash (Linux) | <ul style="list-style-type: none"> Manage the Linux server. Manage many services running on the server. | Access a shell prompt on the Linux server. | For more information or help understanding and using bash, search the Web for any of the numerous articles and tutorials on using the shell. |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|--------------------------|--|---|--|
| BASH (NetWare) | <ul style="list-style-type: none"> Perform a subset of BASH commands. | <p>To start the shell at a NetWare console prompt, enter</p> <pre>bash.nlm</pre> | <p>To learn more about using the BASH commands on NetWare, see the man pages available at the shell prompt by entering</p> <pre>man bash</pre> <p>For more information, see “BASH” in the <i>Utilities Reference for OES</i>.</p> <p>To obtain the source files for this version of BASH on NetWare, visit forge.novell.com (http://forge.novell.com).</p> |
| ConsoleOne® (NetWare) | <ul style="list-style-type: none"> Manage eDirectory objects, schema, partitions, and replicas. Manage NetWare server resources. | <ol style="list-style-type: none"> Do either of the following: <ul style="list-style-type: none"> From a workstation, map a drive to the server and run <code>consoleone.exe</code> from <pre>sys:\public\mgmt\consoleone\1.2\bin.</pre> or From a NetWare server console, click the Novell menu and select ConsoleOne from the list of options. Specify the eDirectory Admin username and password. | <p>For more information about ConsoleOne, see the <i>ConsoleOne 1.3.x User Guide</i>.</p> |
| eGuide Administrator | <p>Configure</p> <ul style="list-style-type: none"> LDAP data sources. Searching. Look-and-feel. Security. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: <pre>https://IP_or_DNS/eGuide/admin</pre> Specify the eDirectory Admin username and password. | <p>For more information on using the eGuide Administrator tool, see the <i>Novell eGuide 2.1.2 Administration Guide</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|------------------------------|---|---|--|
| Health Monitoring Services | <ul style="list-style-type: none"> Monitor the health of Linux or NetWare servers. | <ol style="list-style-type: none"> Do either of the following: In iManager, click <i>Servers > Monitor Servers</i> in the left navigation frame. or In Novell Remote Manager, click <i>Health Monitor</i> under <i>Diagnose Server</i>. Specify the eDirectory Admin username and password. | <p>Health Monitoring Services are documented in the <i>Health Monitoring Services Administration Guide for OES</i>.</p> <p>Health Monitoring Services use a Common Information Model (CIM) provided by the Web-Based Enterprise Management (WBEM) Initiative. For more information on WBEM, visit the DMTF Web site (http://www.dmtf.org/standards/wbem).</p> |
| iFolder 2.1x Management Tool | <ul style="list-style-type: none"> Manage Novell iFolder servers. Manage Novell iFolder users. Monitor resource usage. Generate system reports. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: <code>https:// IP_or_DNS/ iFolderServer/ Admin</code> Specify the eDirectory Admin username and password. | <p>Although the home page is displayed after an http request, logging into the tool requires an https request and connection.</p> <p>For more information on using the iFolder Management Tool, see the <i>Novell iFolder 2.1 Installation and Administration Guide</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|--------------|--|--|---|
| iManager 2.5 | <ul style="list-style-type: none"> • Access various other management tools and plug-ins. • Configure OES network services. • Create and manage users, groups, and other objects. • Delegate administration through Role-Based Services (RBS). • Manage eDirectory objects, schema, partitions, and replicas. • Manage NetWare 6.5 servers. • Manage OES services. • Set up and manage your Novell eDirectory tree. | <ol style="list-style-type: none"> 1. In a Supported Web Browser, enter the following URL: <pre>http:// IP_or_DNS/ iManager.html</pre> 2. Specify the eDirectory Admin username and password. | <p>Requires an SSL connection (HTTPS).</p> <p>Both HTTP and HTTPS requests establish the SSL connection.</p> <p>For more information on using iManager, see the <i>Novell iManager 2.5 Administration Guide</i>.</p> <p>See also Mobile iManager.</p> |
| iMonitor | <ul style="list-style-type: none"> • Monitor and diagnose all the servers in your eDirectory tree. • Examine eDirectory partitions, replicas, and servers. • Examine current tasks taking place in the tree. | <ol style="list-style-type: none"> 1. In a Supported Web Browser, enter one of the following URLs: (On NetWare) <pre>http:// IP_or_DNS:81/ nds</pre> (On Linux) <pre>https:// IP_or_DNS:8030 /nds</pre> 2. Specify the eDirectory Admin username and password. | <p>iMonitor provides a Web-based alternative to tools such as DSBrowse, DSTrace, DSDiag, and the diagnostic features available in DSRepair.</p> <p>Because of this, iMonitor's features are primarily server focused, meaning that they report the health of individual eDirectory agents (running instances of the directory service) rather than the entire eDirectory tree.</p> <p>For more information, see "Using Novell iMonitor 2.1" in the <i>Novell eDirectory 8.7.3 Administration Guide</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|---------------------------------|--|---|---|
| INETCFG (NetWare) | <ul style="list-style-type: none"> • Manage network and server TCP/IP communications. • Manage IP addresses. • Bind boards on a NetWare server. | <ol style="list-style-type: none"> 1. Load the inetcfg NLM™ at a NetWare System Console prompt. 2. Access the server console. 3. Toggle to the screen. | For more information, see “INETCFG” in the <i>Utilities Reference for OES</i> . |
| IP Address Manager (NetWare) | <ul style="list-style-type: none"> • Manage the IP address-application association when changing the NetWare server’s IP address. • Resolve IP address and port conflicts. | <ol style="list-style-type: none"> 1. In a Supported Web Browser, enter the following URL: https:// IP_or_DNS:8009 /ipmcfg 2. Specify the eDirectory Admin username and password. | For more information, see the <i>Novell Netware IP Address Management Administration Guide for OES</i> . |
| iPrint Map Designer | <ul style="list-style-type: none"> • Create a printer map to aid in printer selection/installation. • Edit an existing printer map. | <ol style="list-style-type: none"> 1. In a Supported Web Browser, enter the following URL: http:// IP_or_DNS/ ippdocs/ maptool.htm 2. Specify the eDirectory Admin username and password. | <p>For OES Linux server instructions, see “Setting Up Location-Based Printing” in the <i>OES iPrint Administration Guide for Linux</i>.</p> <p>For OES NetWare server instructions, see “Setting Up Location-Based Printing” in the <i>OES iPrint Administration Guide for NetWare</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|--|--|--|--|
| Mobile iManager | <ul style="list-style-type: none"> • Manage eDirectory. • Create and manage users, groups, and other objects. • Manage OES services. • Access various other management tools and plug-ins. | <p>On a Linux workstation:</p> <ol style="list-style-type: none"> 1. At the bin directory of the expanded <code>iMan_25_Mobile_iManager_linux.tar</code> directory, run <code>imanager.sh</code>. 2. Log in using the eDirectory Admin username, password, and eDirectory tree name. <p>On a Windows workstation:</p> <ol style="list-style-type: none"> 1. At the bin directory of the unzipped <code>iMan_25_Mobile_iManager_win</code> directory, run <code>imanager.bat</code>. 2. Log in using the eDirectory Admin username, password, and eDirectory tree name. | <p>Requires an SSL connection (HTTPS).</p> <p>Both HTTP and HTTPS requests establish the SSL connection.</p> <p>For more information on using Mobile iManager, see “Starting Mobile iManager on Linux” and “Starting Mobile iManager on Windows” in the <i>Novell iManager 2.5 Installation Guide</i>.</p> <p>See also iManager.</p> |
| MySQL 4.0 (phpMyAdmin) (NetWare) | <ul style="list-style-type: none"> • Create and manage MySQL databases. • Monitor processes. • Export databases. • Create and manage user accounts. | <ol style="list-style-type: none"> 1. In a Supported Web Browser, enter the following URL: <code>https:// IP_or_DNS:2200 /phpMyAdmin/ index.php</code> 2. Specify the eDirectory Admin username and password. | <p>For more information, see the <i>MySQL for NetWare Administration Guide for OES</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|--------------------------------|--|--|--|
| NetStorage Web Interface | <ul style="list-style-type: none"> • Manage file system access. • Manage file system space restrictions. • Salvage and purge deleted files. | Use the NetStorage Web interface. | <p>As an Admin user (or equivalent), you can set directory and user quotas for NSS data volumes. You can also set file system trustees, trustee rights, and attributes for directories and files on NSS volumes. And you can Salvage and Purge deleted files.</p> <p>For more information, see either of the following:</p> <ul style="list-style-type: none"> • “Viewing or Modifying Directory and File Attributes and Rights” in the <i>OES NetStorage Administration Guide for Linux</i>. • “Viewing or Modifying Directory and File Attributes and Rights” in the <i>OES NetStorage Administration Guide for NetWare</i>. |
| NetWare Command Line Utilities | <ul style="list-style-type: none"> • Manage and configure all aspects of the NetWare operating system. • Manage many of the network services that NetWare hosts. | Enter the commands at the server console or through a remote connection. | For more information, see the Utilities Reference for OES . |
| Novell Client | <ul style="list-style-type: none"> • Manage file system access. • Manage File System Space Restrictions. • Salvage and purge deleted files. | Use the Novell N icon to access these and other tasks. | <p>As an Admin user (or equivalent), you can set directory and user quotas for NSS data volumes. You can also set file system trustees, trustee rights, and attributes for directories and files on NSS volumes. And you can Salvage and Purge deleted files.</p> <p>For more information, see “Managing File Security and Passwords” in the <i>Novell Client for Windows Installation and Administration Guide</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|--------------------------------|--|--|--|
| Novell Remote Manager (NRM) | <ul style="list-style-type: none"> Manage file system access and attributes for the NetWare Traditional File System and the NSS File System on NetWare. Manage NetWare Traditional File Systems (NetWare). Manage OES servers from a remote location. Monitor your server's health. Change server configuration. Perform diagnostic and debugging tasks. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: https:// IP_or_DNS:8009 Do one of the following: On NetWare, specify the eDirectory username and password. or On Linux, specify either the eDirectory username and password or a Linux (POSIX) username and password. | <p>Functionality is limited for non-Admin or non-root users on both platforms.</p> <p>NRM on Linux doesn't include all the functionality of NRM on NetWare.</p> <p>For more information, see the <i>Novell Remote Manager for NetWare Administration Guide for OES</i> or the <i>Accessing Novell Remote Manager for Linux</i>.</p> |
| NSS Management Utility (NSSMU) | <ul style="list-style-type: none"> Manage the Novell Storage Services File System. | <p>At the NetWare System Console prompt:</p> <ol style="list-style-type: none"> Load the NSSMU NLM. Access the server console. Toggle to the screen. <p>At the Linux shell prompt:</p> <ol style="list-style-type: none"> Load NSSMU by entering /opt/novell/ nss/sbin/nssmu | <p>NSS Management Utility (NSSMU) is a server console application used to manage the Novell Storage System (NSS) logical file system.</p> <p>Some functionality available on NetWare is not available on Linux. For example, software RAID 5 and Encrypted Volume Support are not available for Linux.</p> <p>For more information, see "NSS Management Utility" in the <i>Novell Storage Services File System Administration Guide for OES</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|----------------------------------|--|--|---|
| OpenSSH (client access) | <ul style="list-style-type: none"> Securely run commands on remote servers. Securely copy files and directories to and from other servers using SSH utilities. | Connect to the server using your favorite SSH client. | <p>On Linux, OpenSSH is installed by default.</p> <p>On OES NetWare, load <code>sshd.nlm</code> at the server console.</p> <p>To use OpenSSH from a workstation on your network, you must download one of several available third-party SSH utilities, such as PuTTY.</p> <p>For more information, see “Setting Up SSH at Workstations” in the <i>OpenSSH Administration Guide</i>.</p> |
| OpenSSH Advanced Admin (NetWare) | <ul style="list-style-type: none"> Manage OpenSSH servers as server groups. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: <pre>https:// IP_or_DNS:2200 /sshdadmin/ main.htm</pre> Specify the eDirectory Admin username and password. | For more information, see “Setting Up OpenSSH in Your Network” in the <i>OpenSSH Administration Guide</i> . |
| OpenSSH Simple Admin (NetWare) | <ul style="list-style-type: none"> Manage all aspects of a single OpenSSH server. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: <pre>https:// IP_or_DNS:2200 /sshdadmin/ WebMan?file=webman.xml</pre> Specify the eDirectory Admin username and password. | For more information, see “Setting Up OpenSSH in Your Network” in the <i>OpenSSH Administration Guide</i> . |
| OpenWBEM | <ul style="list-style-type: none"> Perform tasks instrumented by specific providers. | <p>On NetWare, access <code>sys\system\cimom\etc\openwbem\openwbem.conf</code>.</p> <p>On Linux, access <code>/etc/openwbem</code>.</p> | For more information, see the <i>OpenWBEM Services Administration Guide for OES</i> . |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|----------------------------|---|--|---|
| Perl | <p>A programming language developed by Larry Wall that</p> <ul style="list-style-type: none"> • Runs faster than shell script programs. • Reads and writes binary files. • Processes very large files. • Lets you quickly develop CGI applications. | <p>On Linux, install the associated RPM files.</p> <p>On NetWare, refer to the instructions on the Novell Developer Web site (http://developer.novell.com/ndk/doc/perl5/prl57enu/data/h4cr34aj.html).</p> | <p>For more information or help understanding and using Perl, search the Web. There are numerous articles and tutorials on using this versatile programming language.</p> |
| QuickFinder Server Manager | <ul style="list-style-type: none"> • Create search indexes for any Web site or attached file systems. • Modify the search dialog look-and-feel to match your corporate design. Create full-text indexes of HTML, XML, PDF, Word, OpenOffice.org, and many other document formats. • Configure and maintain your indexes remotely from anywhere on the Net. | <ol style="list-style-type: none"> 1. In a Supported Web Browser, enter the following URL: <pre>http:// IP_or_DNS/ qfsearch/admin</pre> 2. Do one of the following: <p>On NetWare, specify the eDirectory Admin user and password.</p> <p>or</p> <p>On Linux, specify the root or other user as documented.</p> | <p>For more information, see the <i>QuickFinder Server Administration Guide</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|------------------------|---|--|--|
| RConsoleJ (NetWare) | <ul style="list-style-type: none"> • Access NetWare servers remotely. • Run server utilities from a workstation. | <ol style="list-style-type: none"> 1. Load the rconag6 NLM on the NetWare server. 2. At a workstation, map a drive to the server and run <code>rconj.exe</code> from <code>sys:\public\mgmt\consoleone\1.2</code>. 3. When prompted, enter the server's IP address or DNS name (with no leading http or https) and your administrator password, and then click Connect. | For more information, see "Managing NetWare Servers Remotely" in the <i>Remote Server Management for NetWare Administration Guide for OES</i> . |
| Remote Manager | | | See Novell Remote Manager . |
| SNMP for eDirectory | <p>Lets you use standard SNMP tools to</p> <ul style="list-style-type: none"> • Monitor an eDirectory server. • Track the status of eDirectory to verify normal operations. • Spot and react to potential problems when they are detected. • Configure traps and statistics for selective monitoring. • Plot a trend on the access of eDirectory. • Store and analyze historical data that has been obtained through SNMP. • Use the SNMP native master agent on all eDirectory platforms. | <ol style="list-style-type: none"> 1. Configure SNMP for eDirectory as documented for your platform. 2. Access SNMP for eDirectory services using the SNMP management interface of your choice. 3. Specify the eDirectory Admin username and password. | <p>SNMP support is installed with eDirectory.</p> <p>For more information on SNMP for eDirectory, see "SNMP Support for Novell eDirectory" in the <i>Novell eDirectory 8.7.3 Administration Guide</i>.</p> |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|--|---|--|--|
| SUSE® LINUX Monitoring Utilities | <ul style="list-style-type: none"> Manage the Linux server and standard Linux services from the shell prompt. | Enter the desired command at the shell prompt. | For more information, see “ System Monitoring Utilities ” in the <i>SUSE LINUX Enterprise Server 9 Administration Guide</i> . |
| TCP/IP Configuration (NetWare - NRM) | <ul style="list-style-type: none"> Add a new network card. Associate TCP/IP with a specific network card. Edit system files. Enable and configure TCP/IP. Configure network management parameters. Copy configuration information to or from a diskette. Modify the hardware parameters of an existing network card. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: https:// IP_or_DNS:8009 /webcfg Specify the eDirectory Admin username and password. | For more information, see “ Monitoring TCP/IP Information ” in the <i>Novell TCP/ IP Administration Guide for OES</i> . |
| TCP/IP Protocol Information (NetWare - NRM) | <ul style="list-style-type: none"> Monitor protocol information. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: https:// IP_or_DNS:8009 /protocols Specify the eDirectory Admin username and password. | For more information, see “ Web-based TCP/IP Monitoring ” in the <i>Novell TCP/ IP Administration Guide for OES</i> . |
| Tomcat Admin (NetWare) | <ul style="list-style-type: none"> Manage the Tomcat servlet container on a NetWare server. | <ol style="list-style-type: none"> In a Supported Web Browser, enter the following URL: https:// IP_or_DNS/ tomcat/admin/ index.jsp Specify the eDirectory Admin username and password. | For more information, see “ Managing Web Applications and Servlets ” in the <i>Tomcat for NetWare Administration Guide for OES</i> . |

| Tool | Tasks | Access Method or URL/ Username | Notes |
|-----------------------------|---|--|--|
| Tomcat Manager (NetWare) | <ul style="list-style-type: none"> • Install and deploy Web applications. | <ol style="list-style-type: none"> 1. In a Supported Web Browser, enter the following URL: <pre>http:// IP_or_DNS/ tomcat/ manager/html/ list</pre> 2. Specify the eDirectory Admin username and password. | For more information, see “ Managing Tomcat with Tomcat Admin ” in the <i>Tomcat for NetWare Administration Guide for OES</i> . |
| YaST (SUSE LINUX) | <ul style="list-style-type: none"> • Install OES Linux. • Configure the server and standard Linux services. • Install and configure OES components and services. | <p>To access YaST from the KDE interface, start the YaST Control Center from the SUSE menu (<i>System > YaST</i>).</p> <p>To access YaST at a shell prompt, enter <code>yast</code>.</p> | For more information, see “ YaST - Configuration ” in the <i>SUSE LINUX Enterprise Server 9 Administration Guide</i> . |

Identity and Directory Services

IV

Novell® Open Enterprise Server (OES) identity and directory services are explained in the following sections:

- [Chapter 15, “eDirectory,” on page 107](#)
- [Chapter 16, “Identity Management Services,” on page 111](#)
- [Chapter 17, “LDAP \(eDirectory\),” on page 117](#)
- [Chapter 18, “Linux Access for eDirectory Users \(LUM\),” on page 119](#)

Novell® eDirectory™ is the central, key component of Novell Open Enterprise Server (OES) and provides the following:

- Centralized identity management
- The underlying infrastructure for managing your network servers and the services they provide
- Access security both within the firewall and from the Web

This section discusses the following tasks:

- [Section 15.1, “Managing eDirectory,” on page 107](#)
- [Section 15.2, “Planning Your eDirectory Tree,” on page 107](#)
- [Section 15.3, “eDirectory Coexistence and Migration,” on page 107](#)
- [Section 15.4, “Creating Users and Groups,” on page 109](#)

15.1 Managing eDirectory

iManager is the OES eDirectory management tool and is used for all eDirectory management and most OES component management tasks, including the following:

- Creating eDirectory objects, including User and Group objects
- Managing eDirectory objects
- Configuring and managing OES service component controls in eDirectory
- Accessing other OES component management tools

For information on using iManager, see the *Novell iManager 2.5 Administration Guide*.

15.2 Planning Your eDirectory Tree

If you don't have eDirectory installed on your network, it is critical that you and your organization take time to plan and design your eDirectory tree prior to installing OES.

The *Lab Guide for OES SP2 Linux* and *Lab Guide for OES NetWare* both provide an introduction to eDirectory planning that you might find useful for getting started with eDirectory.

For detailed information on getting started using eDirectory, see “[Installing or Upgrading Novell eDirectory on Linux](#)” in the *Novell eDirectory 8.7.3 Installation Guide*.

15.3 eDirectory Coexistence and Migration

The following sections summarize eDirectory coexistence and migration considerations.

15.3.1 Coexistence

The following table lists the operating systems and eDirectory versions that OES NetWare® and OES Linux have been tested with (and found to be compatible with):

| Platform | eDirectory Version |
|--|--|
| NetWare 6.5 SP2 | eDirectory 8.7.3 IR2 (eDirectory 8.7.3.2) |
| NetWare 6.0 SP5 | eDirectory 8.6.2 |
| NetWare 5.1 SP8 | eDirectory 8.7.3 |
| NetWare 5.1 SP7 | eDirectory 8.7.3 |
| NetWare 5.1 | NDS [®] 8 (must have latest NDS 8 and eDirectory 8.7 schema extensions) |
| NetWare 4.2 | NDS 6 (6.21 or later) |
| SLES 9 | eDirectory 8.7.3 |
| SUSE [®] LINUX Professional 9.1 | eDirectory 8.7.3 |
| Red Hat* AS 3.0 | eDirectory 8.7.3 IR 3 (eDirectory 8.7.3.3) |
| Windows 2003 Server | eDirectory 8.7.3 IR 3 (eDirectory 8.7.3.3) or later |
| Windows 2003 Server | Active Directory (synchronized users via Identity Manager) |
| Windows 2000 Advanced Server | eDirectory 8.7.3 IR 3 (eDirectory 8.7.3.3) or later |
| Windows NT | NT Domain (synchronized users via Identity Manager) |

NetWare Coexistence Issues

- On NetWare, use Deployment Manager to check the tree for the correct versions of NDS/eDirectory and to determine if the needed schema extensions are present.
- There are several issues with NetWare 5.1 SP7 and NDS 8 regarding SLP and LDAP authentication. If you cannot upgrade to NetWare 5.1 SP8, apply the sas.nlm and SLP modules from NetWare 5.1 SP8 for LDAP and SLP compatibility.

If the sas.nlm module is not applied, an OES Linux server installed into a NetWare 5.1 SP7 tree hangs during installation during LDAP authentication. If the SLP modules are not applied, the NetWare 5.1 SP7 server might not be able to work correctly with the Linux version of OpenSLP.

Linux Coexistence Issues

There are no known eDirectory coexistence issues.

15.3.2 Migration

This section provides information on migrating a previous installation of eDirectory to the OES version (eDirectory 8.7.3 IR5).

NetWare Caveats

For NetWare, a migration is the same as an Upgrade. For instructions, see “[Upgrading to OES NetWare](#)” in the *OES NetWare Installation Guide*.

Linux Caveats

- Upgrades from Novell Nterprise Linux Services (NNLS) are not supported, but upgrades from SLES 9 with eDirectory 8.7.3 to OES Linux are supported.
- If you attempt to install OES Linux on a server that already has eDirectory 8.7.3 installed, the eDirectory included with OES (eDirectory 8.7.3 IR 5) overwrites the previous eDirectory installation. You should install OES on a clean computer. Do not try to upgrade eDirectory.
- Installing OES Linux into a NetWare 6.5 SP2 tree causes the NetWare server to abend due to an issue in NetWare 6.5 SP2 that is fixed in NetWare 6.5 SP3.

Before installing an OES Linux server into a NetWare 6.5 SP2 tree, upgrade any NetWare 6.5, NetWare 6.5 SP1, and NetWare 6.5 SP2 LDAP servers that will be pointed to by the OES installation to NetWare 6.5 SP3.

15.4 Creating Users and Groups

All OES components require that you create User objects to represent the users on your system. The Linux User Management (LUM) and Samba components on OES Linux also require that you create a Linux-enabled Group object that you can assign the users to.

In addition to these basic objects, it is usually helpful to organize your tree structure using Organizational Unit objects to represent the structure of your organization and to serve as container objects to help manage the users, groups, servers, printers, and other organization resources you manage through eDirectory.

The *Lab Guide for OES Linux* and *Lab Guide for OES NetWare* both provide basic instructions for creating container objects as well as Group and User objects in eDirectory.

For more information about Linux User Management, see [Section 18.4, “LUM Implementation Suggestions,” on page 124](#).

For more information about Samba, see [Section G.2.4, “Creating and Enabling Samba Users and Groups in iManager,” on page 264](#).

For detailed information on understanding, creating, and managing the various objects your organization might require, see the *Novell eDirectory 8.7.3 Installation Guide*.

Providing network users with a network identity is a fundamental expectation for networking, but it can also become confusing when users need to track multiple identities to use network services. When you add the traditional POSIX users found on Linux systems to the mix, the picture becomes even more complex.

The identity management services provided by Novell® Open Enterprise Server (OES) leverage Novell eDirectory™ to simplify and customize identity management to fit your needs:

- If you currently store and manage all your users and groups in eDirectory, you can continue to do so.
- If you use Novell Client™ software to provide network file and print services, you can now provide seamless file and print access to OES Linux servers using the NCP™ server for Linux and iPrint services. For more information, see [Section 35.6, “NCP Implementation and Maintenance,” on page 226](#) and [Chapter 36, “Print Services,” on page 235](#).
- If you want eDirectory users to have access to OES Linux services that require POSIX authentication, you can enable the users for Linux access. For more information, see [Chapter 18, “Linux Access for eDirectory Users \(LUM\),” on page 119](#).
- If you need to store and manage users in multiple directories, you can greatly strengthen your organization’s security and dramatically decrease your identity management costs by deploying Novell Identity Manager 2 (IDM2).

The remaining sections in this section discuss the Identity Manager Bundle Edition and provide more information regarding IDM2, including the following topics:

- [Section 16.1, “Using the Identity Manager Bundle Edition,” on page 111](#)
- [Section 16.2, “What Am I Entitled to Use?,” on page 112](#)
- [Section 16.3, “System Requirements,” on page 112](#)
- [Section 16.4, “Installation Considerations,” on page 112](#)
- [Section 16.5, “Getting Started,” on page 113](#)
- [Section 16.6, “Activating the Bundle Edition,” on page 113](#)
- [Section 16.7, “Known Issues,” on page 114](#)

16.1 Using the Identity Manager Bundle Edition

Novell Identity Manager 2 is a data-sharing solution that leverages the Identity Vault to synchronize, transform, and distribute information across applications, databases, and directories.

The Identity Manager Bundle Edition provides licensed synchronization of information (including passwords) held in NT Domains, Active Directory Domains, and eDirectory trees. When data from one system changes, Identity Manager detects and propagates these changes to other connected systems based on the business policies you define.

This section details the following information:

16.2 What Am I Entitled to Use?

The Bundle Edition allows you to use the Identity Manager engine and the following Identity Manager drivers:

- Identity Manager Driver for eDirectory
- Identity Manager Driver for Active Directory
- Identity Manager Driver for NT

Other Identity Manager Integration Modules (drivers) are included in the software distribution. You can install and use these additional Integration Modules for 30 days, at which time you must purchase a license for the Nsure Identity Manager Standard Edition or Professional Edition and a license for the Integration Module you want to use.

The service drivers (Loopback, Manual Task, and Entitlements) are not included as part of the license agreement for the Bundle Edition. In order to use these drivers, you must purchase either the Nsure Identity Manager Standard Edition or Professional Edition.

16.3 System Requirements

- ❑ Novell eDirectory 8.7.3
- ❑ iManager 2.0.2 or 2.5
- ❑ You can run the Identity Manager server on one of the following platforms:
 - NetWare® 6 or 6.5 with the latest Support Pack (you must obtain and install JVM* 1.4.2 on NetWare)
 - Linux Red Hat AS or ES 2.1, or AS 3.0
 - SUSE® Linux Enterprise Server

The Bundle Edition does not include Solaris* or AIX support. If you would like to run the DirXML® engine or Integration Modules on these platforms, you must purchase the Nsure Identity Manager Standard or Professional Edition.

16.4 Installation Considerations

Nsure Identity Manager Bundle Edition contains components that can be installed within your environment on multiple systems and platforms. Depending on your system configuration, you might need to run the installation program several times to install Identity Manager components on the appropriate systems.

In order for the product to be activated, you must install Open Enterprise Server before installing the Identity Manager Bundle Edition. For more information on activation issues, see [Section 16.6.1, “Frequently Asked Questions about Activation,”](#) on page 113.

For detailed installation instructions, see [Installing Identity Manager \(http://www.novell.com/documentation/dirxml20/admin/data/a7c9ie0.html\)](http://www.novell.com/documentation/dirxml20/admin/data/a7c9ie0.html) in the *Identity Manager 2 Administration Guide*.

16.5 Getting Started

The following sections from the *Identity Manager 2 Administration Guide* can help you plan, install, and configure your Identity Manager Bundle Edition:

- [Overview](http://www.novell.com/documentation/dirxml20/admin/data/alxkrnf.html) (<http://www.novell.com/documentation/dirxml20/admin/data/alxkrnf.html>)
- [Planning Your Implementation](http://www.novell.com/documentation/dirxml20/admin/data/anhomxn.html) (<http://www.novell.com/documentation/dirxml20/admin/data/anhomxn.html>)
- [Installing Identity Manager](http://www.novell.com/documentation/dirxml20/admin/data/a7c9ie0.html) (<http://www.novell.com/documentation/dirxml20/admin/data/a7c9ie0.html>)
- [Installing Active Directory, NT, and eDirectory Drivers](http://www.novell.com/documentation/dirxml20/admin/data/bs35odr.html) (<http://www.novell.com/documentation/dirxml20/admin/data/bs35odr.html>)
- [Setting Up a Connected System](http://www.novell.com/documentation/dirxml20/admin/data/bs35odr.html) (<http://www.novell.com/documentation/dirxml20/admin/data/bs35odr.html>)
- [Managing Passwords By Using Password Policies](http://www.novell.com/documentation/dirxml20/admin/data/ampxjj0.html) (<http://www.novell.com/documentation/dirxml20/admin/data/ampxjj0.html>)
- [Logging and Reporting Using Nsure Audit](http://www.novell.com/documentation/dirxml20/admin/data/botc9uj.html) (<http://www.novell.com/documentation/dirxml20/admin/data/botc9uj.html>)

For information about customizing your implementation:

- [Policy Builder and Driver Customization Guide](http://www.novell.com/documentation/dirxml20/policies/data/front.html#bktitle) (<http://www.novell.com/documentation/dirxml20/policies/data/front.html#bktitle>)

16.6 Activating the Bundle Edition

Activation is not required for the Bundle Edition. When you install Novell Open Enterprise Server, the Identity Manager Bundle and Integration Modules (Active Directory, NT, and eDirectory drivers) are automatically activated.

If you choose to purchase additional Identity Manager Integration Modules, you need to install the activation credential for those products and either the Nsure Identity Manager Standard Edition or Professional Edition.

See [Activating Identity Manager Products Using a Generic Credential](http://www.novell.com/documentation/dirxml20/admin/data/brph5hb.html) (<http://www.novell.com/documentation/dirxml20/admin/data/brph5hb.html>) in the *Identity Manager 2 Administration Guide* for more information on activating other Identity Manager products.

16.6.1 Frequently Asked Questions about Activation

Do I need to install Identity Manager on a specific server?

Yes. As a Bundle Edition user, you must install Identity Manager on the server where you installed OES. In order for activation to work properly, you must install Identity Manager on Linux or NetWare and create a driver set on that server.

I installed the Bundle Edition on Linux or NetWare, but it's not activated. Why?

You must install the Bundle Edition on the server where OES exists. If you install it on a non-OES server, the Bundle Edition cannot activate.

Can I run Identity Manager on a Windows server?

Not with the Bundle Edition. However, you can still synchronize data held on a Windows server by using the Identity Manager Remote Loader service. The Remote Loader enables synchronization between the DirXML engine (on your Linux or NetWare server) and a remote driver (on the Windows server.) See [Setting Up Remote Loaders \(http://www.novell.com/documentation/dirxml20/admin/data/bs35pip.html#bs35pip\)](http://www.novell.com/documentation/dirxml20/admin/data/bs35pip.html#bs35pip) in the *Identity Manager 2 Administration Guide* for more information.

In order to run Identity Manager on a Windows server, you need to purchase the Nsure Identity Manager Standard Edition or Professional Edition.

My drivers stopped working. What happened?

You might have installed the Bundle Edition on a non-OES server. The Bundle Edition must be installed on your Linux or NetWare server where OES exists. If Identity Manager is installed on a non-OES server, activation cannot work and, after 30 days, your drivers stop running.

I purchased an additional Integration Module. Why doesn't it work?

With your OES purchase, you are entitled to use the Bundle Edition products. If you want to add new Integration Modules, you also need to purchase the Nsure Identity Manager Standard Edition or Professional Edition. The Integration Module cannot activate until you purchase and activate the standard or professional edition in the *Identity Manager 2 Administration Guide*.

How do I know what's activated?

For information about how to view currently activated products, see [Viewing Product Activations \(http://www.novell.com/documentation/dirxml20/admin/data/agfhtax.html#agfhtax\)](http://www.novell.com/documentation/dirxml20/admin/data/agfhtax.html#agfhtax).

16.7 Known Issues

iManager 2.5 task names are slightly different than the iManager 2.0.2 tasks used in the Identity Manager documentation. [Table 16-1](#) indicates the differences:

Table 16-1 *iManager Menu Differences*

| iManager 2.0.2 Task Name | iManager 2.5 Task Name |
|--------------------------|------------------------|
| DirXML Management | DirXML |
| • Overview | • DirXML Overview |

DirXML Utilities

- NDS2NDS Driver Certificates
- Dataflow
- Dataflow Table View
- Design Dataflow
- Version Discovery Tool
- Activation Request
- Activation Installation
- Create Driver
- Export Driver
- Import Driver
- Create Policy
- Load Sample Objects

DirXML Utilities

- NDS-to-NDS Driver Certificates
- Dataflow
- Dataflow Table View
- Design Dataflow
- Versions Discovery
- Request Activation
- Install Activation
- New Driver
- Export Driver
- Import Driver
- New Policy
- Load Sample Objects

Nsure Audit

- Queries
- Verification
- Query Configuration
- Server Configuration

Auditing and Logging (Nsure Audit)

- Queries
- Verification
- Query Options
- Logging Server Options

Password Management

- Check Password Status
- Manage Challenge Sets
- Manage Password Policies
- Password Synchronization
- View Policy Assignment
- Set Universal Password
- Configure Email Server
- Modify Email Templates

Passwords

- Check Password Status
- Challenge Sets
- Password Policies
- Password Synchronization
- Policy Assignments
- Set Universal Password
- Email Server Options
- Edit Email Templates

UNIX Profile Management**UNIX Profiles**

This section contains information about LDAP support in OES.

- [Section 17.1, “Overview of eDirectory LDAP Services,” on page 117](#)
- [Section 17.2, “Planning eDirectory LDAP Services,” on page 117](#)
- [Section 17.3, “Coexistence and Migration of eDirectory LDAP Services,” on page 117](#)
- [Section 17.4, “eDirectory LDAP Implementation Suggestions,” on page 117](#)

17.1 Overview of eDirectory LDAP Services

Lightweight Directory Access Protocol (LDAP) Services for Novell® eDirectory™ is a server application that lets LDAP clients access information stored in eDirectory.

Most OES services leverage the LDAP server for eDirectory for authentication as illustrated in the service overviews in this guide.

17.2 Planning eDirectory LDAP Services

LDAP for eDirectory provides LDAP authentication for the objects stored in eDirectory. As you plan your eDirectory tree, be sure you understand the information in [“Understanding LDAP Services for Novell eDirectory”](#) in the *Novell eDirectory 8.7.3 Administration Guide*.

17.3 Coexistence and Migration of eDirectory LDAP Services

If you have users in an OpenLDAP database and you want to migrate them to eDirectory, you can use the Novell Import Conversion Export (ICE) Utility.

For more information, see [“Novell Import Conversion Export Utility”](#) in the *Novell eDirectory 8.7.3 Administration Guide*.

17.4 eDirectory LDAP Implementation Suggestions

For help with setting up and using LDAP for eDirectory, refer to the following sections in the *Novell eDirectory 8.7.3 Administration Guide*:

- [“Loading and Unloading LDAP Services for eDirectory”](#)
- [“Verifying That the LDAP Server Is Loaded”](#)
- [“Verifying That the LDAP Server Is Running”](#)
- [“Configuring LDAP Objects”](#)
- [“Refreshing the LDAP Server”](#)
- [“Authentication and Security”](#)
- [“Using the LDAP Server to Search the Directory”](#)

- “Configuring for Superior Referrals”
- “Persistent Search: Configuring for eDirectory Events”
- “Getting Information about the LDAP Server”

Linux Access for eDirectory Users (LUM)

18

Just as users and groups on NetWare® servers are managed through eDirectory™, users and groups on Linux servers are managed according to the POSIX (Portable Operating System Interface) standard.

Because Open Enterprise Server provides services running on both Linux and NetWare, Novell® has developed a technology that lets eDirectory users also function as “local” POSIX users on Linux servers. This technology is called Linux User Management or LUM.

The following sections outline the basic principles involved in Novell LUM and cover the following topics:

- [Section 18.1, “Overview,” on page 119](#)
- [Section 18.2, “Planning,” on page 123](#)
- [Section 18.3, “Coexistence and Migration,” on page 124](#)
- [Section 18.4, “LUM Implementation Suggestions,” on page 124](#)

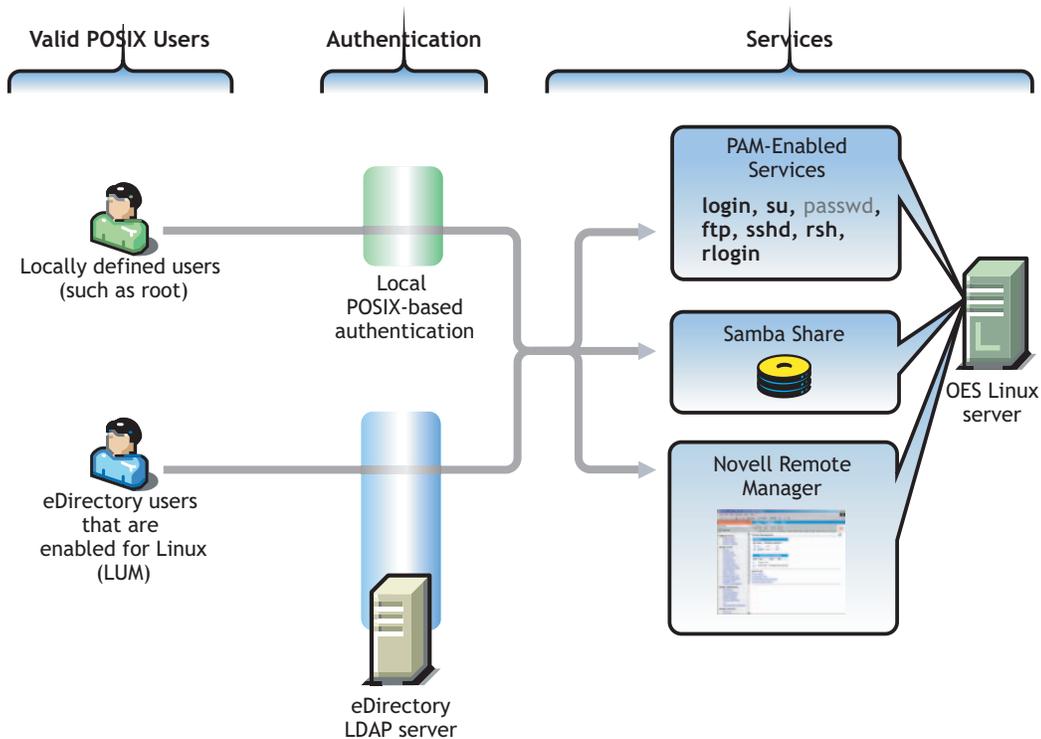
18.1 Overview

The topics in this section are designed to help you understand when Linux-enabled access is required so that your network services are accessible and work as expected. For more information about Linux User Management, see “[Overview](#)” in the *Novell Linux User Management Technology Guide*.

18.1.1 A Graphical Preview of Linux User Management

Figure 18-1 illustrates how Linux User Management controls access to the OES server.

Figure 18-1 LUM Provides POSIX Access for eDirectory Users



The following table explains the information presented in Figure 18-1.

| Valid POSIX Users | Authentication | eDirectory Authenticated Services |
|--|---|---|
| <p>Some services on OES Linux servers must be accessed by POSIX users.</p> <p>eDirectory users can function as POSIX users if they are enabled for Linux access.</p> | <p>When the system receives an action request, it can authenticate both local POSIX users and users who have been enabled for Linux access.</p> | <p>Users can potentially access PAM-enabled services, Samba shares, and Novell Remote Manager as either local or eDirectory users.</p> <p>The passwd command is not enabled for eDirectory access because eDirectory passwords are maintained in eDirectory, not on the local server.</p> |

18.1.2 Linux Requires POSIX Users

Linux requires that all users be defined using standard POSIX attributes, such as username, user ID (UID), primary group ID (GID), password, and other similar attributes.

18.1.3 Linux Users Can Be Local or Remote

Users that access a Linux server can be created

- **Locally (on the server):** Local users are managed at a shell prompt (using commands such as `useradd`) or in YaST. (See the `useradd(8)` man page and the YaST online help for more information.) These local users are stored in the `/etc/passwd` file. (See the `passwd(5)` man page for more information.)
- **Remotely (off the server):** Remote users can be managed by other systems, such as LDAP-compliant directory services. Remote user access is enabled through the Pluggable Authentication Module (PAM) architecture on Linux.

The Linux POSIX-compliant interfaces can authenticate both kinds of users, independent of where they are stored and how they are managed.

18.1.4 About Service Access on OES Linux

Novell Linux User Management (LUM) lets you use eDirectory to centrally manage remote users for access to one or more OES Linux servers.

Said another way, LUM lets eDirectory users function as local (POSIX) users on an OES Linux server. Access is enabled by leveraging the Linux Pluggable Authentication Module (PAM) architecture. PAM makes it possible for eDirectory users to authenticate with the OES Linux server through LDAP.

In OES, the terms *LUM-enabling* and *Linux-enabling* are both used to describe the process that adds standard Linux (POSIX) attributes and values to eDirectory users and groups, thus enabling them to function as POSIX users and groups on the server.

You can use iManager to enable eDirectory users for Linux. For instructions, see [Section 18.4.1, “About Enabling eDirectory Users for Linux Access,” on page 124.](#)

18.1.5 Services in OES Linux That Require Linux-Enabled Access

Some services on an OES Linux server require that eDirectory users be Linux-enabled:

- **Core Linux Utilities Enabled for LUM:** These are the core utilities and other shell commands that you specified during the OES install to be enabled for authentication through eDirectory LDAP. In Linux, these are known as PAM-enabled utilities.

IMPORTANT: Before you accept the default PAM-enabled service settings, be sure you understand the security implications explained in [Section 30.1.3, “User Restriction Limitations,” on page 165.](#)

The core utilities available for LUM-enablement are summarized in [Table 18-1.](#)

Table 18-1 PAM-enabled Services Controlled by LUM

| Command | Where Executed | Task |
|---------|--|--|
| ftp | Another host | Transfer files to and from the OES server which, in this case, is a remote host. |
| login | <ul style="list-style-type: none">• OES server• SSH session with OES server | Log in to the OES server, either directly or in an SSH session with the server. |
| passwd | <ul style="list-style-type: none">• OES• SSH session with OES server | Change the POSIX password. |
| rlogin | Another host | Log in to the OES server which, in this case, is a remote host. |
| rsh | Another host | Execute a command at the OES server which, in this case, is a remote host. |
| sshd | Another host | Establish a secure encrypted connection with the OES server which, in this case, is a remote host. |
| su | <ul style="list-style-type: none">• OES server• SSH session with OES server | Temporarily become another user. This is most often used to temporarily become the root user, who is not a LUM user and is, therefore, not affected by LUM. |

NOTE: Logging in to the OES Linux server through a PAM-enabled service for the first time causes the creation of a home directory.

- **Novell Samba (SMB/CIFS) Shares on the Server:** Windows workgroup users who need access to Samba shares defined on the server must also be Linux-enabled eDirectory users who are configured to access the server. This is because Samba requires POSIX identification for access.

By extension, NetStorage users who need access to SMB/CIFS Storage Location objects that point to the server, must also be LUM-enabled eDirectory users with access to the server.

NOTE: Although Samba users must be enabled for Linux, Samba is not a PAM-enabled service. Logging in to the OES Linux server through Samba will not create a home directory.

- **Novell Remote Manager (NRM) on Linux:** You can access NRM as
 - The root user with rights to see everything on the Linux server.
 - A local Linux user with access governed by POSIX access rights.
 - A LUM-enabled eDirectory user, such as the Admin user created during the install.
- **Novell Storage Management Services (SMS) on Linux:** You can access SMS utilities as
 - The root user with rights to see everything on the Linux server.
 - A local Linux user with access governed by POSIX access rights.
 - A LUM-enabled eDirectory user, such as the Admin user created during the install.

18.1.6 Services That Do Not Require Linux-Enabled Access but Have Some LUM Requirements

Some services do not require eDirectory users to be Linux enabled for service access:

- **QuickFinder, Novell iFolder 2.1x, and Other Web Services:** If only local users access these Web services, Linux-enabling doesn't apply because the users are not remote eDirectory users.
- **NCP Server:** The NCP™ server that has been ported to Linux remains tightly integrated with eDirectory and does not require eDirectory users to be Linux enabled.

However, when NCP volumes are created that point to partitions other than NSS on the server, not all features are available if the eDirectory user is not Linux enabled. For example, cross-protocol access is not possible if the user is not Linux enabled.

- **NSS:** eDirectory users that access NSS volumes directly using NCP (the Novell Client™) are not required to be Linux enabled.

However, if any other file access protocol is used to access NSS through the virtual file system layer that makes NSS appear to be a POSIX-compliant file system, then the users must be Linux enabled.

IMPORTANT: Although the services in this section do not require Linux-enabled access, the services themselves run as POSIX-compliant system users who function on behalf of the end users that are accessing the service.

If the services must access NSS volumes, then the system users must be Linux enabled because only eDirectory users can access NSS volumes.

For more information, see [Appendix F, “OES System Users and Groups,” on page 257](#).

18.1.7 Linux Access Is Not Global Access to OES Linux Servers

As you plan to Linux enable users for access to these services, keep in mind that each OES Linux server that Linux-enabled users need to access must be associated with a Linux-enabled group that the users belong to.

In other words, it is not sufficient to Linux-enable users for access to a single OES Linux server if they need access to multiple servers. An association between the Linux-enabled group that the users belong to and the eDirectory UNIX Workstation object associated with the server must be formed using iManager for each server the users need access to. This can be accomplished for multiple servers using the process described in [Section 18.4.3, “Enabling Users to Access Multiple OES Linux Servers,” on page 125](#).

For more information on LUM, see the *Novell Linux User Management Technology Guide*.

18.2 Planning

The following sections summarize LUM planning considerations.

18.2.1 eDirectory Admin User Is Automatically Enabled for Linux Access

When you install Linux User Management on an OES Linux server, the Admin User object that installs LUM is automatically enabled for eDirectory LDAP authentication to the server.

18.2.2 Planning Which Users to Enable for Access

You need to identify the users (and groups) who need eDirectory LDAP access to OES Linux servers.

This can be easily determined by doing the following:

1. Review the information in [Section 18.1.5, “Services in OES Linux That Require Linux-Enabled Access,”](#) on page 121.
2. Identify the servers that will run the services mentioned.
3. On your planning sheets, note the users and groups that you need to enable and the servers you need to enable them to access.

18.3 Coexistence and Migration

For coexistence and migration information, see [“Understanding the Need for Linux Enabling Users”](#) in the *Novell Server Consolidation and Migration Toolkit Administration Guide*.

18.4 LUM Implementation Suggestions

The following sections summarize LUM implementation considerations.

- [Section 18.4.1, “About Enabling eDirectory Users for Linux Access,”](#) on page 124
- [Section 18.4.2, “UNIX Workstation vs. Linux Workstation \(Naming Discrepancy\),”](#) on page 125
- [Section 18.4.3, “Enabling Users to Access Multiple OES Linux Servers,”](#) on page 125
- [Section 18.4.4, “Enabling eDirectory Groups for Linux Access,”](#) on page 125
- [Section 18.4.5, “Enabling eDirectory Users for Linux Access,”](#) on page 126
- [Section 18.4.6, “Refreshing the User List in the KDE Login Screen,”](#) on page 127

18.4.1 About Enabling eDirectory Users for Linux Access

You can enable eDirectory users for Linux User Management using either iManager 2.5 or the `nambulkadd` command.

- **iManager:** You can enable existing eDirectory users for Linux access using the Linux User Management tasks in iManager.

You can enable multiple users in the same operation as long as they can be assigned to the same primary Linux-enabled group. The enabling process lets you associate the group with one or

more OES Linux servers or Linux workstations. For more information, see [Section 18.4.3, “Enabling Users to Access Multiple OES Linux Servers,”](#) on page 125.

- **nambulkadd:** If you have eDirectory users and groups that need to be enabled for Linux access, you can use the nambulkadd command to modify multiple objects simultaneously. For more information, see the *Novell Linux User Management Technology Guide*.

18.4.2 UNIX Workstation vs. Linux Workstation (Naming Discrepancy)

When using iManager to manage OES Linux access, you might notice a discrepancy in naming.

When OES Linux servers are created, a UNIX Workstation - *server_name* object is created in eDirectory, where *server_name* is the DNS name of the OES Linux server. The iManager Linux User Management plug-in refers to these server objects as “Linux Workstation” objects.

Both “UNIX Workstation” and “Linux Workstation” refer to the same eDirectory objects.

18.4.3 Enabling Users to Access Multiple OES Linux Servers

IMPORTANT: Users gain server access through their Linux-enabled group assignment rather than through a direct assignment to the UNIX Workstation (Linux Workstation) objects themselves.

You can enable users for access to multiple OES Linux servers by associating the Linux-enabled group to which users belong with each UNIX Workstation (Linux Workstation) object you want users to have access to.

18.4.4 Enabling eDirectory Groups for Linux Access

There are two methods for enabling eDirectory groups for Linux access:

Using LUM Utilities at the Shell Prompt to Enable/Create Multiple Groups

Novell Linux User Management includes utilities for creating new Linux-enabled groups, and for enabling existing eDirectory groups for Linux access.

The nambulkadd utility lets you use a text editor to create a list of groups you want enabled for Linux access. For more information, see “nambulkadd” in the *Novell Linux User Management Technology Guide*.

IMPORTANT: Be sure to include a blank line at the end of each text file. Otherwise, the last line of the file won’t be processed properly.

The namgroupadd utility lets you create a new Linux-enabled group or enable an existing eDirectory group for Linux access. For more information, see “namgroupadd” in the *Novell Linux User Management Technology Guide*.

Using iManager

The following steps assume that the eDirectory Group objects already exist and that any User objects you want to enable for Linux also exist and have been assigned to the groups.

- 1 Log in to iManager as the eDirectory Admin user or equivalent.
- 2 Click *Linux User Management > Enable Groups for Linux*.
- 3 Browse to and select one or more Group objects, then click *OK*.
- 4 If you want all users assigned to the group to be enabled for Linux, make sure the *Linux-Enable All Users in These Groups* option is selected.
- 5 Click *Next* twice.
- 6 Browse to and select one or more UNIX Workstation (OES Linux server) objects, then click *OK*.
- 7 Click *Next*, click *Finish*, then click *OK*.

18.4.5 Enabling eDirectory Users for Linux Access

There are two methods for enabling eDirectory users for Linux access:

Using LUM Utilities at the Shell Prompt to Enable/Create Multiple Users

Novell Linux User Management includes utilities for creating new Linux-enabled users, and for enabling existing eDirectory users for Linux access.

The `nambulkadd` utility lets you use a text editor to create a list of users you want enabled for Linux access. For more information, see “`nambulkadd`” in the [Novell Linux User Management Technology Guide](#).

IMPORTANT: Be sure to include a blank line at the end of each text file. Otherwise, the last line of the file won't be processed properly.

The `namuseradd` utility lets you create a single Linux-enabled user or enable an existing eDirectory user for Linux access. For more information, see “`namuseradd`” in the [Novell Linux User Management Technology Guide](#).

Using iManager

The following steps assume that the eDirectory User objects already exist.

- 1 Log in to iManager as the eDirectory Admin user or equivalent.
- 2 Click *Linux User Management > Enable Users for Linux*.
- 3 Browse to and select one or more User objects, then click *OK*.
- 4 Click *Next*.
- 5 As indicated, you can do the following:
 - Select and enable an existing eDirectory group for Linux.
 - Select an eDirectory group that is already enabled for Linux.
 - Specify the name and context of a new eDirectory group to create and enable for Linux.

Select the option that matches your requirements.

- 6 Click *Next*.
- 7 Browse to and select one or more UNIX Workstation (OES Linux server) objects, then click *OK*.
- 8 Click *Next*, click *Finish*, then click *OK*.

18.4.6 Refreshing the User List in the KDE Login Screen

After you create and enable an eDirectory user for Linux access, the user doesn't initially appear on the KDE Login screen. However, the user has Linux access and can log in.

If you want the user to appear in the list, you can refresh the list by logging in as the root user and restarting the `named` process.

At a shell prompt, enter the following command:

```
/etc/init.d/named restart
```


Infrastructure Services



- Chapter 19, “Auditing,” on page 131
- Chapter 20, “Authentication,” on page 133
- Chapter 21, “Backup,” on page 137
- Chapter 22, “Clustering and Failover,” on page 139
- Chapter 23, “Databases,” on page 141
- Chapter 24, “DNS, DHCP, and OpenSLP,” on page 143
- Chapter 25, “File Systems and Storage Services,” on page 145
- Chapter 26, “IPX and TCP/IP,” on page 155
- Chapter 27, “iSCSI,” on page 157
- Chapter 28, “Licensing,” on page 159
- Chapter 29, “Search,” on page 161
- Chapter 30, “Security,” on page 163
- Chapter 31, “Time Synchronization,” on page 171
- Chapter 32, “Web and Application Services,” on page 185

Auditing

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OES NetWare includes NSure Audit 1.0.3 Starter Pack, and the applicable documentation is included in the OES documentation set. For direct links to the documentation included with OES NetWare, see the topics in “[Auditing \(Nsure Audit\)](#)” in the OES online documentation.

OES Linux does not include an audit starter pack. However, the Novell Audit 2.0 Starter Pack is supported on OES Linux and is available for download at no cost from the [Novell Download Site \(http://www.novell.com/downloads\)](http://www.novell.com/downloads). Documentation for Novell Audit 2.0 is available on the [Novell Documentation Web site \(http://www.novell.com/documentation/novellaudit20/treetitl.html\)](http://www.novell.com/documentation/novellaudit20/treetitl.html).

This section contains the following topics:

- [Section 20.1, “Overview of Authentication Services,” on page 133](#)
- [Section 20.2, “Planning for Authentication,” on page 135](#)
- [Section 20.3, “Authentication Coexistence and Migration,” on page 136](#)
- [Section 20.4, “Configuring and Administering Authentication,” on page 136](#)

20.1 Overview of Authentication Services

This section provides specific overview information for the following key OES components:

- [Section 20.1.1, “NetIdentity Agent,” on page 133](#)
- [Section 20.1.2, “Novell Modular Authentication Services \(NMAS\),” on page 133](#)
- [Section 20.1.3, “Password Support in OES,” on page 134](#)

For more authentication topics, see the [OES online documentation](#).

20.1.1 NetIdentity Agent

In OES, the NetIdentity Agent works with Novell® eDirectory™ authentication to provide background authentication to Windows Web-based applications that require eDirectory authentication through a secure identity “wallet” on the workstation. Applications access the eDirectory credentials without prompting users for a username and password.

The NetIdentity Agent supports applications running on OES server platforms as follows:

- **OES Linux:** NetStorage
- **OES NetWare:** Virtual Office, NetStorage, and iPrint (if authentication is required)

NetIdentity Agent browser authentication is supported only by Windows Internet Explorer.

The Novell Client™ provides authentication credentials to NetIdentity, but it does not obtain authentication credentials from NetIdentity because it is not a Web-based application.

NetIdentity Agent requires

- XTier (NetStorage) on the OES server in the URL for the Web-based applications.
- The NetIdentity agent installed on the workstations.

For more information on using the NetIdentity agent, see the [NetIdentity Administration Guide for NetWare 6.5](#).

20.1.2 Novell Modular Authentication Services (NMAS)

Novell Modular Authentication Service (NMAS™) lets you protect information on your network by providing various authentication methods to Novell eDirectory on NetWare®, Windows, and UNIX networks.

These login methods are based on three login factors:

- Password
- Physical device or token
- Biometric authentication

For example:

- You can have users log in using only a password, a fingerprint scan, a token, a smart card, a certificate, or a proximity card, etc.
- You can have users log in using a combination of methods, thus providing a higher level of security.

Some login methods require additional hardware and software. You must ensure you have all of the necessary hardware and software for the methods to be used.

NMAS software consists of the following:

- **NMAS server components:** Installed as part of OES.
- **The NMAS Client:** Required on each Windows workstation that will be authenticating using NMAS.

Support for Third-Party Authentication Methods

NMAS includes several login methods on the Novell Client CD in the `nmas\nmasmethods` folder.

Other third-party methods are available for download. For information on the available third-party login methods, see the [NMAS Partner's Web site \(http://www.novell.com/products/nmas/partners\)](http://www.novell.com/products/nmas/partners). Each method has a `readme.txt` file or a `readme.pdf` file that includes specific installation and configuration instructions.

More Information

For more information on how to use NMAS, see the *Novell Modular Authentication Services (NMAS) 2.3 Administration Guide* (<http://www.novell.com/documentation/lg/nmas23>).

20.1.3 Password Support in OES

In the past, administrators have had to manage multiple passwords (simple password, NDS[®] passwords, Samba passwords) because of password differences. Administrators have also had to deal with keeping the passwords synchronized.

In OES you have the choice of retaining your current password maintenance methods or deploying Universal Password to simplify password management. In either case, if you deploy Virtual Office, users can manage their own passwords. For more information, see “**Change Password**” in the *Novell Virtual Office Configuration Guide*. Also see “**Password Self-Service**” in the *Novell Nsure Identity Manager 2.0.1 Administration Guide*.

All Novell products and services are being developed to work with extended character (UTF-8-encoded) passwords. For a current list of products and services that work with extended characters, see [Novell TID 10083884 \(http://support.novell.com/servlet/tidfinder/10083884\)](http://support.novell.com/servlet/tidfinder/10083884).

The password types supported in eDirectory are summarized in [Table 20-1](#).

Table 20-1 eDirectory Password Types

| Password Type | Description |
|---------------|---|
| NDS | The NDS password is stored in a hash form that is nonreversible in eDirectory. Only the NDS system can make use of this password, and it cannot be converted into any other form for use by any other system. |
| Samba | <p>In OES, Samba users get a Universal Password policy assigned by default.</p> <p>OES also supports the Samba hash password if desired. However, you must choose to not deploy Universal Password if you want to use the Samba hash password. Choosing the Samba password requires that users always remember to synchronize it when changing their eDirectory password.</p> <p>For more information, see Section G.6.5, “Samba Passwords,” on page 279 and Section 10.4.3, “The Samba Proxy User Password Must Be Managed Separately,” on page 78.</p> |
| Simple | <p>The simple password provides a reversible value stored in an attribute on the User object in eDirectory. NMAS securely stores a clear-text value of the password so that it can use it against any type of authentication algorithm. To ensure that this value is secure, NMAS uses either a DES key or a triple DES key (depending on the strength of the Secure Domain Key) to encrypt the data in the NMAS Secret and Configuration Store.</p> <p>The simple password was originally implemented to allow administrators to import users and hashed passwords from other LDAP directories such as Active Directory and iPlanet*.</p> <p>The limitations of the simple password are that no password policy (minimum length, expiration, etc.) is enforced. Also, by default, users do not have rights to change their own simple passwords.</p> |
| Universal | <p>Universal Password (UP) enforces a uniform password policy across multiple authentication systems by creating a password that can be used by all protocols and authentication methods.</p> <p>Universal Password is managed in iManager by the Secure Password Manager (SPM), a component of the NMAS module installed on OES servers. All password restrictions and policies (expiration, minimum length, etc.) are supported.</p> <p>All the existing management tools that run on clients with the UP libraries automatically work with the Universal Password.</p> <p>Universal Password is not automatically enabled unless you install Novell Samba on an OES Linux server. You can optionally choose to have the Samba hash password stored separately. This requires, however, that users always synchronize the Samba password when changing their eDirectory password.</p> <p>The Novell Client supports the Universal Password. It also supports the NDS password for older systems in the network. The Novell Client automatically upgrades to use Universal Password when UP is deployed.</p> <p>For more information, see “Deploying Universal Password” in the <i>Novell Modular Authentication Services (NMAS) 2.4 Administration Guide</i>.</p> |

20.2 Planning for Authentication

For planning topics, see the [Authentication section in the OES online documentation](#).

20.3 Authentication Coexistence and Migration

For authentication- and security-related coexistence and migration information, see “[Security and Certificate Management](#)” in the *OES Coexistence and Migration Guide*.

20.4 Configuring and Administering Authentication

For a list of configuration and administration topics, see the [Authentication section in the OES online documentation](#).

Backup

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See the topics in “[Backup \(SMS\)](#)” in the OES online documentation.

Clustering and Failover

22

See the topics in “[Clustering and Failover](#)” in the OES online documentation.

Databases

23

See the topics in “[Databases](#)” in the OES online documentation.

IMPORTANT: NetWare[®] uses Novell[®] SLP, which provides synchronization between Directory Agents (DAs) that are in the same eDirectory[™] context.

OpenSLP on Linux is not customized to provide DA synchronization.

For links to documentation on these discovery protocols, see the topics in “[DNS, DHCP, and SLP](#)” in the OES online documentation.

Use this section to understand the file storage solutions available in OES and then to plan a storage solution that meets your file system management needs.

The “[File Systems and Storage Services](#)” section in the OES online documentation provides overview, planning, implementation, and configuration links.

This section provides the following information about the process of planning and implementing storage services in OES:

- [Section 25.1, “Overview of OES Storage,” on page 145](#)
- [Section 25.2, “Planning OES File Storage,” on page 149](#)
- [Section 25.3, “Coexistence and Migration of Storage Services,” on page 150](#)
- [Section 25.4, “Initial Setup Is Required for NetWare,” on page 151](#)
- [Section 25.5, “Configuring and Maintaining Storage,” on page 151](#)

Other storage-related topics in this guide:

- [Chapter 33, “Access,” on page 189](#)
- [Chapter 20, “Authentication,” on page 133](#)
- [Chapter 21, “Backup,” on page 137](#)
- [Chapter 35, “File Services,” on page 207](#)

25.1 Overview of OES Storage

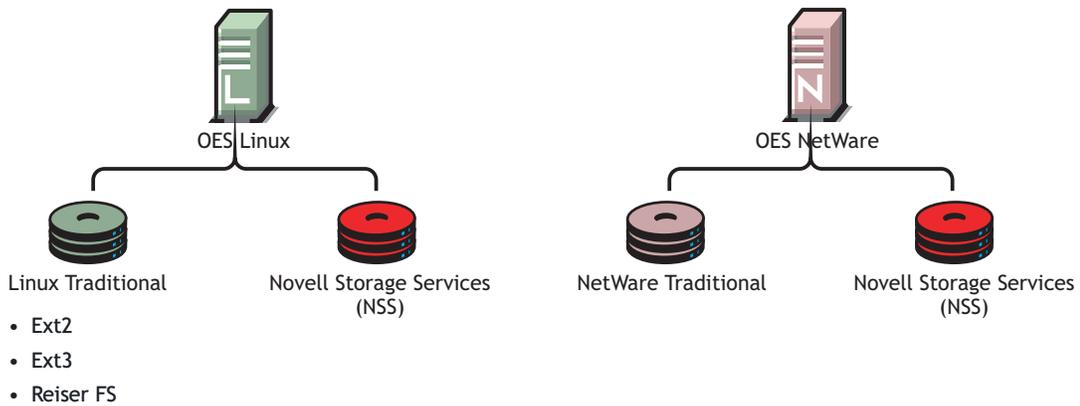
This section presents the following overview information for the file systems included in OES:

- [Section 25.1.1, “File System Support in OES,” on page 146](#)
- [Section 25.1.2, “Storage Basics by Platform,” on page 148](#)
- [Section 25.1.3, “Storage Options,” on page 148](#)
- [Section 25.1.4, “NetWare Core Protocol Support \(Novell Client Support\) on Linux,” on page 149](#)

25.1.1 File System Support in OES

As shown in [Figure 25-1 on page 146](#), both OES server platforms support Novell® Storage Services™ as well as their traditional file systems.

Figure 25-1 File System Choices on OES Servers



[Table 25-1](#) summarizes OES file system types and provides links to more information.

Table 25-1 File Systems Available on OES Servers

| File System Type | Summary | Link for More Information |
|----------------------------------|--|--|
| Linux Traditional File Systems | <p>SLES 9 supports a number of different file systems, the most common of which are Ext2, Ext3, and Reiser FS.</p> <p>There are no differences in support for OES services on the various Linux traditional file systems.</p> <p>There are differences in service support between Linux Traditional and Novell Storage Services (NSS) on OES Linux. For more information, see Figure 25-2 on page 150.</p> | <p>For an overview of the supported file systems on SLES 9, see “File Systems in Linux” in the <i>SUSE LINUX Enterprise Server 9 Administration Guide</i>.</p> |
| NetWare® Traditional File System | <p>Although it is considered a legacy file system on NetWare servers, the NetWare Traditional file system is still robust. And it supports the NetWare file service access model.</p> | <p>For more information, see the <i>NetWare Traditional File System Administration Guide for OES</i>.</p> |

| File System Type | Summary | Link for More Information |
|-------------------------------|--|--|
| Novell Storage Services (NSS) | <p>NSS lets you manage your shared file storage for any size organization.</p> <p>On Netware, NSS features include visibility, a trustee access control model, multiple simultaneous name space support, native Unicode*, user and directory quotas, rich file attributes, multiple data stream support, event file lists, and a file salvage subsystem.</p> <p>Many of these features are also supported on NSS on Linux. For a feature comparison, see “Comparison of NSS on NetWare and NSS on Linux” in the <i>Novell Storage Services File System Administration Guide for OES</i>.</p> | <p>For an overview of NSS, see “Overview of NSS” in the <i>Novell Storage Services File System Administration Guide for OES</i>.</p> |

Novell Storage Services (NSS)

The following sections summarize key points regarding NSS.

Understanding NSS Nomenclature

NSS uses a specific nomenclature to describe key media objects. These terms appear in both the NSS documentation and in NSS error messages.

For more information, see [“NSS Nomenclature”](#) in the *Novell Storage Services File System Administration Guide for OES*.

Comparing NSS with Other File Systems

Because OES supports a variety of file systems, you might want to compare their features and benefits as outlined in the following sections of the *Novell Storage Services File System Administration Guide for OES*:

- **NSS Linux vs. NSS NetWare:** [“Comparison of NSS on NetWare and NSS on Linux”](#)
- **NSS Linux vs. Linux Traditional:** [“Comparison of NSS for Linux and Linux Traditional File Systems”](#)
- **NSS Netware vs. NetWare Traditional:** [“Comparison of NSS on NetWare and the NetWare Traditional File System”](#)

NSS and Storage Devices

NSS supports both physical devices (such as hard disks) and virtual devices (such as software RAIDs and iSCSI devices).

For more information on the various devices that NSS supports, see [“Managing Devices”](#) in the *Novell Storage Services File System Administration Guide for OES*.

25.1.2 Storage Basics by Platform

The following sections summarize storage basics for Linux and NetWare.

Linux and File Systems

For a high-level overview of the file system on Linux, including the `root (/)` directory, mount points, standard folders, and case sensitivity, see “[Understanding Directory Structures in Linux Traditional File Systems](#)” in the *File Systems Management Guide for OES*.

NetWare Directories

NetWare uses volumes and directories (or folders) to organize data. NetWare file systems support directory paths, fake root directories, Directory Map objects, and drive mappings.

For more information, see “[Understanding NetWare Directory Structures](#)” in the *File Systems Management Guide for OES*.

NetWare Storage Devices

NetWare lets you use many different kinds of storage devices, including server disks, single storage devices, arrays of storage devices, and virtual storage devices.

To understand how NetWare connects with and uses storage devices, see “[Overview of Server Disks and Storage Devices for NetWare](#)” in the *OES Server Disks and Storage Devices for NetWare*.

25.1.3 Storage Options

The following sections summarize OES storage options.

Direct-Attached Storage Options (NSS and Traditional)

As shown in [Figure 25-1 on page 146](#), you can install traditional volumes and Novell Storage System (NSS) volumes on both OES platforms. These devices can be installed within the server or attached directly to the server through an external SCSI bus.

For more information, see “[Direct Attached Storage Solutions](#)” in the *Storage and File Services Overview for OES*.

Advanced Storage Options (NSS Only)

NSS Volumes support the following advanced storage solutions, as documented in the *Storage and File Services Overview for OES*.

- “[Network Attached Storage Solutions](#)”

A dedicated data server or appliance that provides centralized storage access for users and application servers through the existing network infrastructure and by using traditional LAN protocols such as Ethernet and TCP/IP. When Gigabit Ethernet is used, access speeds are similar to direct attached storage device speeds.

The downside is that data requests and data compete for network bandwidth.

- “[Storage Area Network Solutions](#)”

A separate, dedicated data network consisting of servers and storage media that are connected through high-speed interconnects, such as

- “**Novell iSCSI**”

You can create a SAN using Novell iSCSI, which uses Novell eDirectory™ to manage iSCSI resources, including granting trustee rights and user file access.

- “**Fault Tolerant and High Availability Architectures**”

Use one or more of the following technologies:

- “**Multiple Path I/O**”: NSS helps prevent failure in the connection between the CPU and the storage device by automatically identifying multiple paths between each NetWare server and its storage devices.

For more information, see “**Managing Multiple Connection Paths to Devices (NetWare)**” in the *Novell Storage Services File System Administration Guide for OES*.

- “**Software RAID**s”: NSS supports software RAID to improve storage availability and performance by enhancing data fault tolerance and I/O performance.

For more information, see “**Managing Software RAID Devices**” in the *Novell Storage Services File System Administration Guide for OES*.

- “**Server Clusters**”: You can configure up to 32 NetWare servers into a high-availability cluster wherein resources and services are dynamically allocated to any server in the cluster and automatically switched to another server if the hosting server fails.

By manually switching services, IT organizations can maintain and upgrade servers during production hours and eliminate scheduled downtime.

For more information, see the *OES Novell Cluster Services 1.8.2 Administration Guide for NetWare* and the *iSCSI 1.1.3 Administration Guide for NetWare 6.5*.

25.1.4 NetWare Core Protocol Support (Novell Client Support) on Linux

Many organizations rely on Novell Client™ software and the NetWare Core Protocol™ (NCP™) for highly secure access to file storage services.

The NCP server for OES Linux lets you attach to Linux using Novell Client software. For more information, see [Section 35.6, “NCP Implementation and Maintenance,” on page 226](#).

25.2 Planning OES File Storage

The following sections can help you plan for storage on your OES network:

- [Section 25.2.1, “Directory Structures,” on page 149](#)
- [Section 25.2.2, “File Service Support Considerations,” on page 150](#)
- [Section 25.2.3, “General Requirements for Data Storage,” on page 150](#)
- [Section 25.2.4, “NSS Planning Considerations,” on page 150](#)

25.2.1 Directory Structures

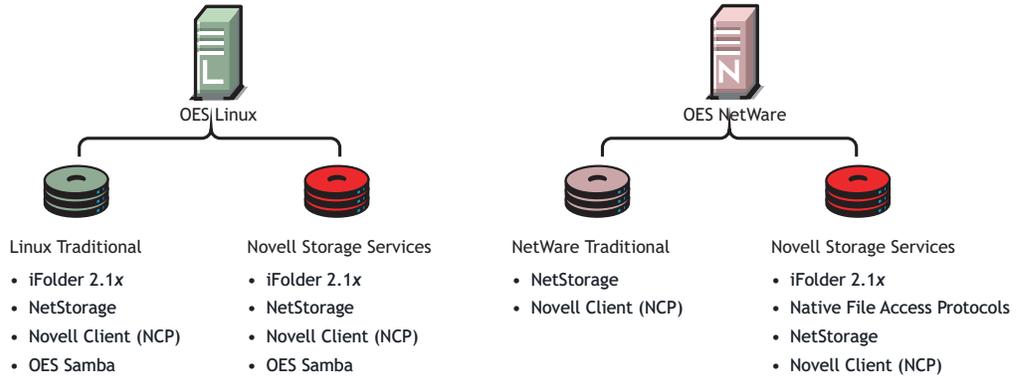
Linux: To plan the directory structures you need on OES Linux, see “[Understanding Directory Structures in Linux Traditional File Systems](#)” in the *File Systems Management Guide for OES*.

Netware: To plan the directory structures you need on OES NetWare, see “[Planning Directory Structures for NetWare](#)” in the *File Systems Management Guide for OES*.

25.2.2 File Service Support Considerations

Figure 25-2 shows which file services can access which volume types.

Figure 25-2 File Services Supported on Volume Types



25.2.3 General Requirements for Data Storage

Finding the right storage solution requires you to identify your data storage requirements. You might want to compare your list of requirements against those described in “[Storage Solutions](#)” in the *Storage and File Services Overview for OES*.

25.2.4 NSS Planning Considerations

Consider the following when planning for NSS:

Device Size Limit

NSS recognizes logical or physical devices up to 2 terabytes (TB) in size. If you have a storage disk larger than 2 TB, use the storage device’s management utility to carve the disk into smaller logical devices to use with the NSS file system.

This is especially important to remember when planning for NSS volumes on Linux because the size limit for Linux traditional volumes is 8 terabytes.

Other NSS Planning Topics

To plan for NSS volumes—including prerequisites, security considerations, and moving volumes between Linux and NetWare—see “[Planning for NSS Storage Solutions](#)” in the *Novell Storage Services File System Administration Guide for OES*.

25.3 Coexistence and Migration of Storage Services

The following sections summarize the coexistence and migration issues related to storage services.

25.3.1 NetWare Traditional File System

You can upgrade both NetWare Traditional volumes and Legacy NSS volumes to OES.

For more information, see “[Upgrading Legacy NSS and NetWare Traditional Volumes](#)” in the *Novell Storage Services File System Administration Guide for OES*.

25.3.2 NSS

Supporting NSS volumes in a mixed environment and migrating data between OES platforms presents a number of possibilities for your storage solutions. To ensure success, however, you must fully understand the proper methods and limitations involved.

To learn about and deal with coexistence and migration issues pertaining to NSS volumes, see “[Coexistence and Migration Issues](#)” in the *Novell Storage Services File System Administration Guide for OES*.

25.4 Initial Setup Is Required for NetWare

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 *Novell Storage Services File System Administration Guide for OES*.

25.5 Configuring and Maintaining Storage

This section covers the following topics:

- [Section 25.5.1, “Managing Directories and Files,”](#) on page 151
- [Section 25.5.2, “Managing NSS,”](#) on page 151
- [Section 25.5.3, “Optimizing Storage Performance,”](#) on page 153
- [Section 25.5.4, “Disk Management on NetWare,”](#) on page 153

25.5.1 Managing Directories and Files

To learn about managing directories and files for the OES server type, see the following sections in the *File Systems Management Guide for OES*.

- **Linux:** “[Understanding Directory Structures in Linux Traditional File Systems](#)”
- **NetWare:** “[Configuring Directories for NetWare and NSS on Linux](#)”

25.5.2 Managing NSS

Use the links in [Table 25-2](#) to find information on the many management tasks associated with NSS volumes.

Table 25-2 NSS Management

| Category/Feature | Description | Link |
|---------------------------------|--|--|
| Compression | Conserve disk space and increase the amount of data a volume can store. | “Managing Compression on NSS Volumes” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Console Commands | Manage NSS volumes at an OES NetWare server console or an OES Linux shell. | “Using NSS Commands and Utilities” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Distributed File Services (DFS) | Use DFS Junctions to transparently redirect data requests, split volumes while maintaining transparent access, and quickly move volume data to another volume. | “Using Distributed File Services to Move and Split Volumes (NetWare)” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Encryption | Create and manage encrypted NSS volumes that make data inaccessible to software that circumvents normal access control. | “Managing Encrypted NSS Volumes” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| EVMS | Use EVMS, which is required for NSS, to manage volumes on Linux, including the system (root [/]) volume if NSS is installed on the same disk. | “Using EVMS to Manage Devices with NSS Volumes (Linux)” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Hard Links | Create multiple names for a single file in the same or multiple directories in an NSS volume. | “Managing Hard Links” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Multipath Support (NetWare) | Manage the dynamic, multiple, redundant connection paths NSS creates between a NetWare server and its external storage devices. | “Managing Multiple Connection Paths to Devices (NetWare)” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Partitions | Manage partitions on NSS volumes. | “Managing Partitions” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Pools | Create and manage NSS pools. | “Managing NSS Pools” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Tools | Learn about the various tools available to manage NSS volumes, the tool capabilities, and how to use them. | “Management Tools for NSS” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| Troubleshooting | Troubleshoot NSS on OES Linux and OES Netware. | “Troubleshooting the NSS File System” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |

| Category/Feature | Description | Link |
|------------------|---|--|
| Volumes | Create and manage NSS volumes in NSS pools. | “Managing NSS Volumes” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |
| | Monitor NSS file systems. | “Monitoring the NSS File System Status” in the <i>Novell Storage Services File System Administration Guide for OES</i> . |

25.5.3 Optimizing Storage Performance

- **NSS on Linux:** [“Configuring the System Cache to Fine-Tune NSS Performance \(Linux\)”](#) in the *Novell Storage Services File System Administration Guide for OES*
- **NSS on NetWare:** [“Configuring the System Cache to Fine-Tune NSS Performance \(NetWare\)”](#) in the *Novell Storage Services File System Administration Guide for OES*

25.5.4 Disk Management on NetWare

Disk management is obviously central to providing storage services. To plan how you will add, allocate, maintain, and remove disks accessed by OES NetWare servers, see *OES Server Disks and Storage Devices for NetWare*.

IPX and TCP/IP

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See the topics in “[IPX and TCP/IP](#)” in the OES online documentation.

See the topics in “**iSCSI**” in the OES online documentation.

This section explains the following:

- [Section 28.1, “The OES Licensing Model,” on page 159](#)
- [Section 28.2, “Licensing on OES NetWare,” on page 159](#)
- [Section 28.3, “Licensing on OES Linux,” on page 160](#)
- [Section 28.4, “Configuring and Administering Licensing Services,” on page 160](#)

28.1 The OES Licensing Model

All OES licenses are purchased on a user-connection basis. The number of servers you are authorized to install is different for each platform, as follows:

- **OES NetWare Servers:** The only licensing restriction that applies is the number of user connections allowed on your network. You are authorized to install as many OES NetWare[®] servers as you need to provide services to those users.

For example, if your OES license is for 100 user connections, you can install as many OES NetWare servers as desired. Up to 100 users can then connect to and use the services provided by the OES NetWare servers.

- **OES Linux Servers:** The same restriction applies to the number of user connections allowed on your network. However, in contrast to OES NetWare, the number of OES Linux servers you are authorized to install is also restricted, as follows:
 - For the first 50 licensed user connections, you are authorized to install one OES Linux server for every ten connections.
 - After the first 50 user connections, you are authorized to install one OES Linux server for every 50 connections.

For example, if your OES license is for 100 user connections, you are authorized to install up to six OES Linux servers (five for the first 50 connections and one for the remaining 50 connections).

For more information on OES licensing, see the [OES Licensing page on the Novell Web site \(http://www.novell.com/licensing/oes_licensing.html\)](http://www.novell.com/licensing/oes_licensing.html).

28.2 Licensing on OES NetWare

When you install or upgrade NetWare, the server installation software automatically installs the Novell[®] Licensing Services (NLS) software. During the installation of the first NetWare server in a tree, you are prompted for a license/key file pair (*.nlf and *.nfk).

After installing OES, you can use Novell iManager to install and manage license certificates in your eDirectory[™] tree and monitor NetWare usage. You can also monitor usage of Novell Licensing Services-enabled products.

For information, see “[How Novell Licensing Services Works](#)” in the *OES Licensing Services Administration Guide for NetWare*.

28.3 Licensing on OES Linux

In contrast with installing OES on the NetWare platform, installing OES on the Linux platform doesn't require a license/key file pair (*.nlf and *.nfk).

Nevertheless, you are required to accept an end user license agreement (EULA) to install OES on either platform. Your rights to use the OES product are limited to the rights set forth in the EULA.

Violators of Novell's license agreements and intellectual property are prosecuted to the fullest extent of the law.

To report piracy and infringement violations, please call 1-800-PIRATES (800-747-2837) or send e-mail to pirates@novell.com (pirates@novell.com).

28.4 Configuring and Administering Licensing Services

See the topics in “[Licensing \(NLS\)](#)” in the OES online documentation.

Search

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See the topics in “[Search \(QuickFinder\)](#)” in the OES online documentation.

This section contains the following topics:

- [Section 30.1, “Overview of OES Security Services,” on page 163](#)
- [Section 30.2, “Planning for Security,” on page 165](#)
- [Section 30.3, “Security Coexistence and Migration,” on page 165](#)
- [Section 30.4, “Configuring and Administering Security,” on page 165](#)
- [Section 30.5, “Comparing the Linux and the NetWare Core Protocol \(NCP\) File Security Models,” on page 166](#)
- [Section 30.6, “Advanced Certificate Information for OES Linux,” on page 168](#)
- [Section 30.7, “Links to Product Security Considerations Sections,” on page 169](#)

30.1 Overview of OES Security Services

This section provides specific overview information for the following key OES components:

- [Section 30.1.1, “Encryption \(NICI\),” on page 163](#)
- [Section 30.1.2, “Novell Certificate Server,” on page 164](#)
- [Section 30.1.3, “User Restriction Limitations,” on page 165](#)

For more authentication and security topics, see the [OES online documentation](#).

30.1.1 Encryption (NICI)

The Novell[®] International Cryptography Infrastructure (NICI) is the Novell solution to a cross-platform, policy-driven, independently certified, and extensible cryptography service. NICI is the cryptography module that provides keys, algorithms, various key storage and usage mechanisms, and a large-scale key management system.

NICI controls the introduction of algorithms and the generation and use of keys. It allows production of a single commodity version of security products that support strong cryptography and multiple cryptographic technologies for worldwide consumption. Initial services built on this infrastructure are Directory Services (Novell eDirectory[™]), Novell Modular Authentication Services (NMA[™]), Novell Certificate Server[™], Novell SecretStore[®], and TLS/SSL.

Key Features

NICI includes the following key features:

- **Supports industry standards:** Is implemented following recognized industry standards.
- **Certified:** Is FIPS-140-1 certified on selected platforms.
- **Cross-platform support:** Is available on both OES platforms.
- **Complies with governmental export and import regulations:** Has cryptographic interfaces that are exportable from the U.S. and importable into other countries with government-imposed

constraints on the export, import, and use of products that contain embedded cryptographic mechanisms.

- Secure and tamper-resistant architecture: The architecture uses digital signatures to implement a self-verification process so that consuming services are assured that NCI has not been modified or tampered with when it is initialized.

More Information

For more information on how to use NCI, see the *NCI 2.6x Administration Guide* (<http://www.novell.com/documentation/lg/nici20>).

30.1.2 Novell Certificate Server

Novell Certificate Server provides public key cryptography services that are natively integrated into Novell eDirectory.

These services let you mint, issue, and manage both user and server certificates to protect confidential data transmissions over public communications channels such as the Internet.

Novell Certificate Server lets you

- Provide public key cryptography services for your network.

You can choose to

- Create an Organizational Certificate Authority (CA) in eDirectory and issue as many user and server certificates as needed.
- Use the services of an external certificate authority.
- Use a combination of both as your needs dictate.
- Avoid the costs associated with obtaining and managing public key certificates by creating an Organizational CA to issue public key certificates.
- Make public key certificates openly available while protecting them against tampering and leveraging eDirectory replication and access control features.
- Expose private keys to only the software routines that use them for signing and decrypting operations.
- Securely back up NCI-encrypted private keys using standard eDirectory backup utilities.
- Centrally administer certificates using ConsoleOne[®]. The Novell iManager plug-in also lets you do some administration tasks.
- Let users export their own certificates using ConsoleOne for use in cryptography-enabled applications.
- Create and manage user certificates for
 - GroupWise[®] 5.5 and later.
 - Microsoft Outlook 98 and Outlook 2000.
 - Netscape* Messenger* and other popular e-mail clients.
 - Netscape Navigator*.
 - Microsoft Internet Explorer.

For more information on how to use Novell Certificate Server, see the *Novell Certificate Server 2.7 Administration Guide* (<http://www.novell.com/documentation/lg/crt27>).

30.1.3 User Restriction Limitations

Seasoned NetWare[®] administrators are accustomed to being able to set the following various access restrictions on users:

- Account balance restrictions
- Address restrictions
- Intruder lockout
- Login restrictions
- Password restrictions
- Time restrictions

Many of the management interfaces that set these restrictions (iManager, for example), might seem to imply that these restrictions apply to users who are accessing an OES server using any protocol.

This is generally true, with two important exceptions:

- Maximum number of concurrent connections in login restrictions
- Address restrictions

These two specific restrictions are enforced only for users that are accessing the server using NCP[™]. Connections through other access protocols (for example, HTTP or CIFS) have no concurrent connection or address restrictions imposed.

For this reason, you will probably want to consider not enabling services such as ssh and ftp for PAM access when setting up Linux User Management.

For more information on Linux User Management, see “[Linux Access for eDirectory Users \(LUM\)](#)” on page 119. For more information on the services that can be PAM-enabled, see [Table 18-1](#) on page 122.

30.2 Planning for Security

For planning topics, see the [Security section in the OES online documentation](#).

30.3 Security Coexistence and Migration

For authentication- and security-related coexistence and migration information, see “[Security and Certificate Management](#)” in the *OES Coexistence and Migration Guide*.

30.4 Configuring and Administering Security

For a list of configuration and administration topics, see the [Security section in the OES online documentation](#).

30.5 Comparing the Linux and the NetWare Core Protocol (NCP) File Security Models

The NetWare (NSS/NCP) and Linux (POSIX) security models are quite different, as presented in [Table 30-1](#).

Table 30-1 *POSIX Vs. NSS/NCP File Security Models*

| Feature | POSIX / Linux | NSS/NCP on OES Linux |
|---------------------------|--|---|
| Administrative principles | <p>Permissions are controlled and managed for each file and subdirectory individually.</p> <p>Because of the nature of the POSIX security model, users usually have read rights to most of the system.</p> <p>To make directories and files private, permissions must be removed.</p> <p>For more information on creating private directories, see “Making Home Directories Private” in the <i>Novell Linux User Management Technology Guide</i>.</p> <p>For more information on making existing directories private, see Section 35.4.2, “Providing a Private Work Directory,” on page 224.</p> | <p>Trustee assignments are made to directories and files and flow down from directories to everything below unless specifically reassigned.</p> |
| Default accessibility | <p>Users have permissions to see most of the file system.</p> <p>The contents of a few directories, such as the <code>/root</code> home directory, can only be viewed by the root user.</p> <p>Some system configuration files can be read by everyone, but the most critical files, such as <code>/etc/fstab</code>, can only be read and modified by root.</p> | <p>Users can see only the directories and files for which they are trustees (or members of a group that is a trustee).</p> |

| Feature | POSIX / Linux | NSS/NCP on OES Linux |
|--|---|---|
| Home directories—an example of default accessibility | <p>By default, all users can see the names of directories and files in home directories.</p> <p>To make directories and files private, permissions must be removed</p> <p>For more information on creating private home directories, see “Making Home Directories Private” in the <i>Novell Linux User Management Technology Guide</i>.</p> <p>For more information on making existing home directories private, see Section 35.4.2, “Providing a Private Work Directory,” on page 224.</p> | <p>By default, only the system administrator and the home directory owner can see a home directory. Files in the directory are secure.</p> <p>If users want to share files with others, they can grant trustee assignments to the individual files, or they can create a shared subdirectory and assign trustees to it.</p> |
| Inheritance from parents | <p>Nothing is inherited.</p> <p>Granting permission to a directory or file affects only the directory or file.</p> | <p>Rights are inherited in all child subdirectories and files unless specifically reassigned.</p> <p>A trustee assignment can potentially give a user rights to a large number of subdirectories and files.</p> |
| Privacy | <p>Because users have permissions to see most of the file system for reasons stated above, most directories and files are only private when you make them private.</p> | <p>Directories and files are private by default.</p> |
| Subdirectory and file visibility | <p>Permissions granted to a file or directory apply to only the file or directory. Users can't see parent directories along the path up to the root unless permissions are granted (by setting the UID, GID, and mode bits) for each parent.</p> <p>After permissions are granted, users can see the entire contents (subdirectories and files) of each directory in the path.</p> | <p>When users are given a trustee assignment to a file or directory, they can automatically see each parent directory along the path up to the root. However, users can't see the contents of those directories, just the path to where they have rights.</p> |

When an NCP volume is created on a traditional Linux or NSS volume, some of the behavior described above is modified. For more information, see the *NCP Server for Linux Administration Guide*, particularly the [“NCP on Linux Security”](#) section.

30.6 Advanced Certificate Information for OES Linux

Table 30-2 contains information about the authentication certificates used by each of the OES Linux components.

Table 30-2 *Certificate Information for OES Linux Products and Services*

| Product/Service | Certificate Information |
|---------------------------------|---|
| Apache | <p>The Apache Web server that is installed with OES is not configured as an LDAP client by default. The <code>/etc/opt/novell/httpd/conf/httpd.conf</code> file contains an LDAP section toward the end that has been commented out. This can be modified to turn on LDAP authentication and configure the settings. The file can point to either a <code>.b64</code> or <code>.der</code> certificate for server authentication.</p> <p>To enable HTTPS connectivity, the OES install creates a default certificate using OpenSSL and adds it to the JVM* (keytool) for Tomcat to use.</p> |
| eGuide | <p>eGuide uses the same basic mechanisms as iManager, except that it doesn't retrieve a certificate from the server if a certificate isn't found in the keystore.</p> |
| iManager 2.5 and Virtual Office | <p>Virtual Office requires that iManager is installed and configured. Both products use LDAP over SSL, meaning that all communications with the LDAP server are encrypted.</p> <p>However, if server authentication is not configured, iManager retrieves a certificate from the server and then uses that certificate for encryption.</p> <p>If server authentication is configured, the administrator can add the server's exported certificate to the JVM CACerts keystore using the Java* keytool tool.</p> |
| iPrint | <p>iPrint is not configured by default to require user authentication. This can be changed using iManager. For more information, see "Setting Up a Secure Printing Environment" in the <i>OES iPrint Administration Guide for Linux</i>.</p> |
| Linux User Management (LUM) | <p>LUM looks for certificates in <code>/var/nam</code>. The certificates are named <code>IP.cer</code> or <code>DNS.der</code>, where <code>IP</code> and <code>DNS</code> represent the IP address and DNS name of the server, respectively.</p> <p>LUM automatically retrieves a certificate if one is not supplied.</p> <p>You can edit the <code>/etc/nam.conf</code> file to change the name of the certificate file or the location to another directory on the file system. LUM uses <code>.der</code> files.</p> |
| Novell iFolder® 2.1x | <p>Novell iFolder can use either no SSL or SSL with server authentication. For more information, see the <i>Novell iFolder 2.1 Installation and Administration Guide</i>.</p> |

30.7 Links to Product Security Considerations Sections

The following product documentation contains additional security information:

Table 30-3 *Security Consideration Links*

| Product/Technology | Security Considerations Section Link |
|---------------------------------------|---|
| Archive and Version Services | “Security Considerations for Archive and Version Services” in the <i>Novell Archive and Version Services 2.0 for NetWare Administration Guide for OES</i> |
| eDirectory | “Setting Up a Security Container As a Separate Partition” in the <i>Novell eDirectory 8.7.3 Administration Guide</i> |
| File Systems | File Systems Management Guide for OES (information throughout the guide) |
| Health Monitoring Services | “Security Considerations” in the <i>Health Monitoring Services Administration Guide for OES</i> |
| Identity Manager 2.0 | “Handling Sensitive Information” in the <i>Novell Nsure Identity Manager 2.0.1 Administration Guide</i> |
| iFolder 3.x | Novell iFolder 3.x Security Administrator Guide |
| iPrint for OES Linux | “Setting Up a Secure Printing Environment” in the <i>OES iPrint Administration Guide for Linux</i> |
| iPrint for OES NetWare | “Setting Up a Secure Printing Environment” in the <i>OES iPrint Administration Guide for NetWare</i> |
| iSCSI for OES NetWare | Enabling and Configuring iSCSI Initiator Security in the <i>iSCSI 1.1.3 Administration Guide for NetWare 6.5</i> |
| Linux User Management | “nambulkadd Security Considerations” in the <i>Novell Linux User Management Technology Guide</i> |
| Native File Access Protocols | “Enabling and Disabling SMB Signing” in the <i>OES Native File Access Protocols Guide</i> . |
| Novell Client for Linux | “Managing File Security” in the <i>Novell Client 1.2 for Linux Installation and Administration Guide</i> |
| Novell Client for Windows | “Managing File Security and Passwords” in the <i>Novell Client for Windows Installation and Administration Guide</i> |
| Novell Remote Manager for OES Linux | “Security Considerations” in the <i>Novell Remote Manager Administration Guide for Linux for OES</i> |
| Novell Remote Manager for OES NetWare | “Security Considerations” in the <i>Novell Remote Manager for NetWare Administration Guide for OES</i> |

| Product/Technology | Security Considerations Section Link |
|--|---|
| Novell Storage Services | “Securing Access to NSS Volumes, Directories, and Files” and “Security Considerations” in the <i>Novell Storage Services File System Administration Guide for OES</i> |
| OES Linux Installation | “Security Considerations” in the <i>OES Linux Installation Guide</i> |
| OpenWBEM | “Ensuring Secure Access” in the <i>OpenWBEM Services Administration Guide for OES</i> |
| QuickFinder | “Security Considerations” in the <i>QuickFinder Server 4.0 Administration Guide</i> |
| Server Consolidation and Migration Toolkit | “Security Considerations” in the <i>Novell Server Consolidation and Migration Toolkit Administration Guide</i> |

The information in this section can help you understand and set up time synchronization on your OES servers:

- [Section 31.1, “Overview of Time Synchronization,” on page 171](#)
- [Section 31.2, “Planning for Time Synchronization,” on page 175](#)
- [Section 31.3, “Coexistence and Migration of Time Synchronization Services,” on page 178](#)
- [Section 31.4, “Implementing Time Synchronization,” on page 181](#)
- [Section 31.5, “Configuring and Administering Time Synchronization,” on page 182](#)

31.1 Overview of Time Synchronization

All servers in an eDirectory™ tree must have their times synchronized to ensure that updates and changes to eDirectory objects occur in the proper order.

eDirectory gets its time from the server operating system (NetWare® or Linux) of the OES server where it is installed. It is, therefore, critical that every server in the tree has the same time.

31.1.1 Understanding Time Synchronization Modules

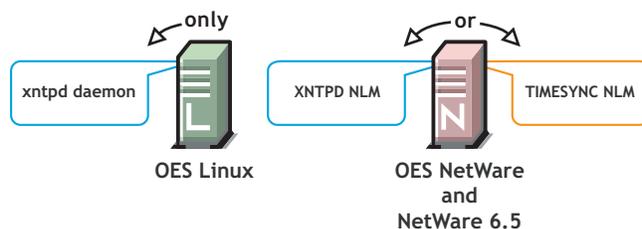
Because your OES eDirectory tree might contain servers running OES Linux, OES NetWare, or previous versions of NetWare, you must understand the differences in the time synchronization modules that each operating system uses and how these modules can interact with each other.

OES Linux vs. OES NetWare

As illustrated in [Figure 31-1](#), OES NetWare (and NetWare 6.5) can use either the Network Time Protocol (NTP) or Timesync modules for time synchronization. Both modules can communicate with OES Linux using NTP.

OES Linux must use the NTP daemon (xntpd).

Figure 31-1 Time Synchronization for Linux and NetWare



OES Servers Communicate Using the Network Time Protocol (NTP)

Because OES Linux and NetWare servers must communicate with each other for time synchronization, and because Linux uses only NTP for time synchronization, it follows that both Linux and NetWare must communicate time synchronization information using NTP time packets.

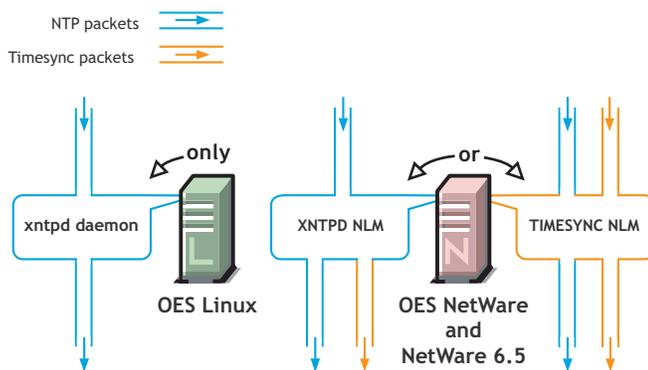
However, this doesn't limit your options on NetWare.

Figure 31-2 illustrates that OES Linux and NetWare servers can freely interchange time synchronization information because OES NetWare includes

- A TIMESYNC NLM™ that both consumes and provides NTP time packets in addition to Timesync packets.
- An XNTPD NLM that can provide Timesync packets in addition to offering standard NTP functionality.

NOTE: Although NetWare includes two time synchronization modules, only one can be loaded at a time.

Figure 31-2 NTP Packet Compatibilities with All OES Time Synchronization Modules



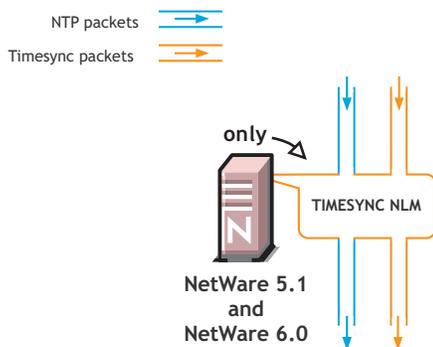
Compatibility with Earlier Versions of NetWare

Earlier versions of NetWare (version 4.2 through version 6.0) do not include an NTP time module. Their time synchronization options are, therefore, more limited.

NetWare 5.1 and 6.0 Servers

Figure 31-3 illustrates that, although NetWare 5.1 and 6.0 do not include an NTP time module, they can consume and deliver NTP time packets.

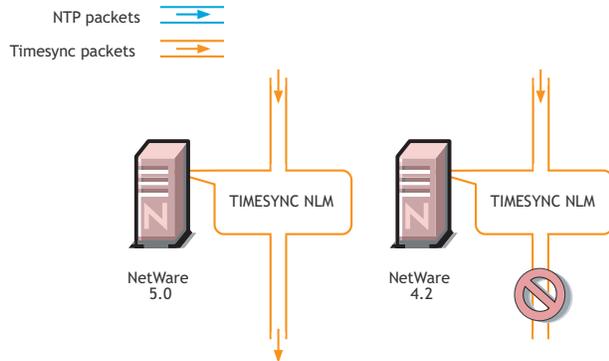
Figure 31-3 NTP Compatibility of NetWare 5.1 and 6.0



NetWare 5.0 and 4.2 Servers

Figure 31-4 illustrates that NetWare 4.2 and 5.0 servers can only consume and provide Timesync packets.

Figure 31-4 Synchronizing Time on NetWare 5.0 and 4.2 Servers



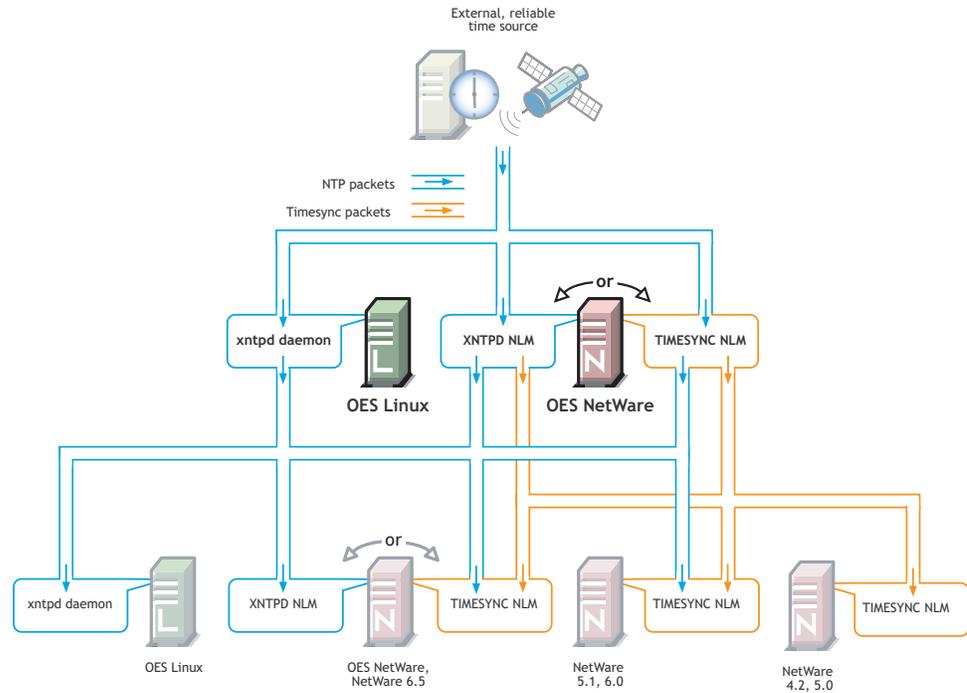
Therefore, if you have NetWare 4.2 or 5.0 servers in your eDirectory tree, and you want to install an OES Linux server, you must have at least one NetWare 5.1 or later server to provide a “bridge” between NTP and Timesync time packets. Figure 31-5 on page 174 illustrates that these earlier server versions can synchronize through an OES NetWare server.

IMPORTANT: As shown in Figure 31-4, We recommend that NetWare 4.2 servers not be used as a time source.

31.1.2 OES Servers as Time Providers

Figure 31-5 on page 174 shows how OES servers can function as time providers to other OES servers and to NetWare servers, including NetWare 4.2 and later.

Figure 31-5 OES Servers as Time Providers

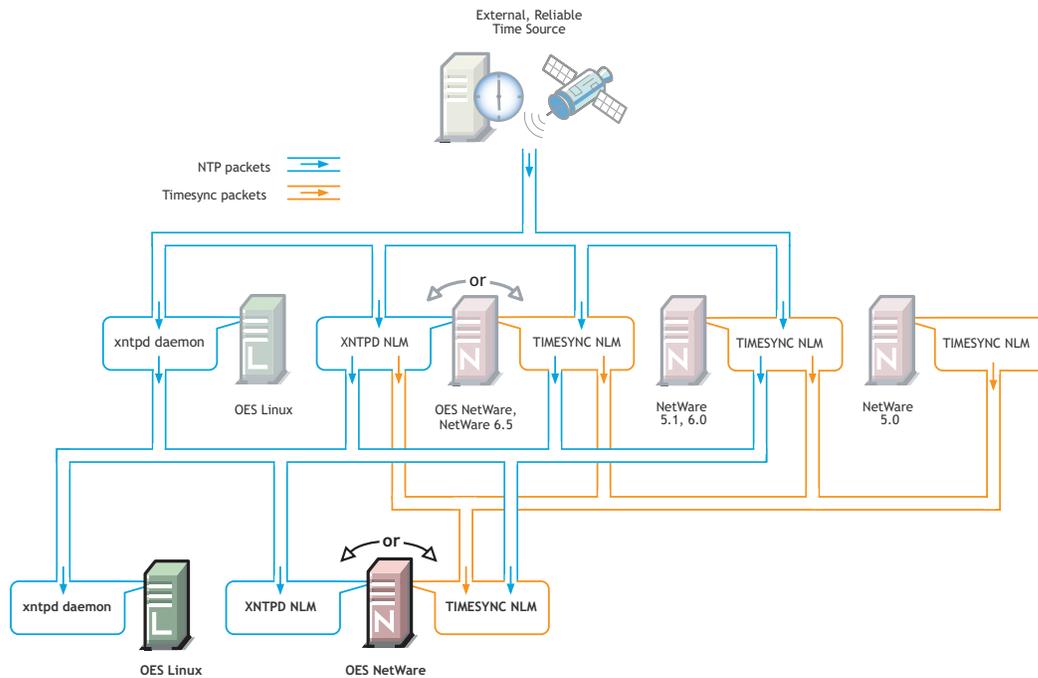


31.1.3 OES Servers as Time Consumers

Figure 31-6 on page 175 shows the time sources that OES servers can use for synchronizing server time.

IMPORTANT: Notice that NetWare 4.2 is not shown as a valid time source.

Figure 31-6 OES Servers as Time Consumers



31.2 Planning for Time Synchronization

Use the information in this section to understand the basics of time synchronization planning. For more detailed planning information, refer to the following resources:

- “How Timesync Works” in the *Network Time Management for NetWare Administration Guide for OES*
- “Network Time Protocol” in the *Novell Network Time Protocol Administration Guide for OES*
- Linux NTP information on the Web (<http://www.eecis.udel.edu/~mills/ntp/html/index.html>)

31.2.1 NetWork Size Determines the Level of Planning Required

The level of time synchronization planning required for your network is largely dictated by how many servers you have and where they are located, as explained in the following sections.

Time Synchronization for Trees with Fewer Than Thirty Servers

If your tree will have fewer than thirty servers, the default installation settings for time synchronization should be sufficient for all of the servers except the first server installed in the tree.

You should configure the first server in the tree to obtain time from one or more time sources that are external to the tree. (See **Step 1** in **Section 31.2.3, “Planning a Time Synchronization Hierarchy before Installing OES,”** on page 177.)

All other servers (both Linux and NetWare) automatically point to the first server in the tree for their time synchronization needs.

Time Synchronization for Trees with More Than Thirty Servers

If your tree will have more than thirty servers, you need to plan and configure your servers with time synchronization roles that match your network architecture and time synchronization strategy.

Example roles might include the following:

- Servers that receive time from external time sources and send packets to other servers further down in the hierarchy
- Servers that communicate with other servers in peer-to-peer relationships to ensure they are in sync

Basic planning steps are summarized in [Section 31.2.3, “Planning a Time Synchronization Hierarchy before Installing OES,”](#) on page 177.

Refer to the following sources for additional help in planning time server roles:

- “[Configuring Timesync on Servers](#)” in the *Network Time Management for NetWare Administration Guide for OES*
- “[Modes of Time Synchronization](#)” in the *Novell Network Time Protocol Administration Guide for OES*
- Linux NTP information on the [Web \(http://www.eecis.udel.edu/~mills/ntp/html/notes.html\)](http://www.eecis.udel.edu/~mills/ntp/html/notes.html)

Time Synchronization across Geographical Boundaries

If the servers in the tree will reside at multiple geographic sites, you need to plan how to synchronize time for the entire network while minimizing network traffic. For more information, see “[Wide Area Configuration](#)” in the *Novell Network Time Protocol Administration Guide for OES*.

31.2.2 Choosing between Timesync and NTP (NetWare Only)

When you install an OES NetWare server, you can choose between Timesync and NTP for time synchronization.

If you select the Timesync option, you can fully configure each server as you install it to match your time synchronization plan.

If you choose the XNTPD option, you can designate up to three NTP time sources, but fine tuning your NTP hierarchy will require some manual configuration after the installation is complete. For help, consult the *Novell Network Time Protocol Administration Guide for OES*.

About Timesync

Timesync is the Novell legacy time synchronization protocol first delivered with NetWare 4. Over the years it has evolved and is now capable of both consuming and delivering NTP packets and Timesync packets.

Timesync is installed and configured by default to ensure the smooth integration of earlier versions of NetWare. However, many system administrators are migrating away from Timesync and implementing NTP.

About NTP

NTP is the emerging choice for many network administrators because

- They feel it is easier to manage a single time synchronization protocol.

For example, the same basic configuration file (`ntp.conf`) can be used on both Linux and NetWare.

- NTP is a cross-platform industry standard available on multiple platforms.
- The XNTPD NLM that runs on OES NetWare provides Timesync packets for NetWare servers that can't consume NTP (NetWare 5.0 and 4.2), enabling them to coexist on an NTP time network.

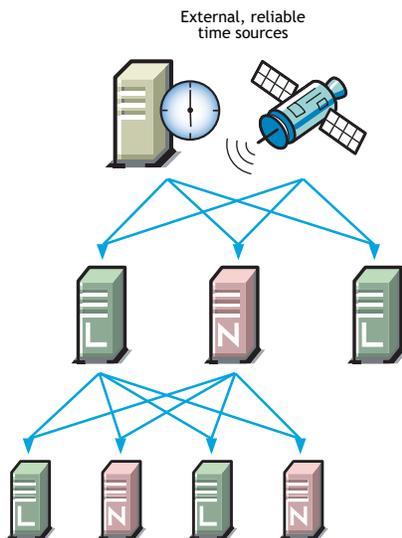
Where to Specify in the NetWare Install

The dialog box that lets you choose between Timesync and NTP is available as an advanced option in the Time Zone panel during the NetWare installation. Choosing between Timesync and NTP is documented in “[Setting the Server Time Zone and Time Synchronization Method](#)” in the *OES NetWare Installation Guide*.

31.2.3 Planning a Time Synchronization Hierarchy before Installing OES

The obvious goal for time synchronization is that all the network servers (and workstations, if desired) have the same time. This is best accomplished by planning a time synchronization hierarchy before installing the first OES server, then configuring each server at install time so that you form a hierarchy similar to the one outlined in [Figure 31-7](#).

Figure 31-7 A Basic Time Synchronization Hierarchy



As you plan your hierarchy, do the following:

- 1 Identify at least two authoritative, external NTP time sources for the top positions in your hierarchy.

- 1a** If your network already has an NTP server hierarchy in place, identify the IP address of an appropriate time server. This might be internal to your network, but it should be external to the eDirectory tree and it should ultimately obtain time from a public NTP server.
 - 1b** If your network doesn't currently employ time synchronization, refer to the list of public NTP servers published on the [ntp.org Web site \(http://ntp.isc.org/bin/view/Servers/WebHome\)](http://ntp.isc.org/bin/view/Servers/WebHome) and identify a time server you can use.
- 2** Plan which servers will receive time from the external sources and plan to install these servers first.
- 3** Map out the position for each Linux server in your tree, including its time sources and the servers it will provide time for.
- 4** Map out the position for each NetWare server in your tree.
 - 4a** Include the server's time sources and the servers it will provide time for.
 - 4b** Decide whether to use Timesync or NTP for your servers. (See [Section 31.2.2, "Choosing between Timesync and NTP \(NetWare Only\)," on page 176.](#))
 - 4c** If your network currently has only NetWare 4.2 or 5.0 servers, be sure to plan for their time synchronization needs by including at least one newer NetWare server in the tree and configuring the older servers to use the newer server as their time source. (See ["NetWare 5.0 and 4.2 Servers" on page 173.](#))
- 5** Be sure that each server in the hierarchy is configured to receive time from at least two sources.
- 6** (Conditional) If your network spans geographic locations, plan the connections for time-related traffic on the network and especially across WANs.

For more information, see ["Wide Area Configuration"](#) in the *Novell Network Time Protocol Administration Guide for OES*.

For more planning information, see the following documentation:

- [Network Time Management for NetWare Administration Guide for OES](#)
- [Novell Network Time Protocol Administration Guide for OES](#)
- Linux NTP information found on the OES Linux server in /usr/share/doc/packages/xntp and on the [Web \(http://www.eecis.udel.edu/~mills/ntp/html/index.html\)](http://www.eecis.udel.edu/~mills/ntp/html/index.html)

31.3 Coexistence and Migration of Time Synchronization Services

The time synchronization modules in Novell Open Enterprise Server (OES) have been designed to ensure that new OES servers, running on either NetWare or Linux, can be introduced into an existing network environment without disrupting any of the products and services that are in place.

Both the Linux and NetWare installs automate the time synchronization process where possible, as explained in [Section 31.4, "Implementing Time Synchronization," on page 181.](#)

This section discusses the issues involved in the coexistence and migration of time synchronization in OES in the following sections:

- [Section 31.3.1, "Coexistence," on page 179](#)
- [Section 31.3.2, "Migration," on page 180](#)

For a general discussion of coexistence and migration issues in OES, see the *OES Coexistence and Migration Guide*.

31.3.1 Coexistence

This section provides information regarding the coexistence of the OES time synchronization modules with existing NetWare or Linux networks, and with previous versions of the Timesync NLM. This information can help you confidently install new OES servers into your current network.

Compatibility

The following table summarizes the compatibility of OES time synchronization modules with other time synchronization modules and eDirectory. These compatibilities are illustrated in [Figure 31-5 on page 174](#) and [Figure 31-6 on page 175](#).

| Module | Compatibility |
|------------------------|--|
| Timesync NLM (NetWare) | <p>Can consume time from</p> <ul style="list-style-type: none"> • All previous versions of Timesync. However, the NetWare 4.2 Timesync NLM should not be used as a time source. • Any Timesync or NTP daemon. <p>Can provide time to</p> <ul style="list-style-type: none"> • All previous versions of Timesync. • Any Timesync or NTP daemon. |
| XNTPD NLM (NetWare) | <p>Can consume time from</p> <ul style="list-style-type: none"> • Any NTP daemon. <p>Can provide time to</p> <ul style="list-style-type: none"> • All previous versions of Timesync. • Any NTP daemon. |
| xntpd daemon (SLES 9) | <p>Can consume time from</p> <ul style="list-style-type: none"> • Any NTP daemon. <p>Can provide time to</p> <ul style="list-style-type: none"> • Any NTP daemon. |
| eDirectory | eDirectory gets its time synchronization information from the host OS (Linux or NetWare), not from the time synchronization modules. |

Coexistence Issues

If you have NetWare servers earlier than version 5.1, you need to install at least one later version NetWare server to bridge between the Timesync NLM on the earlier server and any OES Linux servers you have on your network. This is because the earlier versions of Timesync can't consume or provide NTP time packets and the xntpd daemon on Linux can't provide or consume Timesync packets.

Fortunately, the Timesync NLM in NetWare 5.1 and later can both consume and provide Timesync packets. And the XNTPD NLM can provide Timesync packets when required.

This is explained in [“Compatibility with Earlier Versions of NetWare” on page 172](#).

31.3.2 Migration

The following sections explain time synchronization issues associated with migration.

Migration Path

Your migration path depends on the platform you are migrating data to.

NetWare to NetWare

Time synchronization configuration settings are all migrated by the NetWare Migration Wizard (both Timesync and XNTPD modules) because all associated modules and configuration files reside on `sys:system`.

NetWare to Linux

There is no direct server migration from NetWare to Linux. However, if XNTPD is used for time synchronization on NetWare, the contents of the `sys:system\ntp.conf` file works unchanged on a Linux server as `/etc/ntp.conf`, if the configuration is valid on the network where the Linux server resides.

Migration Tools

Use the following tools for migrating services.

NetWare Migration Wizard

All time synchronization files are migrated with the `sys:system` directory and work unchanged on the new server. See the [Server Migrations](#) in the *Novell Server Consolidation and Migration Toolkit Administration Guide* for more information.

iManager Migrate Plug-in

If you decide you want to use only NTP as your time synchronization protocol, you can use the iManager > Time Synchronization > Migration plug-in to migrate NetWare 6.5 and OES NetWare servers from Timesync to NTP.

For more information, see [“Migrating TimeSync Servers to NTP”](#) in the *Novell Network Time Protocol Administration Guide for OES*.

Earlier versions of NetWare cannot be migrated using the plug-in. However, settings are migrated with the OS via the NetWare Migration Wizard.

Recommended Procedure

Follow the instructions for the migration module you are using.

Migration Issues

None.

31.4 Implementing Time Synchronization

As you plan to implement your time synchronization hierarchy, you should know how the OES NetWare and OES Linux product installations configure time synchronization on the network. Both installs key off whether you are creating a new tree or installing into an existing tree.

31.4.1 New Tree

By default, both the OES Linux and the OES NetWare installs configure the first server in the tree to use its internal (BIOS) clock as the authoritative time source for the tree.

Because BIOS clocks can fail over time, you should always specify an external, reliable NTP time source for the first server in a tree. For help finding a reliable NTP time source, see the [NTP Server Lists \(http://ntp.isc.org/bin/view/Servers/WebHome\)](http://ntp.isc.org/bin/view/Servers/WebHome) on the Web.

OES Linux

When you configure your eDirectory installation, the OES Linux install prompts you for the IP address or DNS name of an NTP v3-compatible time server.

If you are installing the first server in a new eDirectory tree, you have two choices:

- You can enter the IP address or DNS name of an authoritative NTP time source (recommended).
- You can leave the field displaying Local Time, and the server is configured to use its BIOS clock as the authoritative time source.

IMPORTANT: We do not recommend this second option because BIOS clocks can fail over time, causing serious problems for eDirectory.

OES NetWare

By default, the NetWare install automatically configures the Timesync NLM to use the server's BIOS clock. As indicated earlier, this default behavior is not recommended for production networks. You should, therefore, manually configure time synchronization (either Timesync or NTP) while installing each NetWare server.

Manual time synchronization configuration is accessed at install time from the Time Zone dialog box by clicking the Advanced button as briefly outlined in [Section 31.2.2, “Choosing between Timesync and NTP \(NetWare Only\),” on page 176](#) and as fully explained in [“Setting the Server Time Zone and Time Synchronization Method”](#) in the *OES NetWare Installation Guide*.

31.4.2 Existing Tree

When a server joins an existing eDirectory tree, both OES installations do approximately the same thing.

OES Linux

If you are installing into an existing tree, the OES Linux install proposes to use the IP address of the eDirectory server (either NetWare or Linux) as the NTP time source. This default should be sufficient unless one of the following is true:

- The server referenced is a NetWare 5.0 or earlier server, in which case you need to identify and specify the address of another server in the tree that is running either a later version of NetWare or OES Linux.
- You will have more than 30 servers in your tree, in which case you need to configure the server to fit in your planned time synchronization hierarchy. For more information, see [Section 31.2.3, “Planning a Time Synchronization Hierarchy before Installing OES,”](#) on page 177.

The OES Linux install activates the `xntp` daemon and configures it to synchronize server time with the specified NTP time source. After the install completes, you can configure the daemon to work with additional time sources to ensure fault tolerance. For more information, see [Section 31.5.1, “Changing Time Synchronization Settings on a SLES 9 Server,”](#) on page 182.

OES NetWare

If you are installing into an existing tree, the OES NetWare install first checks to see whether you manually configured either NTP or Timesync time synchronization sources while setting the server Time Zone (see [“Setting the Server Time Zone and Time Synchronization Method”](#) in the *OES NetWare Installation Guide*).

If you will have more than 30 servers in your tree, you should have developed a time synchronization plan (see [Section 31.2.3, “Planning a Time Synchronization Hierarchy before Installing OES,”](#) on page 177) and configured your server according to the plan in the Time Zone panel.

If you haven't manually configured time synchronization sources for the server (for example, if your tree has fewer than 30 servers), the install automatically configures the Timesync NLM to point to the IP address of the server with a master replica of the tree's [ROOT] partition.

31.5 Configuring and Administering Time Synchronization

As your network changes, you will probably need to adjust the time synchronization settings on your servers.

31.5.1 Changing Time Synchronization Settings on a SLES 9 Server

This method works both in the GUI and at the shell prompt and is the most reliable method for ensuring a successful NTP implementation.

- 1 Launch YaST on your SLES 9 server by either navigating to the application on the desktop or typing `yast` at the shell prompt.
- 2 Click (or select using the tab and arrow keys) *Network Services > NTP Client*.
- 3 In the *NTP Client Configuration* dialog box, click *Complex Configuration*.
- 4 Modify the NTP time settings as your needs require.

31.5.2 Changing Time Synchronization Settings on a NetWare Server

Time synchronization settings and their modification possibilities are documented in the following administration guides:

- Timesync: *Network Time Management for NetWare Administration Guide for OES*
- NTP: *Novell Network Time Protocol Administration Guide for OES*

Web and Application Services

32

See the topics in “[Web and Application Services](#)” in the OES online documentation.

End User Services

VI

Novell® Open Enterprise Server (OES) user services are explained in the following sections:

- [Chapter 33, “Access,” on page 189](#)
- [Chapter 34, “Collaboration \(Virtual Office\),” on page 203](#)
- [Chapter 35, “File Services,” on page 207](#)
- [Chapter 36, “Print Services,” on page 235](#)
- [Chapter 37, “White Pages \(eGuide\),” on page 241](#)

Using the Information in This Section

The information in this section is designed to help you with the following tasks:

- Understanding the network service access options that OES provides.
- Understanding each OES end user service and its potential to help your organization.
- Making preinstall planning decisions.
- Implementing the services after they are installed.

After you understand OES user services, you can

1. Plan your eDirectory™ tree, as explained in [Section 15.2, “Planning Your eDirectory Tree,” on page 107](#).
2. Install OES services using the instructions in the following guides:
 - For Linux: *OES Linux Installation Guide*
 - For NetWare: *OES NetWare Installation Guide*
3. Create eDirectory users and other objects to provide service access for your network users, as summarized in [Section 15.4, “Creating Users and Groups,” on page 109](#).
4. Review the implementation and maintenance sections for each service, beginning with [Section 33.4, “Access Implementation Suggestions,” on page 199](#).

Each of these sections provides a summary of the tasks associated with each service and links to detailed service documentation.

Access is the key to

- Providing services for users.
- Ensuring that the network is secure.

OES supports a number of access options through which your users can access network services, including

- Web browsers.
- Native interfaces on Linux, Macintosh*, and Windows workstations.
- Novell Client™ software supported for both OES Linux and OES NetWare® servers.
- Personal digital assistants (PDAs) and other electronic devices that are enabled for Web access.

Of course, you control which of these interfaces can be used to access network services.

This section is designed to help you understand OES access options so that you can plan and implement those that are best suited for your network by reviewing the following topics:

- [Section 33.1, “Overview of Access Services,” on page 189](#)
- [Section 33.2, “Planning for Service Access,” on page 195](#)
- [Section 33.3, “Coexistence and Migration of Access Services,” on page 198](#)
- [Section 33.4, “Access Implementation Suggestions,” on page 199](#)
- [Section 33.5, “Configuring and Administering Access to Services,” on page 199](#)

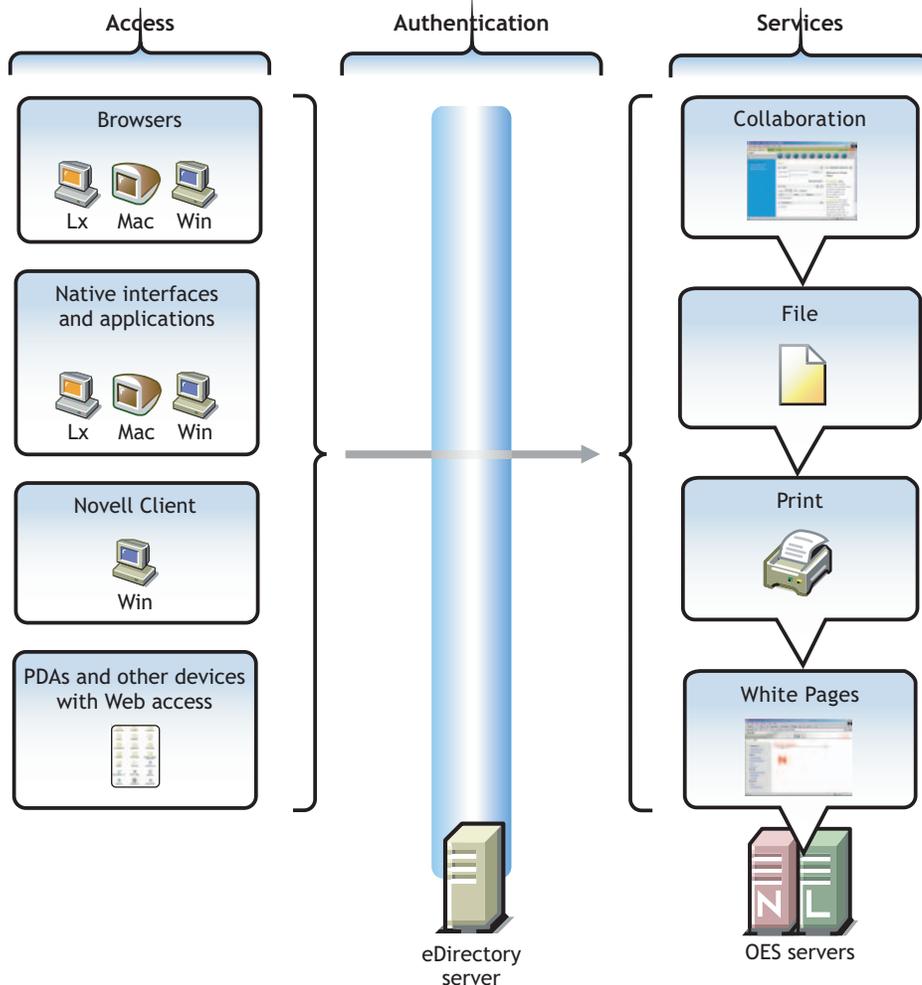
33.1 Overview of Access Services

The following sections present overviews of OES access services.

33.1.1 Access to Services

Figure 33-1 illustrates the variety of user interfaces supported by OES services. Novell® eDirectory™ provides authentication to each service.

Figure 33-1 Access Interfaces and the Services They Access



The interfaces available for each service are largely determined by the protocols supported by the service.

- Browsers and personal digital assistants require support for the HTTP protocol.
- Each workstation type shown in the graphic has a native protocol associated with it. Linux uses NFS as its native protocol for file services access, Macintosh workstations communicate using AFP, and Windows workstations use the CIFS protocol by default for file services.
- Novell Client software uses NetWare Core Protocol™ (NCP™) software to provide the benchmark-setting file services for which Novell is so well known.

Understanding the protocol support for OES services can help you begin to plan your OES implementation. For more information, see [Section 33.2.5, “Matching Protocols and Services to Check Access Requirements,” on page 197](#). Information about user interface support is also

contained in the individual service sections, beginning with **Part VI, “End User Services,”** on page 187.

33.1.2 NetWare Access Control to Directories and Files

eDirectory objects, such as users and groups, are assigned File System Trustee Rights to directories and files. These trustee rights determine what the user or group can do with a directory or file, provided that the directory or file attributes allow the action.

This is illustrated in **Figure 33-2**.

Figure 33-2 Directory and File Access is determined by File System Trustee Rights

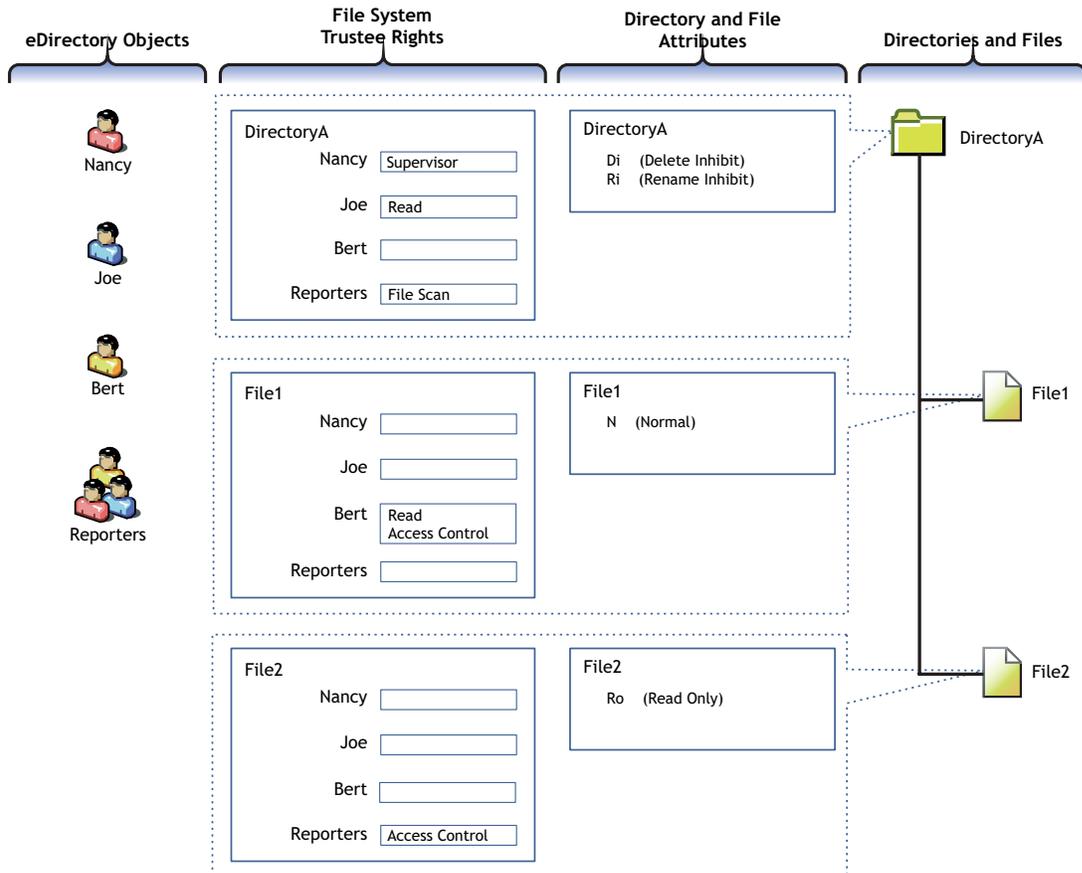


Table 33-1 explains the effective access rights illustrated in **Figure 33-2**.

Table 33-1 Access Rights Explanation

| eDirectory Objects | File System Trustee Rights | Directory and File Attributes | Directories and Files |
|--|--|---|--|
| eDirectory objects (in most cases users and groups) gain access to the file system through eDirectory. | <p>File system trustee rights govern access and usage by the eDirectory object specified for the directory or file to which the rights are granted.</p> <p>Trustee rights are overridden by directory and file attributes.</p> <p>For example, even though Nancy has the Supervisor (all) trustee right at the directory (and, therefore, to the files it contains), she cannot delete File2 because it has the Read Only attribute set.</p> <p>Of course, Nancy could modify the file attributes so that File2 could then be deleted.</p> | <p>Each directory and file has attributes associated with it. These attributes apply universally to all trustees regardless of the trustee rights an object might have.</p> <p>For example, a file that has the Read Only attribute is Read Only for all users.</p> <p>Attributes can be set by any trustee that has the Modify trustee right to the directory or file.</p> | <p>The possible actions by the eDirectory users and group shown in this example are as follows:</p> <ul style="list-style-type: none"> Nancy has the Supervisor trustee right at the directory level, meaning that she can perform any action not blocked by a directory or file attribute. <p>The Di (Delete Inhibit) and Ri (Rename Inhibit) Attributes on DirectoryA prevent Nancy from deleting or renaming the directory unless she modifies the attributes first. The same principle applies to her ability to modify File2.</p> <ul style="list-style-type: none"> Because Joe is a member of the Reporters group, he can view file and directory names inside DirectoryA and also see the directory structure up to the root directory. <p>Joe also has rights to open and read any files in DirectoryA and to execute any applications in DirectoryA.</p> <ul style="list-style-type: none"> Because Bert is a member of the Reporters group, he can view file and directory names inside DirectoryA and also see the directory structure up to the root directory. <p>Bert also has rights to open and read File1 and to execute it if it's an application.</p> <p>And Bert has rights to grant any eDirectory user access to File1.</p> <ul style="list-style-type: none"> Because all three users are members of the Reporters group, they can grant any eDirectory user access to File2. <p>Of course, for Nancy this is redundant because she has the Supervisor right at the directory level.</p> |

33.1.3 Understanding NSS-Specific Access Control Features

Table 33-2 provides links to documentation that discusses the various NSS-specific access control features.

Table 33-2 Summary of NSS Access Control Documentation Links

| Feature | To Understand | See |
|---|---|---|
| Linux Mode vs. NetWare Mode NOTE: This applies only to Linux servers. | The difference between Linux Mode access and NetWare Mode access. | “Access Control for NSS on Linux” in the <i>File Systems Management Guide for OES</i> . |
| NetWare directory and file attributes on NSS volumes on OES Linux NOTE: This is about only what is displayed. POSIX permissions are not used for access control to NSS volumes. | How NSS file attributes are reflected in Linux directory and file permissions viewable through POSIX. | “Displaying Key NSS Directory and File Attributes as Linux POSIX Permissions” in the <i>File Systems Management Guide for OES</i> . |

33.1.4 Understanding General File System Access Control

[Table 33-3](#) provides links to documentation that discusses general access control features.

Table 33-3 General File System Access Control

| Feature | To Understand | See |
|--------------------------------------|--|--|
| Access Control Lists (ACLs) on Linux | How ACLs are supported on the most commonly used Linux traditional file systems and let you assign file and directory permissions to users and groups who do not own the files or directories. | “Access Control Lists in Linux” in the <i>SUSE LINUX Enterprise Server 9 Administration Guide</i> . |
| Directory and file attributes | Directory and file attributes on OES NetWare. | “Directory and File Attributes for NSS Volumes or NetWare Traditional Volumes” in the <i>File Systems Management Guide for OES</i> . |
| File system trustee rights | File system trustee rights on NetWare (NSS and traditional volumes), including how NetWare determines effective file system trustee rights. | “File-System Trustee Rights” in the <i>File Systems Management Guide for OES</i> . |
| NetWare Connection Manager | How the NetWare Connection Manager tracks active user connections and provides access permission information for NSS and Traditional volumes on NetWare. | “The Connection Manager for NetWare” in the <i>File Systems Management Guide for OES</i> . |

| Feature | To Understand | See |
|--|---|---|
| Novell Client™ and the NetWare Connection Manager | How the Novell Client works with the Connection Manager to ensure that users have correct access rights to the file system. | “Novell Client” in the <i>File Systems Management Guide for OES</i> . |
| NetWare trustee rights and directory and file attributes | How to control who can see which files and what they can do with them. | “Understanding File System Access Control for NSS and NetWare Traditional File Systems” in the <i>File Systems Management Guide for OES</i> . |
| POSIX file system rights and attributes on Linux | How to configure file system attributes on OES Linux servers. | “POSIX Access Control Lists” in the <i>File Systems Management Guide for OES</i> . |
| Rights to install applications on NetWare | The access rights required to install applications on NetWare file systems. | “Security Guidelines” in the <i>File Systems Management Guide for OES</i> . |
| Security Equivalence in eDirectory | The concept of Security Equivalence in eDirectory. | “eDirectory Objects and Security Equivalence” in the <i>File Systems Management Guide for OES</i> . |

33.1.5 Novell Client (NCP File Services)

If you have not already determined whether to use the Novell Client on your network, we recommend that you consider the following information:

- “About the Novell Client” on page 194
- “Is the Novell Client Right for Your Network?” on page 195
- “Differences between Linux and Windows” on page 195

About the Novell Client

The Novell Client extends the capabilities of Windows and Linux desktops with access to NetWare and Open OES Linux servers.

After installing Novell Client software, users can enjoy the full range of Novell services, such as

- Authentication via Novell eDirectory.
- Network browsing and service resolution.
- Secure and reliable file system access.
- Support for industry-standard protocols.

The Novell Client supports the traditional Novell protocols (NDAP, NCP, and RSA) and interoperates with open protocols (LDAP, CIFS, and NFS).

Is the Novell Client Right for Your Network?

Although Novell offers well seasoned services that don't require Novell Client, (such as NetStorage, Novell iFolder[®] 2.1x, and iPrint), many network administrators continue to prefer the Novell Client as the access choice for their network users for the following reasons:

- They prefer eDirectory authentication to LDAP authentication because they believe it is more secure.
- They prefer the NetWare Core Protocol (NCP) over the Microsoft CIFS protocol because they believe that CIFS is more vulnerable to the propagation of viruses on the network.

Conversely, other network administrators are equally adamant that their users function better without the added overhead of running an NCP client on each workstation.

We can't determine what is best for your network, but we do provide you with viable choices.

Differences between Linux and Windows

There are some differences between the Linux and Windows clients. These are documented in [“Understanding How the Novell Client for Linux Differs from Novell Client for Windows 2000/XP”](#) in the *Novell Client 1.2 for Linux Installation and Administration Guide*.

33.1.6 Linux User Management Requirements

Some services that run on OES Linux servers require that the users accessing them be (or, at least, appear to the Linux system to be) standard Linux users with Linux user credentials, such as a user ID (UID) and primary group ID (GID).

So that eDirectory users can access these services, Novell provides the Linux User Management (LUM) technology. The impact of this on you as the network administrator is that these users and groups must be enabled for eDirectory LDAP authentication to the local server. For more information, see [“Linux Access for eDirectory Users \(LUM\)”](#) on page 119.

33.2 Planning for Service Access

After you understand the access options available to your network users, you can decide which will work best on your network.

Planning tips for network services are contained in the following sections:

- [Section 33.2.1, “Planning Collaboration \(Virtual Office\) Access,”](#) on page 195
- [Section 33.2.2, “Planning File Service Access,”](#) on page 196
- [Section 33.2.3, “Planning Print Service Access,”](#) on page 197
- [Section 33.2.4, “Planning White Pages \(eGuide\) Access,”](#) on page 197
- [Section 33.2.5, “Matching Protocols and Services to Check Access Requirements,”](#) on page 197

33.2.1 Planning Collaboration (Virtual Office) Access

All eDirectory users in the tree can access Virtual Office using their Web browser. All of the services that you have enabled are then available to them, depending on their access privileges. More

information about Virtual Office is available in [Chapter 34, “Collaboration \(Virtual Office\),”](#) on [page 203](#).

33.2.2 Planning File Service Access

As you plan which file services to provide, be aware of the file service/volume and feature support limitations outlined in the following sections.

Service Access to Volume Type Limitations

Supported combinations are outlined in [Table 33-4](#).

Table 33-4 *Service Access to Volume Types*

| File Service | Linux Traditional Volumes | NSS Volumes on Linux | NetWare Traditional Volumes | NSS Volumes on NetWare |
|-------------------------------------|---------------------------|----------------------|-----------------------------|------------------------|
| Native File Access Protocols (NFAP) | No | No | No | Yes |
| NetStorage | Yes | Yes | Yes | Yes |
| NetWare Core Protocol (NCP) | Yes | Yes | Yes | Yes |
| Novell iFolder 2.1x | Yes | Yes | No | Yes |
| Samba | Yes | Yes | No | No |

Details about the file systems supported by each file service are explained in the documentation for each service.

Also be aware that file services support different sets of access protocols. A summary of the protocols available for access to the various OES file services is presented in [Section 33.2.5, “Matching Protocols and Services to Check Access Requirements,”](#) on [page 197](#).

Feature Support

Table 33-5 *Features Supported on Each Volume Type*

| Feature | Linux Traditional Volumes | NSS Volumes on Linux | NetWare Traditional Volumes | NSS Volumes on NetWare |
|------------------|--|----------------------|-----------------------------|------------------------|
| Directory quotas | No | Yes | Yes | Yes |
| Login scripts | Yes (if also defined as an NCP volume) | Yes | Yes | Yes |
| Mapped drives | Yes (if also defined as an NCP volume) | Yes | Yes | Yes |

| Feature | Linux Traditional Volumes | NSS Volumes on Linux | NetWare Traditional Volumes | NSS Volumes on NetWare |
|---------------------------------------|--|----------------------|-----------------------------|------------------------|
| NetWare directory and file attributes | Yes (if also defined as an NCP volume) | Yes | Yes | Yes |
| NetWare extended attributes | No | Yes | Yes | Yes |
| Purge/Salvage | No | Yes | Yes | Yes |
| Trustee rights | Yes (if also defined as an NCP volume) | Yes | Yes | Yes |
| User space quotas | No | No | Yes | Yes |

33.2.3 Planning Print Service Access

Novell iPrint has access control features that let you specify the access that each eDirectory User, Group, or container object will have to your printing resources.

In the initial release of OES, access control for printers is supported only on the Windows iPrint Client.

You can also use iPrint to set up print services that don't require authentication.

For more information on access control and iPrint, see

- [Setting Printer Access Control on OES Linux \(http://www.novell.com/documentation/oes/iprint_ix/data/akey2rp.html\)](http://www.novell.com/documentation/oes/iprint_ix/data/akey2rp.html).
- [Setting Printer Access Control on OES NetWare \(http://www.novell.com/documentation/oes/iprint_nw/data/akey2rp.html#akey2rp\)](http://www.novell.com/documentation/oes/iprint_nw/data/akey2rp.html#akey2rp)

33.2.4 Planning White Pages (eGuide) Access

All eDirectory users have access to eGuide and the information you expose through it. No further access planning is necessary.

For more information, see [Chapter 37, “White Pages \(eGuide\),” on page 241](#).

33.2.5 Matching Protocols and Services to Check Access Requirements

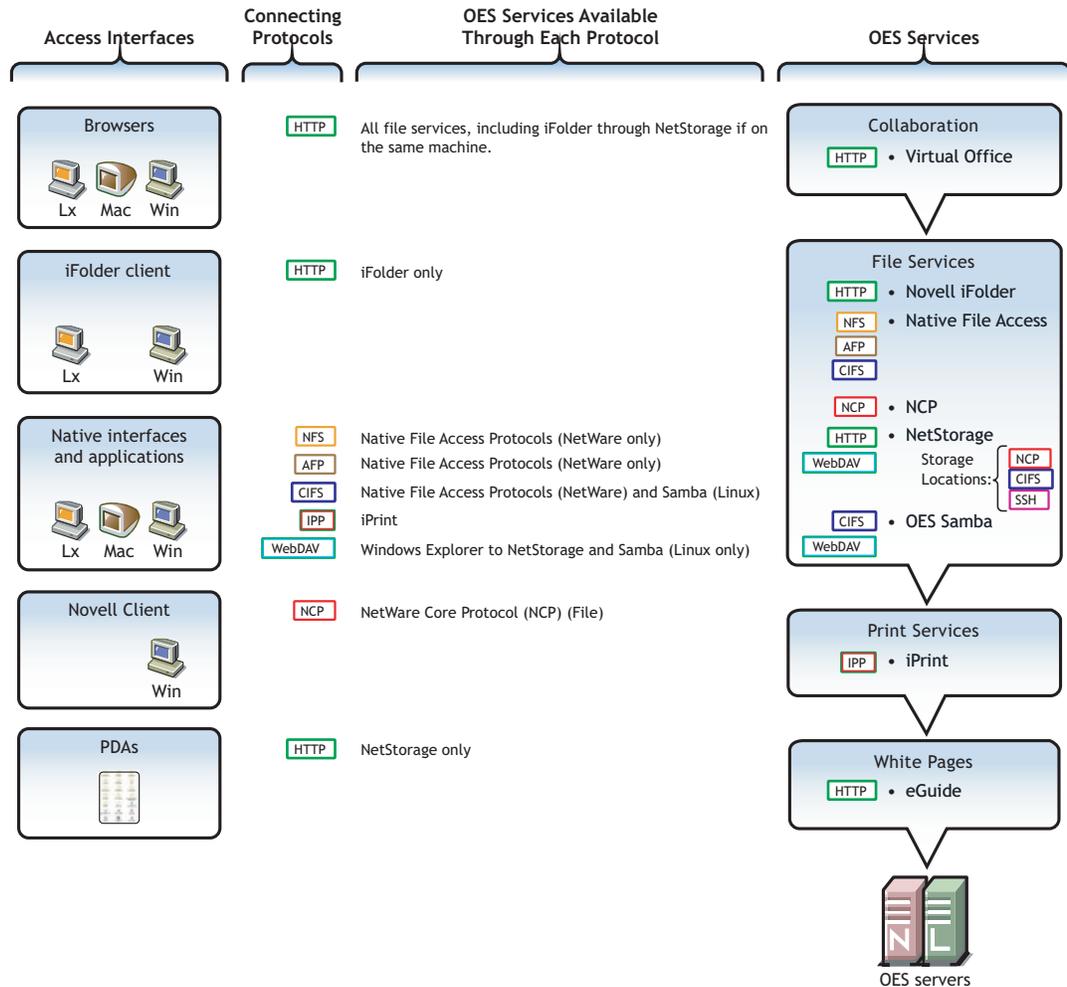
Figure 33-3 illustrates the access interfaces available to users in OES and the services that each interface can connect to. It also shows the protocols that connect access interfaces with network services.

To use the table for planning:

1. Review the different access interfaces in the left column.
2. Check the information to the right of each protocol listed in the second column.

3. In the right-most column, view the protocols supported by each service.

Figure 33-3 Access Interfaces and Services, and the Protocols That Connect Them



33.3 Coexistence and Migration of Access Services

Because NetWare Core Protocol (NCP) is now available on Linux, your Novell Client users can attach to OES Linux servers as easily as they have been able to attach to NetWare servers. In fact, they probably won't notice any changes.

NCP Server for Linux enables support for login scripts, mapping drives to OES Linux servers, and other services commonly associated with Novell Client access. This means that Windows users with Novell Client installed can now be seamlessly transitioned to file services on OES Linux.

For more information, see the *NCP Server for Linux Administration Guide*.

33.4 Access Implementation Suggestions

After you plan and install OES services, be sure to provide clear access instructions to your network users. For a summary of access methods, see [Appendix B, “Quick Reference to OES User Services,” on page 249](#).

33.5 Configuring and Administering Access to Services

The following sections discuss administering access to services.

33.5.1 Password Management

In OES, eDirectory users can change their own passwords if you have installed Virtual Office by completing the following steps:

- 1 In a Web browser, launch Virtual Office by entering the following URL in the Address field:

```
http://IP_or_DNS/vo
```

where *IP_or_DNS* is the IP address or full DNS name of the OES server.

- 2 Log in to Virtual Office using the eDirectory username and password for the account being changed.
- 3 Click the *Padlock* icon .
- 4 Type the current eDirectory password.
- 5 Type the new eDirectory password.
- 6 Retype the password to confirm it.
- 7 Click *OK*.

33.5.2 Linux (POSIX) File System Access Rights

Access control to Linux traditional file systems is controlled through POSIX file system access rights or attributes associated with directories and files. In general, the directories and files can be accessed by three POSIX entities:

- The user who owns the directory or file
- The group who owns the directory or file
- All other users defined on the system

These users and the affected group are each assigned (or not assigned) a combination of three attributes for each directory and file:

| Attribute | Effect on Directory when Assigned | Effect on File when Assigned |
|-----------|---|--|
| Read | Lets the user or group view the directory's contents. | Lets the user or group open and read the file. |
| Write | Let's the user or group create or delete files and subdirectories in the directory. | Lets the user or group modify the file. |

| Attribute | Effect on Directory when Assigned | Effect on File when Assigned |
|-----------|---|---|
| Execute | Lets the user or group access the directory using the cd command. | Lets the user or group run the file as a program. |

For more information, see “[Configuring File System Trustees, Trustee Rights, Inherited Rights Filters, and Attributes](#)” in the *File Systems Management Guide for OES*.

33.5.3 NSS (and NetWare) File and Directory Trustee Management

The *File Systems Management Guide for OES* contains a thorough discussion of file and directory trustee management in its “[Configuring File System Trustees, Trustee Rights, Inherited Rights Filters, and Attributes](#)” section.

The following sections present brief information about managing trustees on NSS volumes.

Changing File and Directory Attributes and Trustees Using NetStorage

You can use the NetStorage Web browser interface to change attributes and trustees for directories and files on NSS volumes, but you can’t change them using a WebDAV connection to NetStorage.

You cannot change attributes or trustees on NetWare Traditional volumes using NetStorage.

Changing File and Directory Attributes and Trustee Rights Using the Novell Client

You can use the Novell Client to change NSS file and directory attributes and to grant trustee rights to an NSS volume on an OES Linux server. For more information, see “[NetWare File Security](#)” in the *Novell Client for Windows Installation and Administration Guide* and “[Managing File Security](#)” in the *Novell Client 1.2 for Linux Installation and Administration Guide*.

Changing File Attributes at the Linux Shell Prompt

Use the `attrib` command to change file and directory attributes on an NSS volume.

The `attrib` command is also documented in “[Attributes Utility for Linux](#)” in the *File Systems Management Guide for OES*.

Or you can enter the following command at the shell prompt:

```
attrib --help
```

Changing Trustee Rights at the Linux Shell Prompt

To grant NSS trustee rights to an NSS volume, enter the following command:

```
rights -f /full/directory/path -r rights_mask trustee
full.object.context
```

where `/full/directory/path` is the path to the target directory on the NSS volume, `rights_mask` is the list of NSS rights, and `full.object.context` is the object (User or Group) in its full eDirectory context including the tree name.

For example, you might enter the following:

```
rights -f /data/groupstuff -r rwfc trustee  
mygroup.testing.example_tree
```

For a complete list of command options, enter `rights` at the shell prompt.

The `rights` command is also documented in “[Trustee Rights Utility for Linux](#)” in the *File Systems Management Guide for OES*.

IMPORTANT: The Virtual Office product and associated patches are not included in OES SP2.

References to Virtual Office are retained for those who are updating a previous OES installation to SP2.

Novell® Open Enterprise Server (OES) includes Virtual Office, a Web portal that provides access to OES services for your customers, employees and partners—anytime, anywhere.

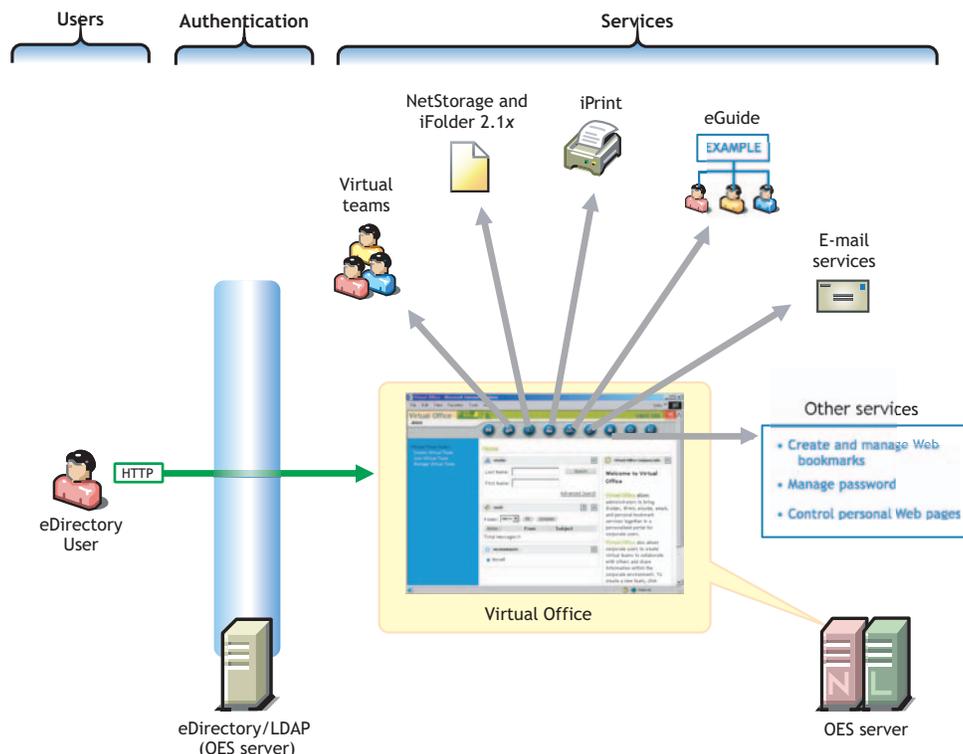
This section contains the following information:

- Section 34.1, “Overview of Virtual Office,” on page 203
- Section 34.2, “Planning for Virtual Office,” on page 204
- Section 34.3, “Virtual Office Coexistence and Migration Considerations,” on page 204
- Section 34.4, “Virtual Office Implementation Suggestions,” on page 204
- Section 34.5, “Virtual Office Maintenance Suggestions,” on page 205

34.1 Overview of Virtual Office

Figure 34-1 on page 203 illustrates the services that Virtual Office makes accessible through a Web browser.

Figure 34-1 How Virtual Office Works



The following table explains the information presented in [Figure 34-1](#).

| Users | Authentication | Services |
|--|---|--|
| Users access the Virtual Office services portal through a Web browser. | Access to Virtual Office and its associated services is controlled by LDAP-based authentication through the eDirectory™ LDAP server. Although shown separately, eDirectory could be installed on the OES server. | Depending on the services you have installed and the way you have configured Virtual Office, users can do the following: <ul style="list-style-type: none">• Create and participate in virtual teams of eDirectory users• Access files through NetStorage• Print to any iPrint printers• Access eGuide• Access an e-mail server (if configured)• Change their eDirectory passwords You determine what services links are available. |

34.2 Planning for Virtual Office

For information on what is needed to configure Virtual Office, see the [Novell Virtual Office Configuration Guide](#).

34.3 Virtual Office Coexistence and Migration Considerations

There is no migration path for Virtual Office servers.

34.4 Virtual Office Implementation Suggestions

If you install a Virtual Office server pattern, the following services are included by default:

- eGuide
- iPrint
- NetStorage
- Novell® iFolder 2.1x
- QuickFinder™ Server 4.0

Each of these services, except eGuide, requires further configuration before it can be used. Instructions for preparing each service for use are included in the service's section in this guide.

Although Virtual Office doesn't require additional configuration, you can easily change the default settings using iManager. For example, you can

- Post messages to the Virtual Office home page.
- Control whether service icons appear in the interface.
- Configure Virtual Office to access NetStorage or eGuide through an Internet proxy server.
- Configure Virtual Office to access other file, print, or e-mail services.

For information on getting started with Virtual Office, see the *Novell Virtual Office Configuration Guide* and the online help installed with Virtual Office.

34.5 Virtual Office Maintenance Suggestions

As your network grows and changes over time, you can use iManager to change your Virtual Office installation so that it continues to provide single-point access to network services. For more information, see the *Novell Virtual Office Configuration Guide*.

The file services in Novell® Open Enterprise Server (OES) let you provide Web- and network-based file services to your network users.

This section contains the following information:

- [Section 35.1, “Overview of File Services,” on page 207](#)
- [Section 35.2, “Planning for File Services,” on page 219](#)
- [Section 35.3, “Coexistence and Migration of File Services,” on page 222](#)
- [Section 35.4, “Aligning NCP and POSIX File Access Rights,” on page 222](#)
- [Section 35.5, “Native File Access Protocols Implementation and Maintenance,” on page 225](#)
- [Section 35.6, “NCP Implementation and Maintenance,” on page 226](#)
- [Section 35.7, “NetStorage Implementation and Maintenance,” on page 227](#)
- [Section 35.8, “Novell iFolder 2.1x Implementation and Maintenance,” on page 229](#)
- [Section 35.9, “Novell iFolder 3.x Implementation and Maintenance,” on page 231](#)
- [Section 35.10, “Samba Implementation and Maintenance,” on page 232](#)

35.1 Overview of File Services

The file service components in OES include the following:

- **Native File Access Protocols (page 208):** Lets Linux, Macintosh, UNIX, and Windows users access and store files on OES NetWare® servers using their native file access methods.
- **NetWare Core Protocol (page 209):** Provides NetWare Core Protocol™ (NCP™) access to NetWare servers and to NCP volumes that you define on OES Linux server partitions.
- **NetStorage (page 210):** Provides network and Web access to various Linux, NetWare, and Windows file services.

The NetStorage server doesn't actually store files and folders. Rather, it provides *access* to other file services on OES Linux and NetWare servers that support the native TCP/IP protocol.

- **Novell iFolder 2.1x (page 215):** Provides a Web- and network-based repository (Novell iFolder® server) that stores master copies of locally accessible files on the OES server.
- **Novell Samba (page 218):** Provides Windows (CIFS and HTTP-WebDAV) access to files stored on an OES Linux server's file system.

The file service components in OES are all mutually compatible—you can install one or more of them on the same OES server.

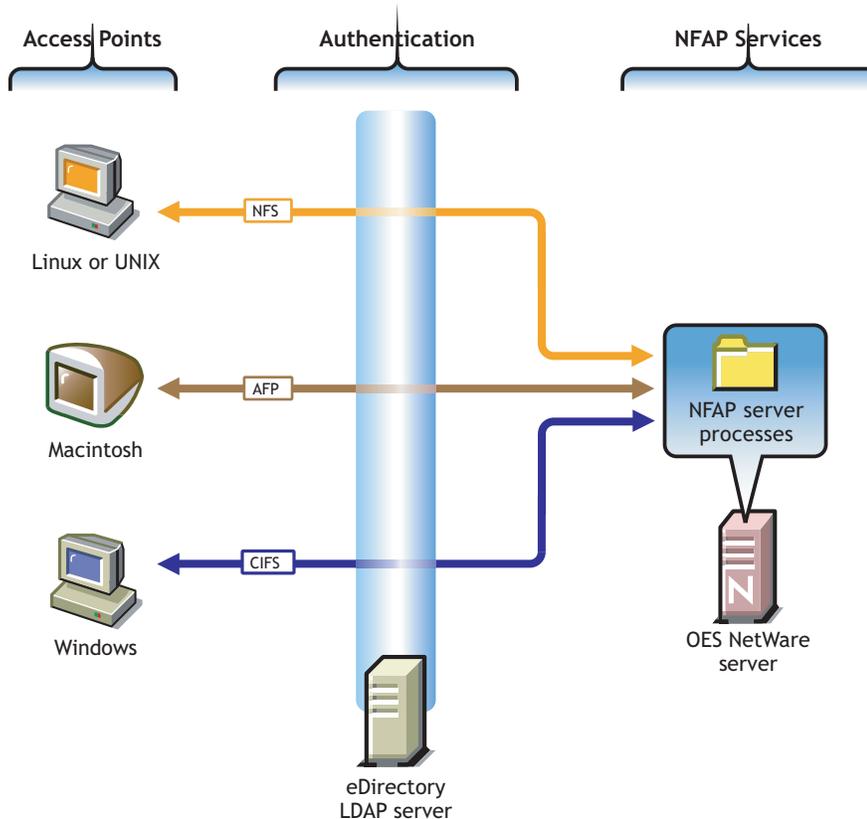
35.1.1 Using the File Services Overviews

Each graphical overview in the following sections introduce one of the OES file service components. If visual presentations help you grasp basic concepts, continue with the following overviews. If you prefer to skip the overviews, go to [Section 35.2, “Planning for File Services,” on page 219](#).

35.1.2 Native File Access Protocols

The Novell Native File Access Protocols (NFAP) product lets users on Macintosh, Windows, and UNIX workstations access and store files on OES NetWare servers without installing any additional software, such as the Novell Client™ (see [Figure 35-1](#)).

Figure 35-1 Native File Access Protocol Support on NetWare



The following table explains the information illustrated in [Figure 35-1](#).

| Access Methods | Authentication/File Encryption | NFAP Services |
|--|---|---|
| Linux, UNIX, Macintosh, and Windows workstation users can create drive mappings, mount points, etc., to the NetWare server. Then they can access the files as though they were stored on a network server that is native for the respective platforms. | All file service access is controlled by LDAP-based authentication through the eDirectory™ LDAP server. Although shown separately, eDirectory could be installed on the OES server. After the service is fully configured, users can log in just as they would to access files on other native systems. | Files are stored on NSS volumes on OES NetWare servers. The same files can be accessed by users on different platforms. |

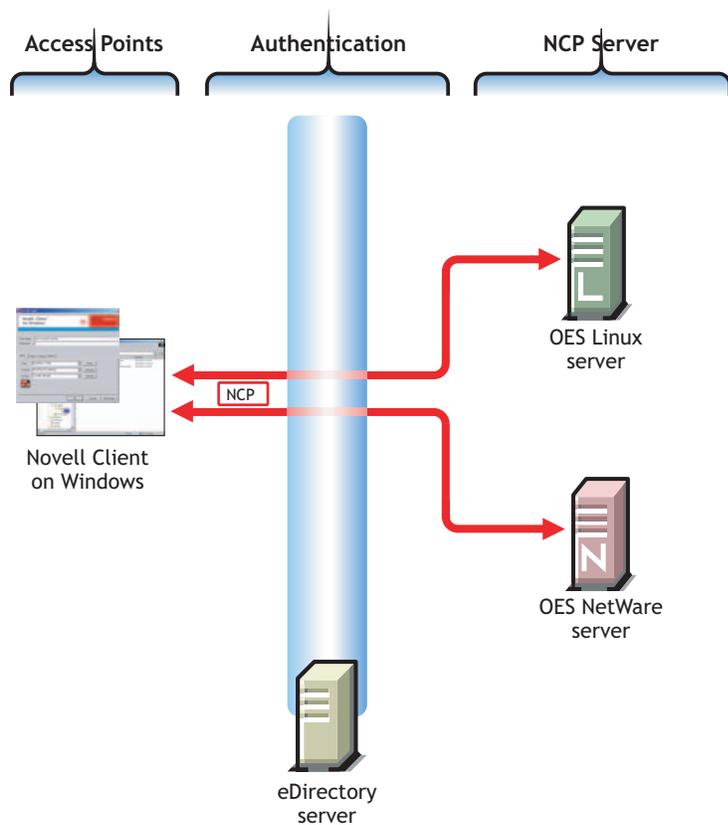
35.1.3 NetWare Core Protocol

NetWare Core Protocol (NCP) is the technology beneath many of the network services for which NetWare is famous.

And now in OES, NCP is also available on Linux. The Novell NCP Server for Linux provides the rich file services that Novell is known for. Windows users who run Novell Client™ software can now access data, manage files and folders, map drives, etc., using the same methods as they do on NetWare servers.

Figure 35-2 illustrates the basics of NCP file services. For more information on how NCP can help you manage access to network resources, see “Access” on page 189.

Figure 35-2 NCP Services for Linux and NetWare



The following table explains the information illustrated in Figure 35-2.

| Access Methods | Authentication | NCP Services |
|--|---|---|
| Access is through an NCP client—specifically, the Novell Client. | All file service access is controlled by eDirectory authentication. | Files are stored on NetWare or NCP volumes that the administrator has created. The same core set of NetWare file attributes are available on both Linux and NetWare. |

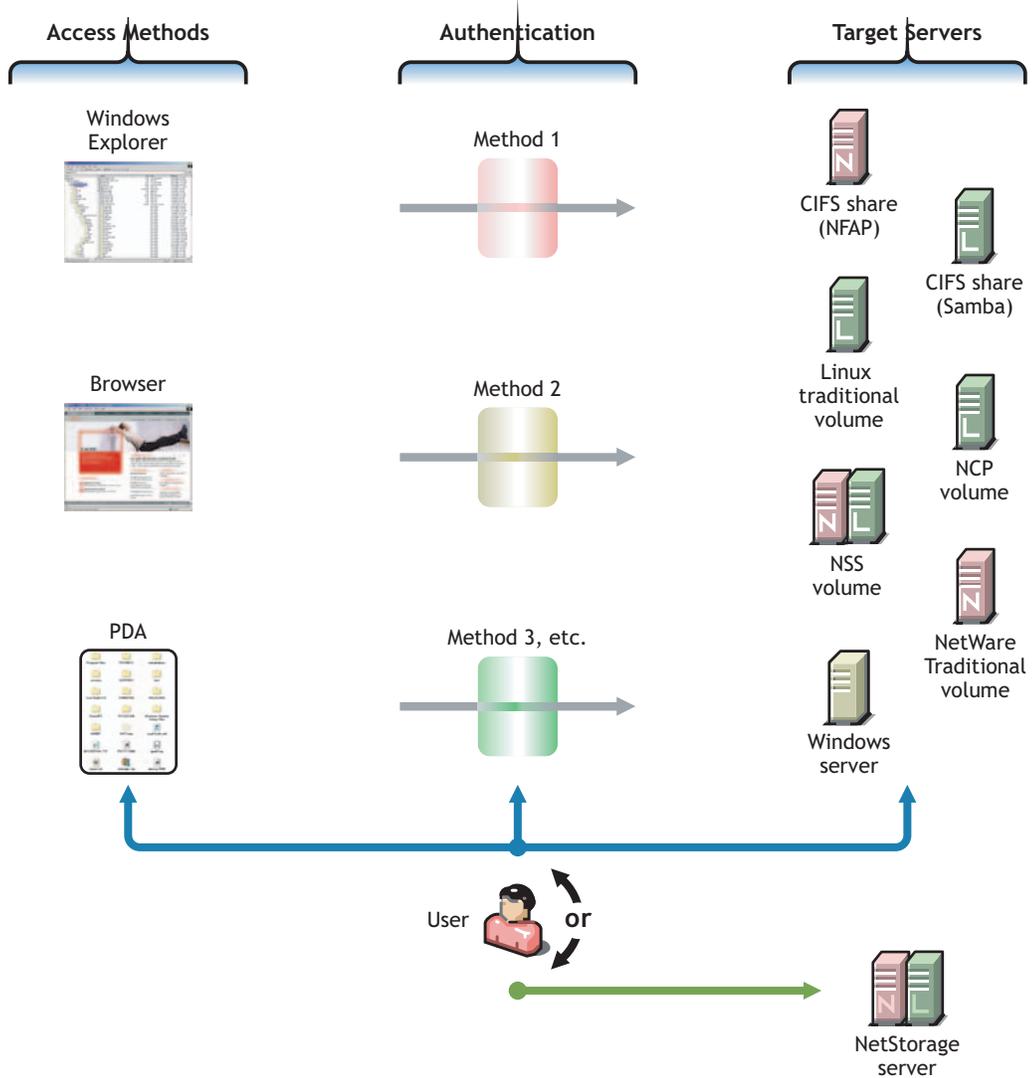
35.1.4 NetStorage

NetStorage makes network files available anywhere, any time.

Common Network File Storage Problems

Network file access is often confusing and frustrating to users, as illustrated in [Figure 35-3](#).

Figure 35-3 Common Network File Storage Problems



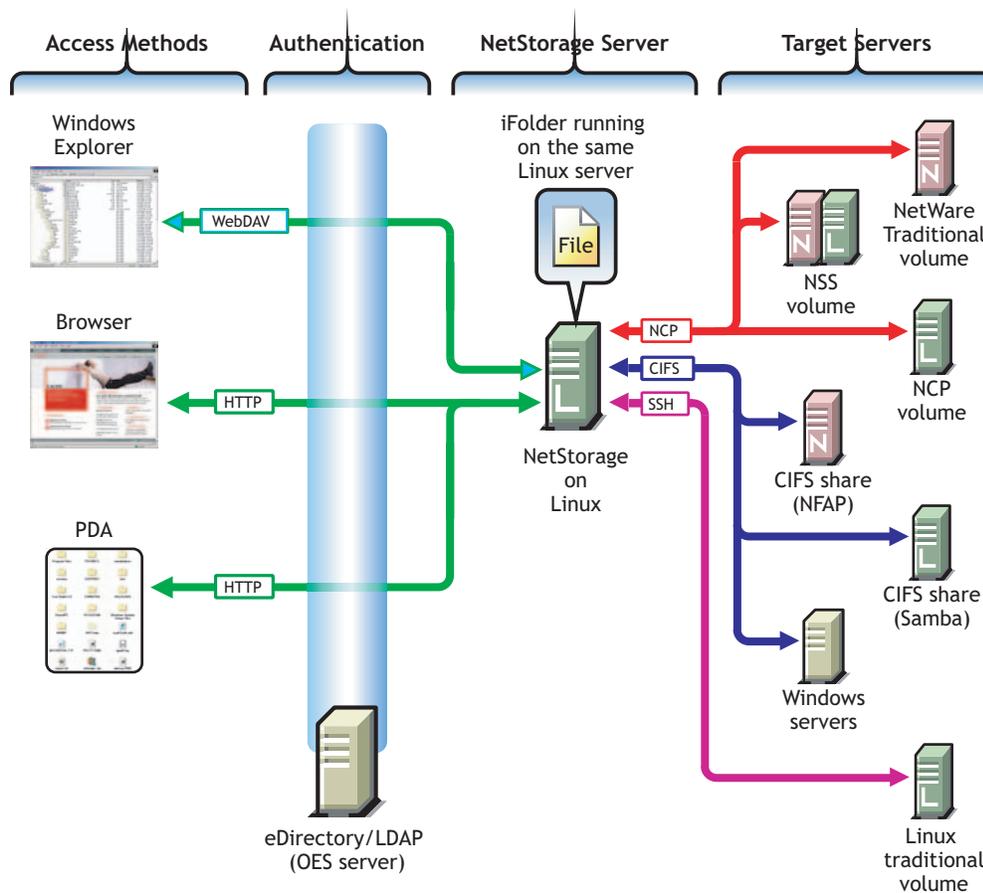
The following table explains the information illustrated in [Figure 35-3](#).

| Access Methods | Authentication | Target File Systems | Solution: NetStorage |
|---|--|---|---|
| Browser or PDA access is business critical to those who must travel. However, access method support varies widely among file service providers. | Authentication helps protect information assets, but having diverse authentication methods leads to frustration and lost productivity. | Having diverse file storage services only adds to the complexity and confusion. | Novell NetStorage ties all of these issues together with an easy-to-administer, easy-to-use solution. |

Novell NetStorage on Linux

NetStorage on Linux provides local and Web access to files on many systems without requiring the Novell Client (see [Figure 35-4](#)).

Figure 35-4 How NetStorage Works on OES Linux



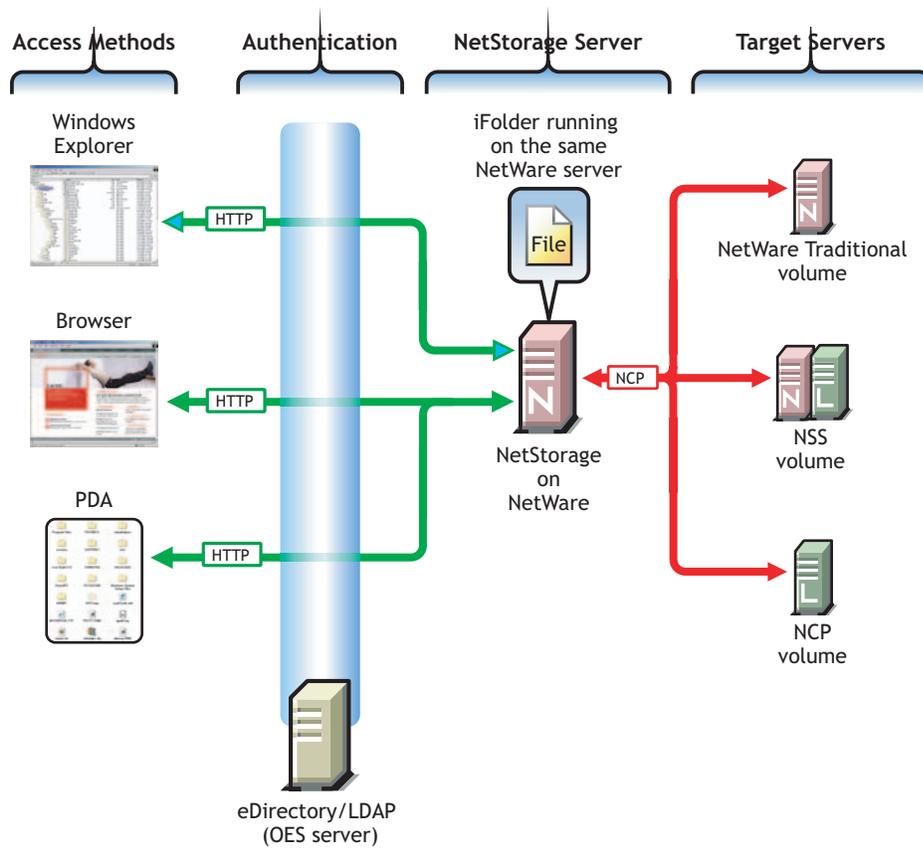
The following table explains the information illustrated in [Figure 35-4](#).

| Access Methods | Authentication | NetStorage Server | Target Servers |
|---|--|--|---|
| <p>Users have read and write access to files from</p> <ul style="list-style-type: none"> • Windows Explorer: This is enabled by the HTTP protocol with WebDAV extensions. • Browsers: Users can access files directly by connecting to the NetStorage server. • PDAs: PDA users with network connections can access their files as well. <p>Access is granted through login script drive mapping (NCP server required) or through Storage Location Objects.</p> | <p>File service access is controlled by LDAP-based authentication through the eDirectory LDAP server.</p> <p>Although shown separately, eDirectory could be running on the OES server.</p> | <p>The NetStorage server receives and processes connection requests and provides access to storage on various servers on the network.</p> <p>A Novell iFolder server running on the same server as NetStorage is automatically available through NetStorage to Novell iFolder users.</p> | <p>NetStorage on Linux can connect eDirectory users to their files and folders stored in the following locations:</p> <ul style="list-style-type: none"> • The same targets as NetWare (see Figure 35-5 on page 213) if the NCP server is running • Windows workgroup shares (CIFS or Samba shares) • Linux traditional volumes through an SSH connection. <p>Additionally, Linux volumes can also be made available as NCP volumes.</p> |

Novell NetStorage on NetWare

NetStorage on NetWare provides local and Web access to files on NetWare and Linux without requiring the Novell Client software (see [Figure 35-5](#)).

Figure 35-5 How NetStorage Works on OES NetWare



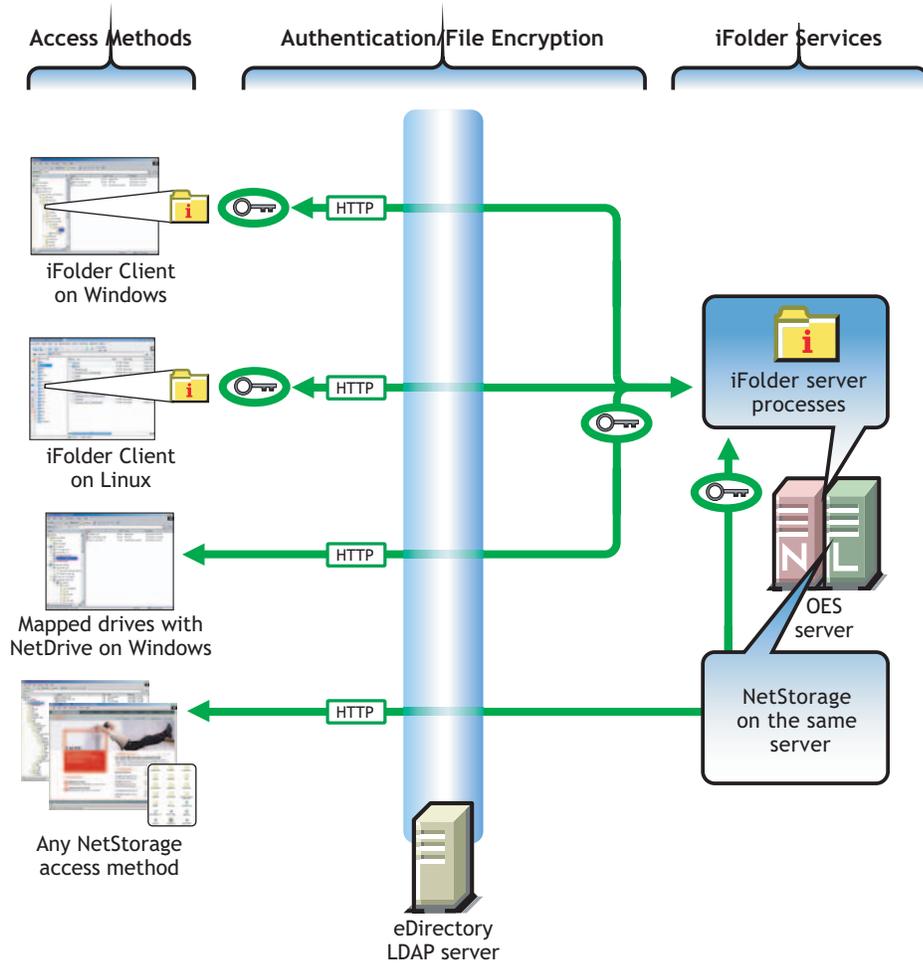
The following table explains the information illustrated in [Figure 35-5](#).

| Access Methods | Authentication | NetStorage Server | Target Servers |
|--|--|--|---|
| <p>Users have read and write access to files from</p> <ul style="list-style-type: none"> • Windows Explorer: This is enabled by the HTTP protocol with WebDAV extensions. • Browsers: Users can access files directly by connecting to the NetStorage server. • PDAs: PDA users with network connections can access their files as well. | <p>File service access is controlled by LDAP-based authentication through the eDirectory LDAP server.</p> <p>Although shown separately, eDirectory could be running on the OES server.</p> | <p>The NetStorage server receives and processes connection requests and provides access to storage on various servers on the network.</p> <p>A Novell iFolder server running on the same server as NetStorage is automatically available to Novell iFolder users. You must configure NetStorage if you want access to the Novell iFolder data stored on other servers.</p> | <p>NetStorage on NetWare can connect eDirectory users to their files and folders stored in the following locations:</p> <ul style="list-style-type: none"> • NetWare Traditional volumes where users have access rights • NSS volumes on either NetWare or OES Linux servers where users have access rights • Any administrator-defined NCP volumes created on an OES Linux server |
| <p>Access is granted through login script drive mapping or through Storage Location Objects.</p> | | | |

35.1.5 Novell iFolder 2.1x

Novell iFolder 2.1x provides a Web- and network-based repository (Novell iFolder server) that stores master copies of locally accessible files (see [Figure 35-6](#)).

Figure 35-6 *How Novell iFolder Works*



The following table explains the information illustrated in [Figure 35-6](#).

| Access Methods | Authentication/File Encryption | Novell iFolder Services |
|--|---|--|
| Linux and Windows workstation users who have the Novell iFolder Client installed can access and modify their files in a workstation folder. Changes are automatically synchronized with the Novell iFolder server. | All file service access is controlled by LDAP-based authentication through the eDirectory LDAP server. | Local and network copies of each file can be automatically synchronized by the Novell iFolder Client and Server pieces, or users can manually synchronize the files. |
| Windows users who install NetDrive can map a network drive to the Novell iFolder server. Files are modified on the server. | Although shown separately, eDirectory could be installed on the OES server. Files can be encrypted using a passphrase for transmission to and from storage on the Novell iFolder server. | |
| NetStorage is the Web-access solution for Novell iFolder 2.1x. | | |

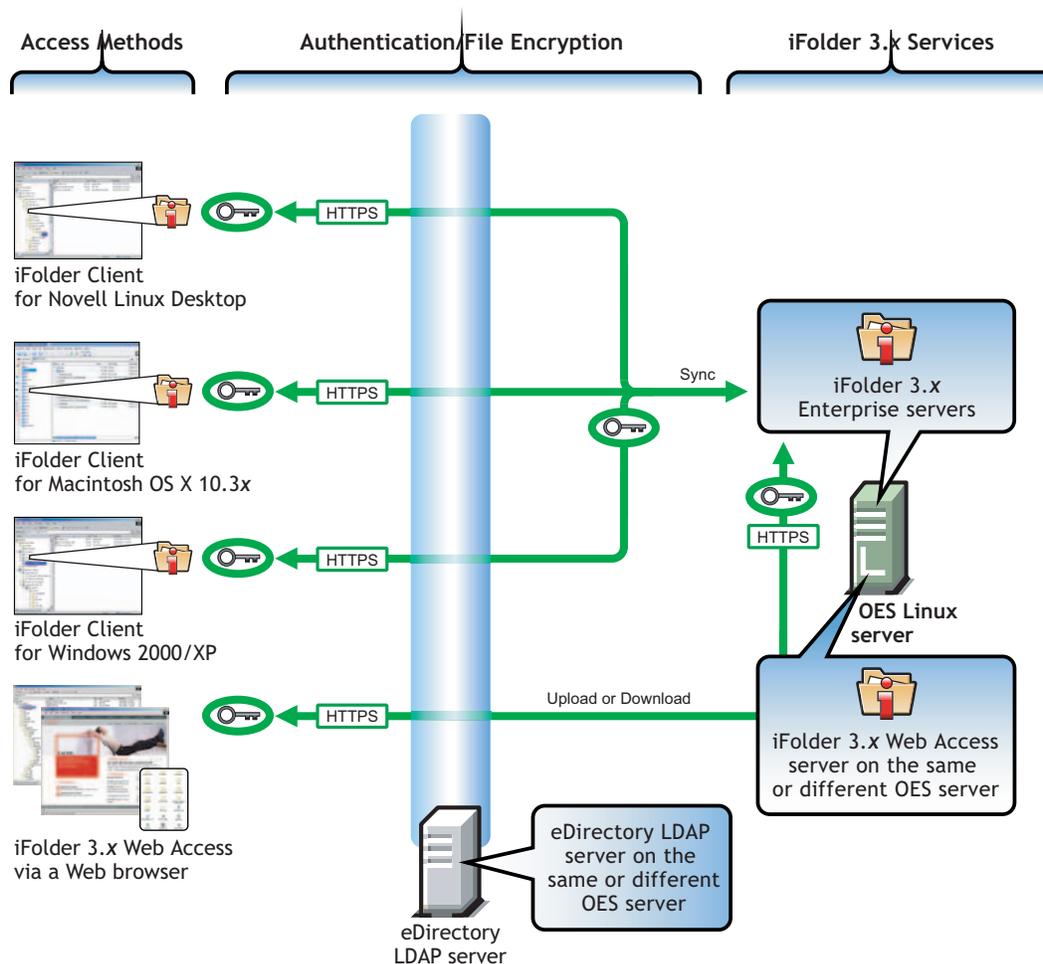
Novell iFolder 2.1x offers other access options and features not shown in this graphic, including

- Web access to files on other Novell iFolder 2.1x servers through a seamless integration with NetStorage.
- Concurrent access to multiple accounts and collaborative access to a single account.
- Thin-client support.

35.1.6 Novell iFolder 3.1

Novell iFolder 3.1 supports multiple iFolders per user, user-controlled sharing, and a centralized network server for file storage and secure distribution (see [Figure 35-7](#)).

Figure 35-7 *How Novell iFolder Works*



The following table explains the information illustrated in [Figure 35-7](#).

| Access Methods | Authentication/File Encryption | Novell iFolder Services |
|--|--|--|
| Linux, Macintosh, and Windows workstation users who have the Novell iFolder Client installed can access and modify their files in one or more workstation folders. Changes are automatically synchronized with the iFolder 3.x Enterprise servers. | All file service access is controlled by LDAP-based authentication through the eDirectory LDAP server. | Local and network copies of each file are automatically synchronized by the Novell iFolder Client and Server pieces. |
| A Web interface lets users access their files from any computer with an active network or Internet connection. | Although shown separately, eDirectory could be installed on the OES server. | |
| | Files can be encrypted for transport using SSL connections (HTTPS). | |

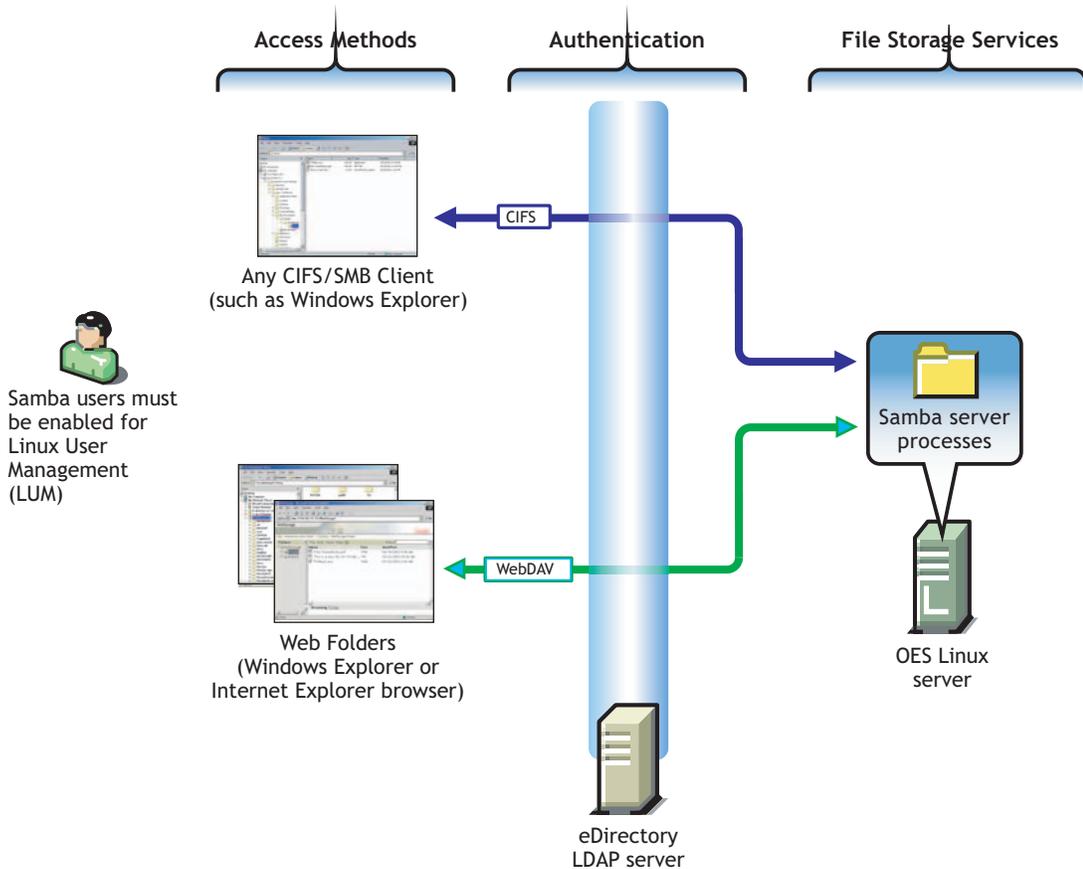
Additional overview information is available in “[Overview of Novell iFolder 3.x](#)” in the [Novell iFolder 3.x Administration Guide](#).

For detail about new features in iFolder 3 and to compare differences between iFolder 2.1x and iFolder 3, see “[What's New](#)” in the [Novell iFolder 3.x Administration Guide](#).

35.1.7 Novell Samba

Samba on an OES Linux server provides Windows (CIFS and HTTP-WebDAV) access to files stored on the OES server (see [Figure 35-8](#)).

Figure 35-8 *How Samba on OES Works*



The following table explains the information illustrated in [Figure 35-8](#).

| Access Methods | Authentication | File Storage Services |
|--|--|---|
| <p>eDirectory users on Windows workstations have two native Windows file access options (provided their eDirectory accounts have been enabled for LUM and Samba):</p> <ul style="list-style-type: none"> • CIFS Client Access <p>Windows Explorer users can access and modify files on the Samba server just as they would on any workgroup server share.</p> <ul style="list-style-type: none"> • Web Folder <p>Users can create Web Folders in Windows Explorer or Internet Explorer.</p> <p>Files on the OES Linux server running Samba are accessed and maintained using the HTTP-WebDAV protocol.</p> | <p>All file service access is controlled by LDAP-based authentication through the eDirectory LDAP server.</p> <p>Although shown separately, eDirectory could be installed on the OES server.</p> | <p>Of course, the same files can also be accessed through other OES file services (such as NetStorage) that connect to Linux volumes.</p> |

Samba is an open source initiative. In addition to Linux support, Samba initiatives provide support for other platforms such as Apple* Computer's operating systems. More information is available on the Web. See "[Web Links](#)" in the "[Samba Support in OES](#)" section in this guide.

35.2 Planning for File Services

Functional overviews of each file service product are included in [Section 35.1, "Overview of File Services,"](#) on page 207.

35.2.1 Deciding Which Components Match Your Needs

To decide which file service components to install, you should match service features listed in [Table 35-1](#) to your network's file service requirements.

Table 35-1 OES File Services Feature Breakdown

| Product | Access Method Features | Back-End Storage Features | Security Features |
|---|--|---|--|
| Native File Access Protocol (NFAP) (NetWare only) | <ul style="list-style-type: none"> • Linux File Managers • Macintosh Finder* • UNIX File Managers • Windows Explorer | <ul style="list-style-type: none"> • NetWare volumes | <ul style="list-style-type: none"> • Secure LDAP Authentication |

| Product | Access Method Features | Back-End Storage Features | Security Features |
|--|---|---|---|
| NCP Server (NetWare Core Protocol) | Novell Client (NCP client) | <ul style="list-style-type: none"> Any Linux volumes (including NSS) that are defined as NCP volumes NetWare volumes | <ul style="list-style-type: none"> eDirectory Authentication |
| NetStorage | <ul style="list-style-type: none"> Any supported browsers Personal Digital Assistant (PDA) Remote (browser-based) Web Folders (on either an Internet Explorer browser or in Windows Explorer) Windows Explorer | <ul style="list-style-type: none"> iFolder server (on same machine) Linux traditional volumes NetWare volumes NCP volumes NSS volumes Samba (SMB) servers Windows (CIFS servers) | <ul style="list-style-type: none"> Secure LDAP Authentication |
| NOTE: NetStorage provides access only to other file services. | | | |
| Novell iFolder 2.1x | <ul style="list-style-type: none"> Linux File Managers Offline access with file synchronization (between local and network copies) on reconnect Windows Explorer | <ul style="list-style-type: none"> Novell iFolder file repository on OES server | <ul style="list-style-type: none"> Files are encrypted on the Novell iFolder server and for transport as well. Secure LDAP Authentication |
| Novell iFolder 3.x | <ul style="list-style-type: none"> Linux File Managers Macintosh Chooser Offline access with file synchronization (between local and network copies) on reconnect Web browsers Windows Explorer | <ul style="list-style-type: none"> Novell iFolder 3 Enterprise server file repository on OES Linux server | <ul style="list-style-type: none"> Files can be encrypted for transport using SSL (HTTPS). Secure LDAP Authentication |
| Novell Samba (Linux only) | <ul style="list-style-type: none"> Any CIFS/SMB client Remote access (Web Folders in the Internet Explorer browser) Windows Explorer | <ul style="list-style-type: none"> Linux traditional file system on OES server | <ul style="list-style-type: none"> Secure LDAP Authentication |

35.2.2 Planning Your File Services

- For the file services you plan to install, compute the total additional RAM required (above the basic system requirement).

Note the following points:

- **Native File Access Protocols:** There are no additional RAM requirements.
- **NCP:** There are no additional RAM requirements.
- **NetStorage:** There are no additional RAM requirements.
- **Novell iFolder 2.1x:** Suggestions for calculating the additional RAM you need are contained in “[Preparing to Install iFolder 2.1](#)” in the *Novell iFolder 2.1 Installation and Administration Guide*.
- **Novell iFolder 3.x:** Suggestions for calculating the additional RAM you need are contained in “[Server Workload Considerations](#)” in the *Novell iFolder 3.x Administration Guide*.
- **Samba:** There are no additional RAM requirements.

2 Record the additional required RAM in your planning notes.

3 For the file services you plan to install, compute the total additional disk space required (above the basic system requirement).

Note the following points:

- **Native File Access Protocols:** Allocate enough disk space to meet your users’ file storage needs. Because all platforms can access the same storage space, you need only consider the total space needed, not the platform-specific requirements.
- **NCP:** Allocate enough disk space to meet your users’ file storage needs. On Linux, this space must exist on partitions you have designated as NCP volumes. On NetWare, all volumes are accessible through NCP.
- **NetStorage:** There are no disk space requirements because NetStorage provides access only to other file storage services.
- **Novell iFolder 2.1x:** Suggestions for calculating the additional disk space you need are contained in “[Preparing to Install iFolder 2.1](#)” in the *Novell iFolder 2.1 Installation and Administration Guide*.
- **Novell iFolder 3.x:** Suggestions for calculating the additional disk space you need are contained in “[Server Workload Considerations](#)” in the *Novell iFolder 3.x Administration Guide*.
- **Samba:** Allocate enough disk space for the partition containing the /home directory to meet your users’ file storage needs.

4 Record the additional required disk space in your planning notes.

5 For the file services you plan to install, refer to the information in the OES installation guides indicated in the following table and note your planning choices on your planning sheet.

| File Service Product | Linux Planning References | NetWare Planning References |
|------------------------------|---------------------------|--|
| Native File Access Protocols | N/A | The following sections in the <i>OES Native File Access Protocols Guide</i> . <ul style="list-style-type: none"> • “Preparing for CIFS and AFP” • “Administrator Workstation Prerequisites” • “Client Computer Prerequisites” |

| File Service Product | Linux Planning References | NetWare Planning References |
|----------------------|---|---|
| NCP | “Novell NCP Server” in the <i>OES Linux Installation Guide</i> | Installed by default. No planning required. |
| NetStorage | “Novell NetStorage” in the <i>OES Linux Installation Guide</i> | “NetStorage Install” in the <i>OES NetWare Installation Guide</i> |
| Novell iFolder 2.1x | “Novell iFolder 2.x” in the <i>OES Linux Installation Guide</i> | “iFolder Server Options” in the <i>OES NetWare Installation Guide</i> |
| Novell iFolder 3.x | “Novell iFolder 3.x” in the <i>OES Linux Installation Guide</i> | N/A. |
| Samba | “Novell Samba” in the <i>OES Linux Installation Guide</i> | N/A |

35.3 Coexistence and Migration of File Services

The links in [Table 35-2](#) are to sections located in the *OES Coexistence and Migration Guide*.

Table 35-2 File Services Coexistence and Migration Links

| File Services Product | Link to Coexistence and Migration Information |
|------------------------------|---|
| Native File Access Protocols | “Native File Access Protocols” |
| NCP | “Novell Client (NCP)” |
| NetStorage | “NetStorage” |
| Novell iFolder 2.1x | “iFolder 2.1.x” |
| Novell iFolder 3.x | “iFolder 3.x” |
| Samba | “Samba” |

35.4 Aligning NCP and POSIX File Access Rights

NetWare administrators have certain expectations regarding directory and file security. For example, they expect that home directories are private—that only the directory owners can see directory contents. However, because of the differences in the NetWare Core Protocol (NCP) and POSIX file security models (see [Section 30.5, “Comparing the Linux and the NetWare Core Protocol \(NCP\) File Security Models,”](#) on page 166) that is not the case by default on POSIX file systems.

Use the information in this section to understand how you can configure POSIX directories to more closely align with the NCP model.

- [Section 35.4.1, “A Brief Explanation of Managing Access Rights,”](#) on page 223
- [Section 35.4.2, “Providing a Private Work Directory,”](#) on page 224
- [Section 35.4.3, “Providing a Group Work Area,”](#) on page 224
- [Section 35.4.4, “Providing a Public Work Area,”](#) on page 225
- [Section 35.4.5, “Setting Up Rights Inheritance,”](#) on page 225

35.4.1 A Brief Explanation of Managing Access Rights

NCP directories are, by default, private. When you assign a user or a group as a trustee of a directory or file, those trustees can automatically navigate to the assigned area and exercise whatever access privileges you have assigned at that level and below. You can assign as many trustees with different access privileges as suits your purposes.

On the other hand, traditional Linux (POSIX) directories can be accessed through three sets of permissions defined for each file object on a Linux system. These sets include the read (r), write (w), and execute (x) permissions for each of three types of users: the file owner, the group, and other users. The Linux kernel in OES also supports access control lists (ACLs) to expand this capability. However, ACLs are outside the scope of this discussion. For more information on ACLs, see “[Access Control Lists in Linux](#)” in the *SUSE LINUX Enterprise Server 9 Administration Guide*.

The Linux shell `chown` command lets you change the file owner and/or group to a LUM user or a LUM-enabled group. For example, `chown -R user1 /home/user1` would change the owner of the `user1` home directory and all its subdirectories and files to `user1`. For more information, see the `chown` man page on your OES Linux server.

The Linux shell `chmod` command provides a very simple and fast way of adjusting directory and file access privileges for the three user types: owner, group, and other (all users). In its simplest form, the command uses three numbers, ranging from 0 through 7, to represent the rights for each of the three user types. The first number sets the rights for the owner, the second number for the group, and the third number for all others. Each number represents a single grouping of rights, as follows:

| Number | Setting | Binary Representation |
|--------|---------|-----------------------|
| 0 | - - - | 0 0 0 |
| 1 | - - x | 0 0 1 |
| 2 | - w - | 0 1 0 |
| 3 | - w x | 0 1 1 |
| 4 | r - - | 1 0 0 |
| 5 | r - x | 1 0 1 |
| 6 | r w - | 1 1 0 |
| 7 | r w x | 1 1 1 |

Those familiar with the binary number system find this method an easy way to remember what each number represents.

For example, the command `chmod 777 /home` would grant read, write and execute rights (7) to owner, group, and other for the `/home` directory, while `chmod 700 /home` would grant the three rights to only the directory owner, with group and other having no rights. `chmod 750 /home` would grant `rw` rights to the owner, `r-x` rights to the group, and no rights to other users.

For more information about the `chmod` command, see the `chmod` man page on your OES Linux server.

35.4.2 Providing a Private Work Directory

To make an NCP directory private, you assign a single user as the trustee and make sure that no unexpected users or groups have trustee rights in any of the parent directories.

To provide a private work area on a traditional Linux volume:

- 1 Make the user the directory owner. For example, you could use the `chown` command to change the owner (user),

```
chown -R user: /path/user_dir
```

where *user* is the eDirectory user, *path* is the file path to the work directory, and *user_dir* is the work directory name. The `-R` option applies the command recursively to all subdirectories and files.

- 2 Grant only the user read, write, and execute rights (`rwX --- ---`) to the directory. For example, you could use the `chmod` command as follows,

```
chmod -R 700 /path/user_dir
```

where *path* is the file path to the work directory, and *user_dir* is the work directory name.

- 3 Check each parent directory in the path up to the `root (/)` directory, making sure that all users (referred to as “other users” in Linux) have read and execute rights (`r-x`) in each directory as shown by the third group of permissions (`... .. r-x`).

This is the default for most directories on Linux. (Owner and group permissions are not shown because they are irrelevant.)

35.4.3 Providing a Group Work Area

On an NCP volume, you can provide a group work area by assigning users to a group and then granting the group trustee rights to the directory. As an alternative, if users need different levels of access within the work area, you can assign each user as a trustee and grant only the rights needed.

To provide a group work area on a traditional Linux volume:

- 1 Set group ownership for the directory using the `chown` command. For example, you could enter

```
chown -R :group /path/group_dir
```

where *group* is the group name, *path* is the file path to the work area, and *group_dir* is the group work directory. The `-R` option applies the action to all subdirectories and files in *group_dir*.

- 2 Grant the group read, write, and execute rights (`... rwX ...`). For example, you could enter

```
chmod -R 770 /path/group_dir
```

where *path* is the file path to the work area, and *group_dir* is the group work directory. The second `7` grants `rwX` to the group. (The example assumes that the owner of the directory should also retain all rights. Therefore, the first number is also `7`.)

- 3 Check each parent directory in the path up to the `root (/)` directory, making sure that the group has read and execute rights (`r-x`) in each directory as shown by the second group of permissions (`... r-x ...`).

Use the `chmod` command to adjust this where necessary by specifying the number 5 for the group permission. For more information, see “[A Brief Explanation of Managing Access Rights](#)” at the beginning of this section.

35.4.4 Providing a Public Work Area

On an NCP volume, you can provide a public work area by assigning [Public] as a trustee and then granting the required trustee rights to the directory.

For the work area itself, you would set permissions for the owner, group, and all others to read, write, and execute rights (`rwX rwX rwX`) (`chmod 777`).

All others must also have read and execute rights on the system in each parent directory in the path all the way to the root of the Linux system. This means that you set permissions for all parent directories to `rwX --- r-x`.

To provide a public work area on a traditional Linux volume:

- 1 Assign all rights (`rwX`) to other (all users) using the `chmod` command. For example, you could enter

```
chmod -R 707 /path/group_dir
```

where *path* is the file path to the work area, and *group_dir* is the group work directory. The third 7 grants `rwX` to the group. (The example assumes that the owner of the directory should also retain all rights and that the group setting is irrelevant.)

- 2 Check each parent directory in the path up to the `root (/)` directory, making sure that all users (other) have read and execute rights (`r-x`) in each directory as shown by the third group of permissions (`... .. rwX`).

Use the `chmod` command to adjust this where necessary by specifying the number 5 for the other permission. For more information, see “[A Brief Explanation of Managing Access Rights](#)” at the beginning of this section.

35.4.5 Setting Up Rights Inheritance

The final step in aligning POSIX rights to the NCP model is setting the Inherit POSIX Permissions volume flag in the NCP configuration file so that all files and subdirectories created in these areas inherit the same permissions as their parent directory. For instructions, see “[Setting Volume Definition Flags](#)” in the *NCP Server for Linux Administration Guide*.

35.5 Native File Access Protocols Implementation and Maintenance

After installing a NetWare server, if you want to provide native access to Linux, Macintosh, UNIX, or Windows users, there are tasks to complete for each of the platforms.

The *OES Native File Access Protocols Guide* contains the following relevant sections:

- “[Working with UNIX Machines](#)”
- “[Working with Macintosh Computers](#)”
- “[Working with Windows Computers](#)”

To ensure a successful NFAP implementation, complete all the instructions in the sections for your chosen platforms.

Because NFAP provides native protocol access to files on NSS volumes on the NetWare server, the service is covered by maintenance tasks that apply to NSS file systems. For information on maintaining file services on NetWare, see the [“File Systems and Storage Services”](#) links in the online documentation.

35.6 NCP Implementation and Maintenance

The implementation information in the following sections can help you get started with NCP on OES servers.

35.6.1 NCP Services on NetWare

After installing an OES NetWare server, eDirectory users on Windows workstations with the Novell Client installed can access all the directories and files that you have granted them access to.

A common way for granting access is using the menu button (the red N) located in the system tray (taskbar) on most workstations after the Novell Client is installed. More information about managing file access is available in [Chapter 33, “Access,” on page 189](#).

35.6.2 Novell NCP Server for Linux

If you have installed the NCP Server for Linux, the same eDirectory/Novell Client users can access files on the OES Linux server. However, there are no home or data volumes available initially. These require a setup step not required on NetWare.

The Default NCP Volume

The NCP Server for Linux enables NCP access to NCP volumes defined on the OES Linux server. When you install the NCP server, the installation creates one NCP volume named `SYS :` that maps to the `/usr/novell/sys` folder on the Linux server.

This NCP volume contains `LOGIN` and `PUBLIC` directories that, in turn, contain a small subset of the files found on a NetWare server in the directories with the same names.

Creating Home and Data Volume Pointers

Initially, there are no NCP home directories or data volumes available to Novell Clients that attach to an OES Linux server.

If you want users to have NCP home or data directories on the server, you must decide where you want these directories to live on the server's partitions and then create NCP volumes using the `NCPCON` utility at the Linux shell prompt.

For example, if you wanted to create an NCP volume (pointer) named `HOME` and mount it to the `/usr` folder on the Linux server, you would enter the following command at the shell prompt:

```
ncpcon create volume HOME /usr
```

After issuing this command, when a Novell Client attaches to the OES Linux server, the `HOME :` volume appears along with the `SYS :` volume created by the installation.

IMPORTANT: NCP Volume pointers are always created with uppercase names (HOME :, SYS :, etc.) regardless of the case specified when the volume pointers are created.

35.6.3 Assigning File Trustee Rights

You can use the same methods for assigning file trustee rights on NCP volumes on OES Linux servers that you use when assigning them on NetWare. For example, the Novell Client can be used by anyone with the Access Control right on the volume, or the root user can use the `ncpcon` utility > rights command at a shell prompt to administer NCP trustee rights. See “[Changing NCP File System Rights](#)” in the *NCP Server for Linux Administration Guide*. (The `ncpcon` rights command is related to but not the same as the rights utility used to manage trustees on NSS volumes.)

35.6.4 NCP Maintenance

Because NCP provides Novell Client access to files on OES NetWare and OES Linux servers, the service is covered by maintenance tasks that apply to file systems on these servers. For information on maintaining file services, see the “[File Systems and Storage Services](#)” section in the online documentation.

35.7 NetStorage Implementation and Maintenance

The following sections are provided only as introductory information. For more information about using NetStorage, see the *OES NetStorage Administration Guide for NetWare*.

35.7.1 About Automatic Access and Storage Locations

The inherent value of NetStorage lies in its ability to connect users with various servers and file systems. Some connections are created automatically depending on the OES platform where NetStorage is installed. Other connections must be created by the network administrator.

Table 35-3 *NetStorage Access Summary*

| OES Platform | Automatic Access |
|--------------|---|
| Linux | <ul style="list-style-type: none">• Novell iFolder folders on the same server• NSS volumes on the same server that use the default mount point (/media/nss)• Drive mapping locations in login scripts of the user logging in (if the NCP Server for Linux is running on the server) |
| NetWare | <ul style="list-style-type: none">• User Home directories• Novell iFolder folders on the same server• Drive mapping locations in login scripts of the user logging in |

To provide access to file systems not listed in [Table 35-3](#), you must create Storage Location objects in eDirectory. For instructions on creating Storage Locations, see the following:

- For Linux: “[Creating a Storage Location Object](#)” in the *OES NetStorage Administration Guide for Linux*
- For NetWare: “[Creating a Storage Location Object](#)” in the *OES NetStorage Administration Guide for NetWare*

35.7.2 Novell iFolder Doesn’t Use Storage Locations

Novell iFolder access in NetStorage is controlled through the iFolder Storage Provider task in iManager and does not involve Storage Location objects. For more information about the iManager task, see the context-sensitive help in iManager.

35.7.3 Novell iFolder 2.1x Requires Additional Setup

If your NetStorage installation has a Novell iFolder link, you must complete all the instructions in [Section 35.8, “Novell iFolder 2.1x Implementation and Maintenance,”](#) on page 229 before attempting to let users access the service.

35.7.4 Assigning User and Group Access Rights

Because NetStorage provides access to other file storage systems, the users and groups that access the other systems through NetStorage must be created and granted file and directory access on those systems.

For example:

- NetWare users must exist in the eDirectory tree where the NetWare server resides and have access rights to the files and directories on the NetWare server.
- Windows users must exist on the Windows systems and have the required access rights to the files and directories on those systems.
- If your users will access Samba files on an OES Linux server, they must be enabled for LUM and Samba access on the OES Linux server. For more information, see [Section 18.1.5, “Services in OES Linux That Require Linux-Enabled Access,”](#) on page 121.

IMPORTANT: The usernames and passwords used to authenticate to the NetStorage (OES) server through eDirectory must match the usernames and passwords defined on the target systems.

35.7.5 Authenticating to Access Other Target Systems

The OES installation establishes a primary authentication domain for NetStorage. To access any storage location, users must exist somewhere in this primary domain. When it receives an authentication request, NetStorage searches for the username in the context you specified during OES installation and in all its subcontexts.

Authentication to other file systems is often controlled by other authentication domains. For example, you might create a storage location on the OES server that points to a NetWare server that resides in a different eDirectory tree. To access this storage location, users must authenticate to the other tree.

This means that you must specify an additional context in the NetStorage configuration as a nonprimary authentication domain.

When defining a nonprimary authentication domain, you must

- Ensure that the username and password in the nonprimary domain matches the username and password in the primary domain.
- Specify the exact context where User objects reside. NetStorage doesn't search the subcontexts of nonprimary authentication domains.

For more information about managing NetStorage authentication domains, see “[Authentication Domains](#)” in the *OES NetStorage Administration Guide for NetWare*.

35.7.6 NetStorage Authentication Is Not Persistent by Default

By default, users must reauthenticate each time they access NetStorage in a browser. This is true even if another browser window is open and authenticated on the same workstation.

The reason for this is that persistent cookies are not enabled by default.

This setting can be changed. For more information, see “[Persistent Cookies](#)” in the *OES NetStorage Administration Guide for NetWare*.

35.7.7 NetStorage Maintenance

Your NetStorage installation can change as your network changes and evolves by providing access to new or consolidated storage locations. For information about the kinds of tasks you can perform to keep your NetStorage implementation current, see the following:

- For Linux: *OES NetStorage Administration Guide for Linux*
- For NetWare: *OES NetStorage Administration Guide for NetWare*

35.8 Novell iFolder 2.1x Implementation and Maintenance

The following implementation pointers are provided only as introductory information. To begin using Novell iFolder, see the *Novell iFolder 2.1 Installation and Administration Guide*.

35.8.1 Managing Novell iFolder 2.1x

You manage Novell iFolder through the iFolder Management Console, which you can access directly or through iManager. For more information, see “[Using the iFolder Management Console to Configure Your iFolder System](#)” in the *Novell iFolder 2.1 Installation and Administration Guide*.

35.8.2 Configuring the Novell iFolder Server

Before you let users log in to the Novell iFolder 2.1x server, complete the setup tasks in “[Configuring Your First iFolder Server](#)” in the *Novell iFolder 2.1 Installation and Administration Guide*.

35.8.3 Creating and Enabling Novell iFolder 2.1x Users

To provide user access to Novell iFolder 2.1x:

1. Create User objects in eDirectory.
2. Enable the User objects as Novell iFolder users.
3. Have users create their Novell iFolder accounts by installing and using the Novell iFolder Client. They can then access Novell iFolder in the following ways:
 - On their local workstation
Changes to their local iFolder are synchronized with the Novell iFolder server.
 - Using NetDrive to create a mapped drive to the Novell iFolder server
 - Using NetStorage to access the Novell iFolder server (providing you have enabled NetStorage for access to the Novell iFolder server)

The NetDrive and NetStorage options provide direct access to the data store on the server, bypassing the local iFolder.

For more information, see “[Managing iFolder User Accounts](#)” in the *Novell iFolder 2.1 Installation and Administration Guide*.

35.8.4 Novell iFolder 2.1x Maintenance

This section summarizes documentation resources to help you maintain Novell iFolder 2.1x.

Monitoring the Novell iFolder Service Load

As the Novell iFolder service load increases, you might need to increase the server capacity by installing additional RAM or adding disk space.

Use the iFolder Management Console to monitor how the server is meeting the needs of your Novell iFolder users. For more information, see “[Accessing the iFolder System Monitoring Tool](#)” in the *Novell iFolder 2.1 Installation and Administration Guide*.

Consulting the Novell iFolder Documentation

Novell iFolder documentation includes the following information:

- *Novell iFolder 2.1 Installation and Administration Guide*: Provides comprehensive information for administrators on configuring and managing Novell iFolder servers in the enterprise environment and includes the following:
 - A conceptual overview
 - Scenarios for deployment
 - Planning and management issues
 - Instructions for using the iFolder Management Console to manage Novell iFolder
- *Novell iFolder Quick Start*: Introduces the Novell iFolder client and provides information on installing and configuring the Novell iFolder client on Windows workstations and laptops.
- *Novell iFolder 2.1 User Guide*: Provides comprehensive information on installing, managing, and using the Novell iFolder client on workstations and laptops and includes the following:
 - A conceptual overview

- Scenarios for use
- Instructions for setting Novell iFolder client preferences
- Information on securely accessing files from a handheld device or using a Web browser and Novell NetDrive
- *Novell NetDrive 4.1 User Guide*: Provides information on installing and using NetDrive 4.1.
- *Novell 2.1 Readme*: Provides information on known issues for the Novell iFolder server and client.
- *Novell NetDrive 4.1 Readme*: Provides information on known issues for NetDrive 4.1.

35.9 Novell iFolder 3.x Implementation and Maintenance

The following implementation pointers are provided only as introductory information. To begin using Novell iFolder, see the *Novell iFolder 3.x Administration Guide*.

35.9.1 Managing Novell iFolder 3.1x

You manage Novell iFolder through the iFolder Management Console, which you can access directly or through iManager. For more information, see “[Accessing iManager and the Novell iFolder 3 Plug-In](#)” in the *Novell iFolder 3.x Administration Guide*.

35.9.2 Configuring Novell iFolder Servers

Before you let users log in to the Novell iFolder 3.x server, complete the setup tasks in “[Configuring the iFolder Enterprise Server](#)” (and “[Configuring the iFolder Web Access Server](#)” if desired) in the *Novell iFolder 3.x Administration Guide*.

35.9.3 Creating and Enabling Novell iFolder 3.x Users

To provide user access to Novell iFolder 3.x:

1. Provision eDirectory User objects for iFolder 3.x.
2. Enable the User Account Policies for iFolder access.
3. (Optional) Enable Account Quotas (Space Limits) for the user accounts.
4. Create iFolders for users.
5. Distribute the iFolder Client to users.

For more information, see “[Managing an iFolder Web Access Server](#)” in the *Novell iFolder 3.x Administration Guide*.

35.9.4 Novell iFolder 3.x Maintenance

The following implementation pointers are provided only as introductory information. To begin using Novell iFolder, see the *Novell iFolder 3.x Administration Guide*.

Managing the Novell iFolder System

As the Novell iFolder service load increases, you might need to increase the server capacity by installing additional RAM or adding disk space and perform other maintenance tasks. For help, see the following sections in the *Novell iFolder 3.x Administration Guide*:

- “Managing an iFolder Enterprise Server”
- “Managing iFolder Services”
- “Managing an iFolder Web Access Server”
- “Managing iFolder Users”
- “Managing iFolders”

Consulting the Novell iFolder Documentation

Novell iFolder documentation includes the following guides:

- *Novell iFolder 3.x Administration Guide*: Provides comprehensive information for administrators on configuring and managing Novell iFolder servers in the enterprise environment and includes the following:
 - A conceptual overview
 - Scenarios for deployment
 - Planning and management issues
 - Instructions for using the iManager to manage Novell iFolder 3.x
- *iFolder User Guide for Novell iFolder 3.x*: Provides comprehensive information on installing, managing, and using the Novell iFolder client on workstations and laptops and includes the following:
 - A conceptual overview
 - Scenarios for use
 - Instructions for setting Novell iFolder client preferences
 - Information on securely accessing files from a handheld device or using a Web browser and Novell NetDrive
- “Novell iFolder 3.2 for Open Enterprise Server SP2 Linux”: Provides information on known issues for the Novell iFolder server and client.
- *Novell iFolder 3.x Security Administrator Guide*: Provides information for security administrators.

35.10 Samba Implementation and Maintenance

To use Novell’s implementation of Samba file services on your OES server, you must have installed the service using the instructions the *OES Linux Installation Guide* (for a new installation) or installed it after the initial OES installation as explained in [Section G.2.2, “Installing Samba,” on page 262](#).

35.10.1 Implementing Samba File Services

NOTE: If you are new to OES, we recommend the *Lab Guide for OES SP2 Linux* for an introduction to creating and working with eDirectory objects and OES file services, including Novell Samba.

All users whose accounts have been enabled for Samba access can access the OES server as they would any Windows server.

For instructions on implementing Samba, see [Section G.2, “Implementing Samba,”](#) on page 261.

For more information on Novell’s implementation of Samba, see [Appendix G, “Samba Support in OES,”](#) on page 261.

35.10.2 Maintaining Samba File Services

Information on maintaining your Samba installation is found in [Appendix G, “Samba Support in OES,”](#) on page 261.

Novell® Open Enterprise Server (OES) includes Novell iPrint, an easy-to-implement printing solution that provides print-anywhere functionality to your network users on Linux, Macintosh, and Windows machines.

This section contains the following information:

- [Section 36.1, “Overview of Print Services,” on page 235](#)
- [Section 36.2, “Planning for Print Services,” on page 237](#)
- [Section 36.3, “Coexistence and Migration of Print Services,” on page 237](#)
- [Section 36.4, “Print Services Implementation Suggestions,” on page 237](#)
- [Section 36.5, “Print Services Maintenance Suggestions,” on page 239](#)

36.1 Overview of Print Services

Novell iPrint lets Linux, Macintosh, and Windows users

- Quickly locate network printers using their Web browser.
- Easily install and configure a located printer using their native printer installation method.
- Print to installed printers from any location (including the Web) using an IP connection.

The information in this section provides a high-level overview of Novell iPrint print services. It is designed to acquaint you with basic iPrint functionality so you will understand

- The configuration steps you need to perform to provide iPrint print services.
- How iPrint functions from the user’s perspective.

36.1.1 Using This Overview

If you already know that you want to provide OES print services for your users and you understand how iPrint works, skip the overviews and continue with [Section 36.2, “Planning for Print Services,” on page 237](#).

If you want to learn more about iPrint, continue with this overview section.

36.1.2 iPrint Components

A Novell iPrint installation consists of various components, most of which are represented by objects in your eDirectory™ tree:

- **Print Driver Store (Linux):** This is a repository that stores the drivers on an OES Linux server for your network printers. It is the first component you configure and is represented by an eDirectory object that you create.
- **Print Broker (NetWare):** This is a repository that stores the drivers on an OES NetWare® server for your network printers. It is the first component you configure and is represented by an eDirectory object that you create.

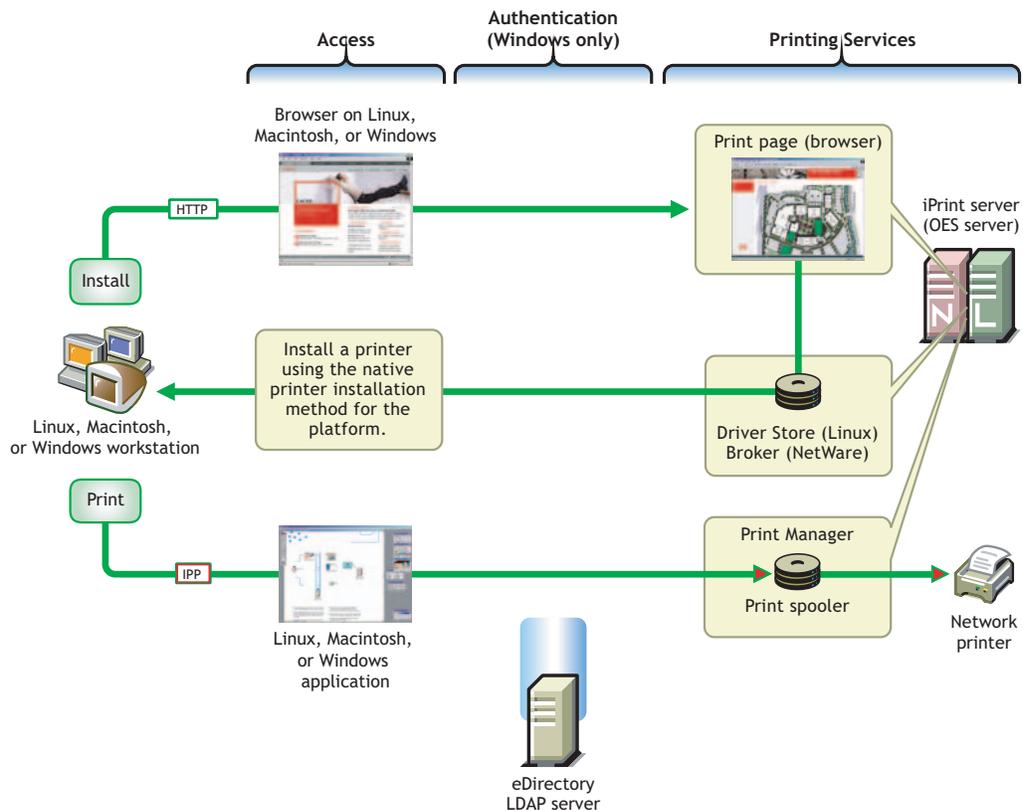
- **Printer Drivers:** These are the platform-specific printer drivers and PostScript* Printer Description (PPD) files that are stored in the Driver Store or Broker and are installed on workstations when users select a target printer. Printer drivers and PPD files exist as file structures within the Driver Store and Broker and are not represented by objects in eDirectory.
- **Printer Objects:** These are eDirectory objects you create that store information about the printers available through iPrint. The information stored in an object is used each time its associated printer is added to a workstation's list of available printers.
- **Print Manager:** This is a daemon that runs on OES Linux or an NLM™ that runs on the OES NetWare server. It receives print jobs from users and forwards them to the target printer when it is ready. It is represented by and controlled through an eDirectory object that you can configure.
- **iPrint Client:** This is a set of browser plug-ins. On Macintosh and Windows workstations it is automatically installed the first time it interacts with iPrint. On Linux workstations, it must be installed manually. The client is required on each platform to navigate through the iPrint Web pages, select a target printer, and install the print driver.

For more information on iPrint, see “[Print Services](#)” in the OES online documentation.

36.1.3 iPrint Functionality

[Figure 36-1](#) describes how iPrint functions from a user workstation perspective.

Figure 36-1 How iPrint Works



The following table explains the information illustrated in [Figure 36-1](#).

| Access | Authentication | Printing Services |
|---|--|---|
| The iPrint Client must be installed on each workstation accessing iPrint services. | You can require authentication for Windows users if needed. The option to require authentication is not available for Linux and Macintosh users. | Users with the iPrint client installed and access to the OES server can install printer drivers and print to iPrint printers. |
| A user needing to use a printer for the first time accesses the organization's print page on the Web. | Although shown separately, eDirectory could be installed on the OES server. | By default, iPrint generates a printer list for the printers hosted on the server. |
| When the user selects the target printer, its platform-specific driver is automatically installed and configured. | | A customized Web page lets users browse to the target printer using location lists and maps that you have previously created for the site where the printer is located. |
| After printer installation, users can print to the printer from any application. | | |

36.2 Planning for Print Services

Consider the following information as you plan your iPrint installation:

- We recommend that you record your planning decisions on a planning worksheet for future reference.
- iPrint has no additional RAM requirements.
- Most iPrint installations (even in large enterprises) do not require additional disk space for associated print job spooling.

However, if you anticipate very heavy print usage and want to plan for additional disk space in that regard, the iPrint spooler area is located in the /var partition or directory structure on OES Linux servers. On NetWare servers, you designate the location when creating the Print Manager object.

- To finish planning your iPrint installation, refer to the information for your server platform:
 - For NetWare: “**Novell iPrint Server**” in the *OES NetWare Installation Guide*
 - For Linux: “**Novell iPrint**” in the *OES Linux Installation Guide*

36.3 Coexistence and Migration of Print Services

See “**Printing**” in the *OES Coexistence and Migration Guide*.

36.4 Print Services Implementation Suggestions

This section provides only summary implementation information. For complete iPrint documentation, see the following:

- *OES iPrint Administration Guide for Linux*
- *OES iPrint Administration Guide for NetWare*

36.4.1 Initial Setup

After your OES server is installed, you must do the following to complete your iPrint installation:

- 1 Create a Driver Store on OES Linux or a Broker on OES NetWare to store the print drivers.

These eDirectory objects store the drivers for your network printers on Linux and NetWare servers, respectively. Each Printer object you create for your network needs to reference a printer driver in Driver Store/Broker. When users subsequently install printers, the correct drivers for the platform running on their workstation are downloaded from the Driver Store and installed.

You create the Driver Store using iManager. For specific instructions, see the following:

- For Linux: “[Creating a Driver Store](#)” in the *OES iPrint Administration Guide for Linux*
- For NetWare: “[Creating a Broker](#)” in the *OES iPrint Administration Guide for NetWare*

- 2 Add a printer driver to the Driver Store or Broker for each printer/platform combination needed.

For example, If you have Windows XP, Windows 2000, and Novell Linux Desktop (NLD) workstations on your network and you have four different printer types, you need to add four printer drivers for each platform (a total of 12 printer drivers) to the Driver Store or Broker.

You add printer drivers to the store using iManager. For specific instructions, see the following:

- For Linux: “[Updating Printer Drivers](#)” in the *OES iPrint Administration Guide for Linux*
- For NetWare: “[Adding or Updating Printer Drivers](#)” in the *OES iPrint Administration Guide for NetWare*

- 3 Create a Print Manager object.

The Print Manager receives print jobs from users and forwards them to the target printer when it is ready. It must be running for you to create Printer objects.

The Print Manager is an object you create in eDirectory and is usually started and stopped using iManager.

You create the Print Manager object using iManager. For specific instructions, see the following:

- For Linux: “[Creating a Print Manager](#)” in the *OES iPrint Administration Guide for Linux*
- For NetWare: “[Creating a Print Manager](#)” in the *OES iPrint Administration Guide for NetWare*

- 4 Create Printer objects.

You must create a Printer object for each printer you want users to access through iPrint. These objects store information about the printer that is used each time the printer is installed on a workstation.

You create Printer objects using iManager. For specific instructions, see the following:

- For Linux: “[Creating a Printer](#)” in the *OES iPrint Administration Guide for Linux*
- For NetWare: “[Creating a Printer](#)” in the *OES iPrint Administration Guide for NetWare*

- 5 (Optional) Create location-based, customized printing Web pages.

By default, each iPrint installation includes the creation of a Default Printer List Web page that users can access to install iPrint printers.

You have the option of enhancing the browsing experience by creating location-based printing Web pages that feature either lists of printers by location, maps of the buildings showing each printer, or a combination of both.

If your organization is located at multiple sites or even in a building with multiple floors, providing location-based print Web pages can greatly simplify printing for your users.

Your iPrint installation contains the iPrint Map Designer to help you easily create location maps with clickable printer icons. For more information, see the following:

- For Linux: “[Setting Up Location-Based Printing](#)” in the *OES iPrint Administration Guide for Linux*
- For NetWare: “[Setting Up Location-Based Printing](#)” in the *OES iPrint Administration Guide for NetWare*

6 Provide instructions to users for accessing iPrint printers.

After performing the steps above, your network is ready for iPrint functionality. You need only tell users how to access your printing Web pages; Novell iPrint does the rest.

36.4.2 Implementation Caveats

The Start Here section of this guide documents a few implementation caveats relating to iPrint on Linux. See “[iPrint on OES Linux](#)” on page 74.

36.4.3 Other Implementation Tasks

In addition to the tasks described in [Section 36.4.1, “Initial Setup,”](#) on page 238, there are additional tasks you might want or need to consider. To see a list of potential tasks, refer to the “[Print Services](#)” links in the OES online documentation.

36.5 Print Services Maintenance Suggestions

As you add printers to your network or move them to different locations, be sure to update your iPrint installation to reflect these changes.

After your installation is completed and users are printing, you can monitor print performance using the information located in the following locations:

- For Linux: “[Using the Print Manager Health Monitor](#)” in the *OES iPrint Administration Guide for Linux*
- For NetWare: “[Using the Print Manager Health Monitor](#)” in the *OES iPrint Administration Guide for NetWare*

For more information on iPrint and its functionality within OES, see the “[Print Services](#)” links in the online documentation.

This section contains the following eGuide information:

- [Section 37.1, “Overview,” on page 241](#)
- [Section 37.2, “Planning,” on page 243](#)
- [Section 37.3, “Implementation Suggestions,” on page 243](#)
- [Section 37.4, “Maintenance Suggestions,” on page 243](#)

37.1 Overview

eGuide lets you use the information in eDirectory™ to create a “White Pages” directory for your organization that users can access from their Web browser.

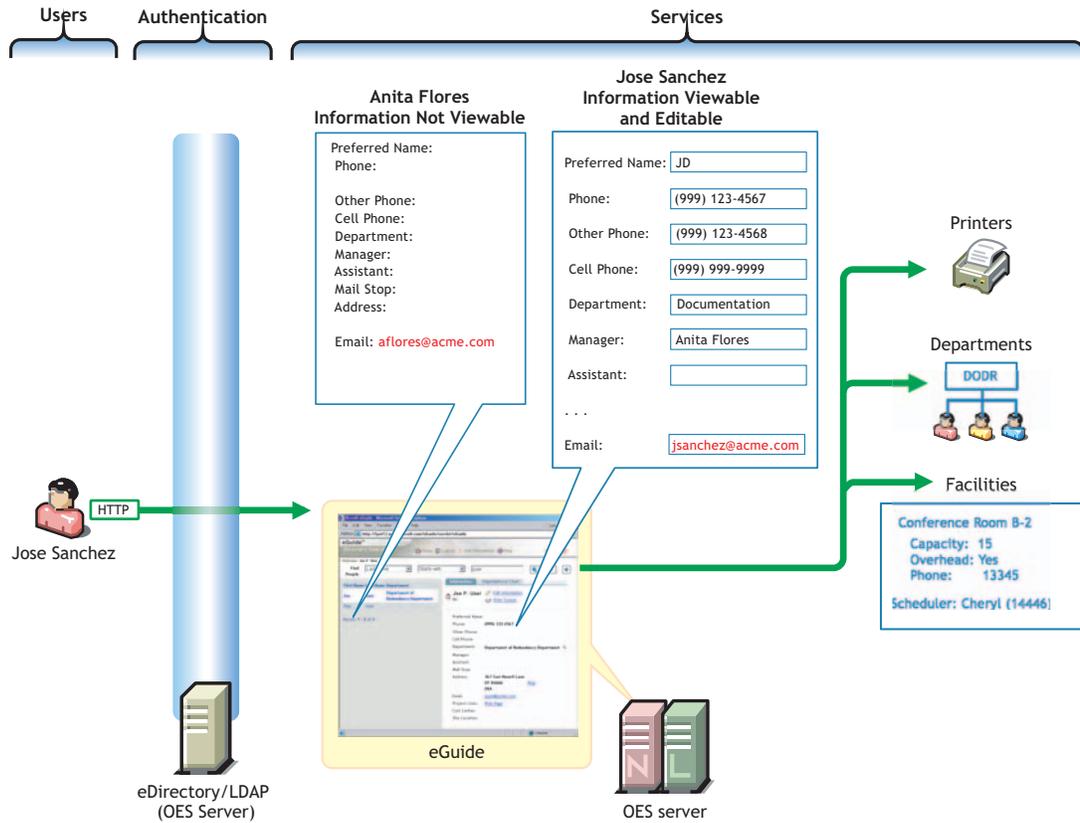
You can configure eGuide to publish any information that you choose to store in eDirectory.

For example, the default eGuide installation in OES lets users search for the names of all eDirectory User objects on your system. By default, it lets them see the details for their own User objects that are stored in eDirectory, but it doesn’t let them modify the eDirectory information. Also, it lets them see only the e-mail address attributes associated with other objects.

You can configure eGuide so that users can see other information for other users in your organization, such as their telephone numbers, office locations, job titles, and any other information you choose to store in eDirectory. You can also configure eGuide so that users can maintain their own information in eDirectory. You can even let them choose the information they want other users to be able to access.

Figure 37-1 summarizes the eGuide functionality available in OES.

Figure 37-1 How eGuide Works



The following table explains the information illustrated in Figure 37-1.

| Users | Authentication | Services |
|--|--|--|
| An eDirectory user named Jose Sanchez logs in to eGuide. | <p>Access to eGuide is controlled through LDAP-based authentication through the eDirectory LDAP server.</p> <p>Although shown separately, eDirectory could be installed on the OES server.</p> | <p>Jose searches using the asterisk (*) wildcard and sees two entries: Anita Flores and Jose Sanchez.</p> <p>If he clicks Anita's name, he sees only her e-mail address (by default).</p> <p>On the other hand, Jose can see his own information.</p> <p>The eGuide administrator can configure eGuide so that Jose can edit some of his information and the changes will be stored in eDirectory.</p> <p>The administrator can also let users search on any object types eDirectory, thus letting them find the people, places, things, and information they need to be productive and self-sufficient.</p> |

37.2 Planning

The planning you do for eGuide should involve the following considerations:

- Whether you want eGuide available to your users
- The eDirectory objects you want to expose through eGuide
- The role you want users to play in accessing and maintaining eDirectory information through eGuide

For more information on planning your eGuide implementation, see “[eGuide Product Overview](#)” in the *Novell eGuide 2.1.2 Administration Guide*.

37.3 Implementation Suggestions

You can implement your eGuide plans using the information in “[Configuring eGuide](#)” and other appropriate sections in the *Novell eGuide 2.1.2 Administration Guide*.

37.4 Maintenance Suggestions

As both your organization and your network evolve, you should ensure that eGuide is helping you achieve your organizational objectives. The information in the *Novell eGuide 2.1.2 Administration Guide* can help you maintain your eGuide implementation.

Reference Information

VII

This section contains the following OES reference materials:

- [Appendix A, “Linux Tips for NetWare Administrators,” on page 247](#)
- [Appendix B, “Quick Reference to OES User Services,” on page 249](#)
- [Appendix C, “Services Supported on Each Platform,” on page 251](#)
- [Appendix D, “OES Browser Support,” on page 253](#)
- [Appendix E, “OES Linux Service Scripts,” on page 255](#)
- [Appendix F, “OES System Users and Groups,” on page 257](#)
- [Appendix G, “Samba Support in OES,” on page 261](#)
- [Appendix H, “Documentation Updates,” on page 285](#)

Linux Tips for NetWare Administrators



The information previously in this section is now contained in a separate guide—*Novell OES SP2 Linux Tips for NetWare Administrators*.

Quick Reference to OES User Services

B

Use [Table B-1](#) as a quick reference for providing your network users with instructions for accessing each Novell® OES service.

Table B-1 OES User Services Quick Reference

| services | Access Method or URL | Notes |
|---------------------------------------|---|--|
| eGuide | http://server_ip_address_or_dns_name/eGuide http://server_ip_address_or_dns_name:443/eGuide | |
| Novell iFolder® 3.x Web Access server | https://server_ip_address_or_dns_name/ifolder | “ifolder” is the default name, but this can be customized by the administrator. |
| iPrint | http://server_ip_address_or_dns_name/ipp https://server_ip_address_or_dns_name:443/ipp | |
| Native File Access | Use the native file access tools on your Linux, Macintosh, Windows, or UNIX workstation to access volumes on OES NetWare that you have the appropriate file trustee rights to | |
| NetStorage | http://server_ip_address_or_dns_name/NetStorage https://server_ip_address_or_dns_name:443/NetStorage | |
| Novell Client™ | <ol style="list-style-type: none"> 1. Install the Novell Client on a supported Windows workstation. 2. Log in to eDirectory™. 3. Access NCP™ volumes on NetWare or Linux that you have the appropriate file trustee rights to. | |
| Novell iFolder (2.x) | http://server_ip_address_or_dns_name/iFolder https://server_ip_address_or_dns_name/iFolder | Specifying a secure port is not required for a secure HTTP connection to Novell iFolder. |
| Samba | Map a network drive in Windows Explorer. Create a Web Folder in Internet Explorer. | |
| Virtual Office | http://server_ip_address_or_dns_name/vo | You can specify HTTPS and the secure port (443) if desired. Both URLs establish a secure connection with the OES server. |

Services Supported on Each Platform

C

See [Table 3-1 on page 34](#).

OES Browser Support

D

As a general rule, OES management tools support the following browsers:

- Mozilla* Firefox*
- Mozilla.org 1.7.7
- Internet Explorer 6

Table D-1 provides service-specific links and information about browser support in Novell® OES.

Table D-1 Browser Support in OES

| Management Tool | Supported Browser Information Link |
|-----------------------------------|--|
| eGuide | <ul style="list-style-type: none"> • eGuide Administration Utility in “System Requirements” in the <i>Novell eGuide 2.1.2 Administration Guide</i> • eGuide Client in “System Requirements” in the <i>Novell eGuide 2.1.2 Administration Guide</i> |
| iManager 2.5 | <ul style="list-style-type: none"> • “Using a Supported Web Browser” in the <i>Novell iManager 2.5 Administration Guide</i> <p>There are rendering differences for some iManager plug-ins between Internet Explorer 6 (IE) and Mozilla-based browsers. For example, options that are accessed through tabs in IE are sometimes accessed through drop-down lists in Firefox.</p> |
| iMonitor | <ul style="list-style-type: none"> • “System Requirements” in “Using Novell iMonitor 2.1” in the <i>Novell eDirectory 8.7.3 Administration Guide</i> |
| IP Address Manager (NetWare) | Same as Novell Remote Manager |
| iPrint | <ul style="list-style-type: none"> • “Supported Browsers for iPrint” in the <i>OES iPrint Administration Guide for Linux</i> • “Supported Browsers for iPrint” in the <i>OES iPrint Administration Guide for NetWare</i> |
| MySQL 4.0 (phpMyAdmin) (NetWare®) | <ul style="list-style-type: none"> • “Administering MySQL Using phpMyAdmin” in the <i>MySQL for NetWare Administration Guide for OES</i> |
| Novell iFolder® 2.1x | <ul style="list-style-type: none"> • Internet Explorer 6 • Mozilla 1.7 • Konqueror (KDE 3.2) |
| Novell Remote Manager | <ul style="list-style-type: none"> • “System Requirements” in the <i>Novell Remote Manager Administration Guide for Linux for OES</i> • “System Requirements” in the <i>Novell Remote Manager for NetWare Administration Guide for OES</i> |
| OpenSSH Manager (NetWare) | <ul style="list-style-type: none"> • “Added Functionality” in the <i>OpenSSH Administration Guide</i> |
| QuickFinder™ Server Manager | <ul style="list-style-type: none"> • “Managing QuickFinder” in the <i>QuickFinder Server 4.2 Administration Guide</i> |

| Management Tool | Supported Browser Information Link |
|--------------------------------|---|
| TCP/IP Configuration (NetWare) | Same as Novell Remote Manager |
| Tomcat Manager | • “Managing Tomcat with Tomcat Admin” in the <i>Tomcat for NetWare Administration Guide for OES</i> |

OES Linux Service Scripts

E

Novell® OES services rely on specific service scripts located in `/etc/init.d`. The scripts used by OES, some of which are standard Linux scripts, are listed in [Table E-1](#).

IMPORTANT: For managing OES services, we strongly recommend using the browser-based tools outlined in [Section 14.1, “Overview of Management Tools and Interfaces,”](#) on page 91. The browser-based tools provide error checking not available at the service-script level, and they ensure that management steps happen in the sequence required to maintain service integrity.

Table E-1 OES Service Scripts in `/etc/init.d`

| Services Associated with Scripts | Script Name | Notes |
|------------------------------------|------------------------------|--|
| Apache Web server | apache2 | The <code>rcapache2</code> symbolic link, which is by default part of the path, can be used to start, stop, and restart the Apache Web Server, rather than referencing the init script directly. |
| eDirectory™ | nd | This lets you start and stop eDirectory. It executes the <code>/usr/sbin/ndsd</code> binary. |
| eDirectory LDAP support | nldap | This lets you load and unload the LDAP library that Novell eDirectory uses to provide LDAP support. It is not actually a service. |
| eDirectory SLP support | slpd | |
| eDirectory SNMP support | ndssnmpsa | |
| Health Monitoring (OpenWBEM CIMOM) | owcimomd | |
| iPrint | novell-idsd novell-ipsmd | |
| Linux User Management | namcd nscd | |
| NetStorage (XTier) | novell-xregd novell-xsrvd | |

| Services Associated with Scripts | Script Name | Notes |
|--|--|--|
| Novell Cluster Services™ (NCS) | novell-ncs | <p>NCS uses some shell scripts and utilities that come with the heartbeat package. For example, NCS uses a binary called send_arp to send out ARP packets when a secondary address is bound.</p> <p>NCS never runs the heartbeat daemons. In fact, NCS and heartbeat are mutually exclusive when it comes to execution, and heartbeat must always be configured to not run (chkconfig heartbeat off) when NCS is loaded on the server.</p> |
| Novell iFolder® 2.x | novell-ifolder | |
| Novell Remote Manager (NRM) | novell-httpstkd | <p>This script runs by default on every OES Linux server and enables access to NRM for Linux through a browser.</p> <p>Use this script followed by the status option to view current status. Or use stop, start, or restart options to alter the run state of the NRM daemon as needed.</p> |
| Novell Storage Services™ | novell-nss | |
| Red Carpet® | rcd | |
| Samba | smb | |
| Samba CIFS support | smbfs | |
| Storage Management Services™ | novell-smdrd | |
| Tomcat | novell-tomcat4 | |
| (Other system services—do not run manually.) | post_ndsd_start post_ndsd_stop pre_ndsd_start pre_ndsd_stop | |

OES System Users and Groups

F

Novell® OES adds specific user and group accounts to the Linux system and to eDirectory™ for OES service use. The accounts are created without passwords, so they are immune from login attacks of any kind.

The following sections summarize the Linux and eDirectory users and groups that the OES installation creates. Additional system-level users and groups might be created as you configure and administer OES services.

F.1 System Users Created on Linux

Table F-1 System Linux Users

| Username | Entry in <code>/etc/passwd</code> | Associated Service |
|-------------------------------------|--|--|
| <code>iprint</code> | <code>iprint:x:UID:GID::/var/opt/novell/iprint:/shell</code> | iPrint daemons |
| <code>novell_nobody</code> | <code>novell_nobody:x:UID:GID:Novell System User:/opt/novell:/shell</code> | CIMOM |
| <code>novlifdr</code> ¹ | <code>novlifdr:x:UID:GID:Novell iFolder System User:/var/lib/ifolder:/shell</code> | Novell iFolder® 2.x |
| <code>novlwww</code> ¹ | <code>novlwww:x:UID:GID:Novell System User:/var/opt/novell/novlwww:/shell</code> | Tomcat4 (Tomcat5 runs as tomcat.) |
| <code>novlxregd</code> ¹ | <code>novlxregd:x:UID:GID:Novell XRegD System User:/var/opt/novell/xtier/xregd:/shell</code> | XTier registry daemon |
| <code>novlxsvd</code> ¹ | <code>novlxsvd:x:UID:GID:Novell XSrvD System User:/var/opt/novell/xtier/xsvd:/shell</code> | XTier service |
| <code>wwwrun</code> ¹ | <code>wwwrun:x:UID:GID:WWW daemon apache:/var/lib/wwwrun:/shell</code> | Apache |

¹ When Novell Storage Services™ (NSS) is installed on the Linux server, these users are removed from the local system and created as LUM-enabled users in eDirectory. This is required because these users must have access to NSS data, and all NSS access is controlled through eDirectory.

For more information on `/etc/passwd`, refer to the `passwd` man page (`man 5 passwd`).

F.2 System Users Created in eDirectory

Table F-2 System eDirectory Users

| Username | eDirectory Context | Purpose |
|--------------------------|---|---|
| <i>Admin_Name</i> | <i>Admin_context</i> specified during installation. | The eDirectory administrator is created with a new tree and has all rights to manage the tree. The name of this user is specified during installation (default is Admin). |
| eGuidePublicUser### | <i>Admin_context</i> | This User object lets users without administrative rights log in and use eGuide. |
| iFolderProxy### | specified during installation | This User object is used to browse eDirectory for iFolder 3 users. |
| NFAUUser | <i>Admin_context</i> | This User object is used to browse, create, and update eDirectory objects on behalf of NIS (Yellow Pages). |
| <i>server_name</i> admin | <i>Admin_context</i> | This User object is used by NSS to read user objects, and to maintain volume, pool, and other storage system objects. |
| publicUser | VirtualOffice. <i>Admin_context</i> | Provides for contextless login for Virtual Office users by browsing eDirectory (LDAP) for matching CNs. If multiple CNs are found, the user chooses which to use. |

F.3 System Groups Created on Linux

Table F-3 System Linux Groups

| Groupname | Entry in /etc/group | Purpose |
|------------------------|-----------------------|--|
| ifdrwww ¹ | ifdrwww!:GID: | Novell iFolder [®] 2.x runs as this group. |
| iprint | iprint!:GID: | The iPrint daemons run as this group. |
| novell_nogroup | novell_nogroup!:GID: | CIMOM runs as this group. |
| novlxtier ¹ | novlxtier!:GID:wwwrun | Both novlxregd and novlxsrvd run as this group. Apache (wwwrun) is a group member because it needs XTier socket access. |
| shadow | shadow:x:GID:novlwww | QuickFinder [™] requires this system group. novlwww is a member of this group. |

| Groupname | Entry in /etc/group | Purpose |
|------------------|---------------------------|--|
| www ¹ | www:x:GID:novlxsrvd,admin | <p>Apache (wwwrun) and tomcat4 (novlwww) run as this group.</p> <p>QuickFinder requires that user Admin (eDirectory) belong to this group.</p> <p>User novlxsrvd is in the group because it needs access to an Apache domain socket.</p> |

¹ When Novell Storage Services (NSS) is installed on the Linux server, these groups are removed from the local system and created as LUM-enabled groups in eDirectory. This is required because members of these groups must have access to NSS data, and all NSS access is controlled through eDirectory.

For more information on /etc/group, refer to the group man page (man 5 group).

F.4 System Groups Created in eDirectory

Table F-4 System eDirectory Group

| Groupname | eDirectory Context | Purpose |
|-------------------------|----------------------------|--|
| admin | Tomcat-Roles.Admin_context | This group is created by the Tomcat 4 application on OES NetWare servers. It contains users who are allowed to use the Tomcat Admin utility on NetWare. For more information on Tomcat Admin, see “Managing Tomcat with Tomcat Admin” in the <i>Tomcat for NetWare Administration Guide for OES</i> . |
| apchadmn-Administrators | Admin_context | This group is created by the Apache Manager application on OES NetWare servers. It contains users who are allowed to use the Apache Manager application to manage the Apache Web server on NetWare. |
| DNSDHCP-GROUP | Admin_context | This group is created when you install DNS/DHCP Services on OES NetWare. The DNS and DHCP servers gain rights to DNS and DHCP data within the tree through this Group object. |
| manager | Tomcat-Roles.Admin_context | This group is created by the Tomcat 4 application on OES NetWare servers. It contains users who are allowed to use the Tomcat Manager utility on NetWare. For more information on Tomcat Manager, see “Managing Web Applications and Servlets” in the <i>Tomcat for NetWare Administration Guide for OES</i> . |

| Groupname | eDirectory Context | Purpose |
|-----------------------|---------------------------|--|
| NFAUWorld | <i>Admin_context</i> | This Group object is initially created with the Server object. Its effective rights to the file system are used to compute and set the rwx rights of UNIX users accessing a NetWare file system. |
| sshadm-Administrators | <i>Admin_context</i> | This group is created by the OpenSSH application on OES NetWare servers. It contains users who are allowed to manage the OpenSSH server on NetWare. |

Samba Support in OES



This section discusses the Novell® OES distribution of Samba and contains the following sections:

- [Section G.1, “Overview of Samba,” on page 261](#)
- [Section G.2, “Implementing Samba,” on page 261](#)
- [Section G.3, “Providing Access to Samba File Services,” on page 267](#)
- [Section G.4, “Samba User Tasks,” on page 271](#)
- [Section G.5, “Samba Caveats,” on page 273](#)
- [Section G.6, “Additional Information,” on page 273](#)
- [Section G.7, “Troubleshooting Samba Access,” on page 283](#)

G.1 Overview of Samba

Samba is a suite of tools that lets you use the Microsoft SMB/CIFS networking protocol (the protocol used by Windows file services) with Linux and other platforms, such as Linux and Macintosh.

The following sections introduce the Samba implementation on OES Linux.

G.1.1 Samba Functionality in OES

Samba lets an OES Linux server function as a Windows file server, providing Windows file services to Windows client users.

Although Samba can also provide Windows print services, the Samba implementation in OES focuses on providing file services. Print services in OES are provided by iPrint, not Samba.

A more detailed overview of the Samba file services in OES is provided in [Section 35.1.7, “Novell Samba,” on page 218](#).

This documentation focuses primarily on how Novell has packaged Samba in OES and configured it as an OpenLDAP client that uses the eDirectory™ LDAP server for user authentication. For more information about Samba, refer to the links contained in [Section G.6, “Additional Information,” on page 273](#).

G.2 Implementing Samba

This section provides implementation instructions and links to other relevant implementation sections.

- [Section G.2.1, “Samba Implementation Overview,” on page 262](#)
- [Section G.2.2, “Installing Samba,” on page 262](#)
- [Section G.2.3, “Enabling Existing eDirectory Users with smbbulkadd,” on page 263](#)
- [Section G.2.4, “Creating and Enabling Samba Users and Groups in iManager,” on page 264](#)

G.2.1 Samba Implementation Overview

Table G-1 *Samba Implementation Overview*

| Task | More information |
|--|--|
| 1. Install Samba on the server. | <p>You can install Samba on your OES Linux server as part of the initial server installation, or you can add it later.</p> <p>For more information, see Section G.2.2, “Installing Samba,” on page 262.</p> |
| 2. Understand Samba user requirements. | <p>Samba users are defined both in the Windows environment and in eDirectory.</p> <p>For more information, see Section , “Samba Users Are Both Windows and eDirectory Users,” on page 264.</p> |
| 3. Create Samba users | <p>Network administrators create eDirectory™ users with the same usernames and passwords as the users have on their Windows workstations.</p> <p>For more information, see Section G.2.4, “Creating and Enabling Samba Users and Groups in iManager,” on page 264.</p> |
| 4. Create work directories for the users to access | <p>User need rights to directories on the OES server where they can create and store data.</p> <p>For more information, see Section G.3.1, “Creating Work Directories for Users,” on page 267.</p> |
| 5. Make work directories available in Windows Explorer, Network Neighborhood, etc. | <p>Users need to be able to browse to a workgroup, server, and shares (work directories) just as they would on a Windows server.</p> <p>For more information, see Section G.3.2, “Setting Up Workgroups and Shares,” on page 268</p> |
| 5. Understand the access options available to users | <p>For more information, see Section G.4, “Samba User Tasks,” on page 271.</p> |

G.2.2 Installing Samba

Novell Samba can be installed at the same time as Open Enterprise Server, or it can be added to an OES Linux server after the initial installation.

To install Samba as part of an initial installation, see the instructions in [“Installing OES Linux as a New Installation”](#) in the *OES Linux Installation Guide*.

To install Samba on an existing OES Linux server, do the following:

NOTE: These instructions assume you are using the KDE graphical user interface and installing from a network installation source. If you are using the ncurses (text) version of YaST, these

instructions provide only a rough guide through the interface. If you are installing from CDs, insert them when prompted.

- 1 Log in to the server as the `root` user.
- 2 Start YaST.
- 3 Click *Network Services > Novell Samba*.
- 4 Click *Continue* to install the Samba RPMs.
- 5 Type the eDirectory Admin user password in the *Admin password* field when prompted, then click *Next*.
- 6 Look at the *Base context for Samba users* field. The field is automatically populated with the context of your OES Linux server. Unless your Samba users will be located in this context or in a sub-context (sub-container) of it, you must change this field.

For example, if your server is installed in `OU=SERVERS.O=EXAMPLE`, and you plan to create users in `OU=USERS.O=EXAMPLE`, then you must change the context to either `O=EXAMPLE` or `OU=USERS.O=EXAMPLE`. Otherwise, the system cannot locate your user objects and you cannot enable them for Samba access. For most installations, setting the base context to the O container, such as `O=EXAMPLE`, works well.

For more information, see [Section 5.1.11, “Samba Enabling Problems and the Base Context for Samba Users Field,” on page 58](#).
- 7 Click *Next*.

Samba is now installed, but your eDirectory users must be enabled for Samba before they can use it.

For more information, see either [“Enabling Existing eDirectory Users with `smbbulkadd`” on page 263](#) or [“Creating and Enabling Samba Users and Groups in iManager” on page 264](#).

G.2.3 Enabling Existing eDirectory Users with `smbbulkadd`

If you have multiple eDirectory users that you want to enable for Samba, Novell Samba includes a utility you can run at the shell prompt. The users must already exist in eDirectory and must be enabled for Linux access (see [Section 18.4.5, “Enabling eDirectory Users for Linux Access,” on page 126](#)).

After the users are enabled for Linux access:

- 1 Assign the Samba Default Password Policy (Universal Password policy) to the parent containers (OU objects) of the users you want to enable for Samba. (Alternatively, you can assign a different Samba-qualified policy. For more information, see [Section G.6.5, “Samba Passwords,” on page 279](#).)
 - 1a Log in to iManager as the eDirectory Admin user.
 - 1b In *Roles and Tasks*, click *Passwords > Password Policies*.
 - 1c Select *Samba Default Password Policy*, then click *Edit*.
 - 1d In the *Password Policy* drop-down list, click *Policy Assignment*.
 - 1e Click the Object Selector next to the *Assign to* field.
 - 1f Browse to and select the parent container (OU object) of the users you are enabling.

For example, if your users are in an OU container object named *users*, you would browse to and select the *users* container.

1g Click *OK*.

1h Click *Apply > OK*.

- 2** Using your favorite Linux text editor (such as Kwrite or Kate), create a text file that lists the following information for each user on a separate line. Be sure to include a blank line at the end of the file as indicated:

```
-u username -x edir,context -p password  
(blank line—no text)
```

where *username* is the eDirectory username, *edir,context* is the full eDirectory context of the user expressed using LDAP (comma-delimited) syntax, and *password* is the same password used to log in to the Windows workstation.

IMPORTANT: Both the eDirectory password and the Universal Password will be set to the password you specify.

For example, to Samba-enable three Linux-enabled eDirectory users named win1, win2, and win3 in users.doc.company, you could create a file named `smbusers.txt` in the `/tmp` directory with the following contents:

```
-u win1 -x ou=users,ou=doc,o=company -p pass1  
-u win2 -x ou=users,ou=doc,o=company -p pass2  
-u win3 -x ou=users,ou=doc,o=company -p pass3  
(blank line—no text)
```

- 3** While logged in as the `root` user, run the `smbbulkadd` command.

To see the various command options, enter `smbbulkadd` at the shell prompt.

For example, to process the `smbusers.txt` file mentioned in the example in [Step 2](#), you would enter the following at the shell prompt:

```
smbbulkadd -a cn=admin,o=company -w adminpasswd -f /tmp/  
smbusers.txt
```

The system reports the status for each user being enabled for Samba.

- 4** Check the status reported to ensure that all users were enabled. If not, correct any errors in the `smbusers.txt` file and run `smbbulkadd` again.

Users that are already enabled are ignored.

G.2.4 Creating and Enabling Samba Users and Groups in iManager

We recommend that you create and enable users for Samba access using the iManager utility as explained in this section. Your other option is to run various Linux-enabling (LUM) command line utilities to assign the users to a Linux-enabled group as explained in the *Novell Linux User Management Technology Guide*. You then need to enable the users for Samba access using iManager, as explained in “[Enabling the Users for Samba Access](#)” on page 267.

Samba Users Are Both Windows and eDirectory Users

As stated earlier, the purpose of Samba in OES is to provide Windows file services for Windows client users to data directories on OES Linux servers.

Both the Windows workstations and the OES Linux servers required authenticated access. On the Windows workstation, users log in using their Windows usernames and passwords. When they log in to the OES Linux server, they use their eDirectory usernames and passwords. Samba requires that these usernames and passwords match.

In other words, the Windows usernames on your network workstations and the eDirectory usernames you create for Samba access must be the same and must have the same password.

Creating and Enabling Samba Users

The following tasks must be completed in the order given:

- [“Creating an eDirectory Context” on page 265](#)
- [“Creating eDirectory Users” on page 265](#)
- [“Creating an eDirectory Group and Assign the Users to It” on page 266](#)
- [“Enabling the Group and Users for Linux Access \(LUM\)” on page 266](#)
- [“Enabling the Users for Samba Access” on page 267](#)

Creating an eDirectory Context

IMPORTANT: Samba users must be created in a container within the Base Context for Samba Users that you specified when you installed Samba ([Step 6 on page 263](#)).

User objects that don't meet this requirement cannot be enabled for Samba access until either the user is moved to a container within the Base Context or the Base Context is broadened to include the user's context.

- 1** In your browser, enter the iManager URL (http://IP_or_DNS_name/nps) and log in to iManager as the eDirectory Admin user or equivalent.
- 2** If the container for your new Samba users already exists, skip to [“Creating eDirectory Users” on page 265](#).
- 3** To create a context in iManager for your users, click *Roles and Tasks > eDirectory Administration > Create Object > Organizational Unit* and create the (OU) object before proceeding.

For more information on context requirements for the object, see the previously referenced [Section 5.1.11, “Samba Enabling Problems and the Base Context for Samba Users Field,” on page 58](#).

Continue with [Creating eDirectory Users](#).

Creating eDirectory Users

- 1** If the users you plan to enable for Samba are already defined as eDirectory users, skip to [“Creating an eDirectory Group and Assign the Users to It” on page 266](#).

Otherwise, click *Roles and Tasks > Users > Create User*.

TIP: To see whether a User object already exists using iManager, click the *View Objects* icon. Click the *Search* tab. Set the *Type* to *User*, and click *Search*. All currently-defined User objects are listed.

- 2 Be sure to select the context you have identified for your Samba users ([Step 3](#) in the previous section).
- 3 Specify an eDirectory password.
- 4 Do not set a simple password, even though the interface indicates it is required for native Windows access. Enabling a user for Samba access creates a Universal Password by default, making it much easier for users to keep their passwords synchronized.
- 5 (Conditional) You can create a home directory for the user if you have an NCP volume available (either created on a traditional Linux partition or existing by virtue of an installed NSS partition).

For more information and some minor caveats, see [“Creating Home Directories Using iManager 2.5” on page 278](#). See also, [“Samba on NSS Can Be a Good Combination for Performance” on page 277](#).
- 6 Click *OK*.
- 7 Click *Repeat Task* to create another user, or click *OK* to finish.

After creating all the users, continue with [Creating an eDirectory Group and Assign the Users to It](#).

Creating an eDirectory Group and Assign the Users to It

- 1 If your eDirectory users are already members of a group you can enable for Linux access, skip to [“Enabling the Group and Users for Linux Access \(LUM\)” on page 266](#).

Otherwise, create an eDirectory group by clicking *Groups > Create Group*, and then completing the required fields until the group is created.
- 2 Assign the target eDirectory users to the group you created in [Step 1](#) by clicking *Groups > Modify Group*. Select the *Members* drop-down option below the page title, or use the *Members* tab in Internet Explorer and use the dialogs presented to add users to the group.

Continue with [Enabling the Group and Users for Linux Access \(LUM\)](#).

Enabling the Group and Users for Linux Access (LUM)

- 1 Enable the group you just created for Linux access by clicking *Linux User Management > Enable Groups for Linux*.
- 2 In the Enable Groups page, after selecting the group, make sure that the *Linux-Enable All Users in These Groups* option is selected, then click *Next*.
- 3 Confirm that you want to enable the users for Linux by clicking *Next*.
- 4 On the next page, browse to and select the UNIX Workstation - *server_name* object of each server you want users to have Samba access to, then click *OK*.

UNIX Workstation objects are created in the same context as the servers they represent.
- 5 Click *Next*, then click *Finish*.

Continue with [Enabling the Users for Samba Access](#).

Enabling the Users for Samba Access

TIP: The following procedure enables users for Samba access one at a time. You can enable multiple users with the `smbbulkadd` utility. For more information, see [Section G.2.3, “Enabling Existing eDirectory Users with `smbbulkadd`,” on page 263](#).

- 1 In iManager, click *Samba Management > Enable Linux User for Samba*.
- 2 Browse to and select a User object, then click *OK* twice to confirm that you want the user to authenticate through eDirectory.
- 3 Type and confirm the user password, matching the password you entered when creating the user in eDirectory, then click *OK*.
- 4 (Conditional) If additional information and options appear with the option to enable Samba access, choose the options appropriate for your implementation, then click *OK*.

If you need more information, see [Section G.6.7, “Understanding the Option to Enable Samba Users,” on page 281](#).

- 5 Click *Repeat Task* and repeat from [Step 2](#) until each Samba user is enabled.
- 6 Click *OK* to finish.

Now that your users are enabled to use Samba file services, you need to provide access to those services. Continue with the next section, [Providing Access to Samba File Services](#).

G.3 Providing Access to Samba File Services

Samba configurations can be as simple or as complex as you need them to be. For more information on the Samba configuration file included in OES, see [“The `smb.conf` Configuration File” on page 274](#). For extensive information on using the configuration file in complex configurations, search for `smb.conf` on the Web.

This section contains some basic guidelines and examples for setting up Samba access:

- [Section G.3.1, “Creating Work Directories for Users,” on page 267](#)
- [Section G.3.2, “Setting Up Workgroups and Shares,” on page 268](#)

G.3.1 Creating Work Directories for Users

Before your users can access Samba services, they must have rights to one or more work directories on the Samba server.

There are various kinds of work areas. They might be private, shared by a group, or publicly available. Home directories are usually private, whereas collaboration directories are shared by a group. Later in this section is an example for creating a shared work area and providing access to it.

You can create home directories on NCP volumes automatically when you create users in eDirectory (see [“Creating Home Directories Using iManager 2.5” on page 278](#)).

Home directories on traditional Linux volumes should be created after users are enabled for Linux access (LUM) and Samba so that the required access rights are assigned. For more information, see [“Logging In to Create Home Directories” on page 279](#) and [“Using Linux User Management Commands to Create Home Directories” on page 279](#).

Also, if you plan to have users access files and directories through both Samba and the Novell Client software, be sure to read [Section 35.4, “Aligning NCP and POSIX File Access Rights,” on page 222](#) and follow the directions there.

G.3.2 Setting Up Workgroups and Shares

Users need to be able to access the Samba server in My Network Places and Windows Explorer just as they would a Windows server. This means that the server needs to be assigned to a workgroup and it needs to publish Windows shares that are visible to users.

By default, the Samba server is assigned to the “workgroup” workgroup and publishes certain preconfigured shares. However, these defaults are insufficient for many Samba installations.

You can customize your workgroup and share configurations by modifying the `/etc/samba/smb.conf` file as explained in the following sections:

- [“Setting Up Access to Only the Home Directories” on page 268](#)
- [“Creating a New Share: An NSS/NCP Example” on page 269](#)
- [“Creating a Share for Group Access: A POSIX Example” on page 270](#)
- [“Restarting Samba to Implement the Changes” on page 271](#)

Setting Up Access to Only the Home Directories

Use the information in [Table G-2](#) and a text editor, such as Kate or VI, to provide access for your network users to only their individual Home directories.

For additional information about the `smb.conf` file, see [“The smb.conf Configuration File” on page 274](#).

Table G-2 Customizing the `/etc/samba/smb.conf` file for Home Directory Access Only

| Section | Entry Name | Description | Recommended Action |
|----------|-------------|---|--|
| [global] | workgroup = | <p>Specifies the Windows workgroup that the Samba server either joins (if it exists) or effectively creates (if the name is new).</p> <p>The Samba installation sets the value of this parameter to <code>workgroup</code>, which is the default setting for all Windows 2000 and Windows XP workstations. As a result the “workgroup” workgroup can contain hundreds of workstations and servers, rendering it unusable.</p> | <p>Replace the value with a name for the workgroup that you want users to see when they browse in Network Neighborhood.</p> <p>For example, change the entry to read <code>workgroup = our_workgroup</code>.</p> |

| Section | Entry Name | Description | Recommended Action |
|-------------------------|------------|---|--|
| [homes] | | <p>This sets up a share named homes.</p> <p>The primary purpose of this standard Samba share is to expose only the home directories of your Samba users.</p> | <p>The parameters in this section provide private access to home directories, which is the expectation of most network administrators. If you want to learn more about the parameters, search the Web for information about the <code>smb.conf</code> file.</p> |
| | path = | <p>This parameter is not needed if user Home directories are contained in <code>/home</code> on the server. In other words, if the default path were shown, it would be <code>/home/%S</code>, which is the Home directory of the logged in user.</p> <p>This parameter can be added if the Home directories are not contained in the standard location,</p> <p>For example, if the server has an NSS volume, and the home directories are stored on it, you can provide Samba access by including a path such as,</p> <pre>path = /media/nss/HOME2/%S</pre> <p>where HOME2 is the mount point of the NSS volume.</p> <p>If you want to provide home directories on an NSS/NCP volume, be sure to review the information in Section G.6.3, "Home Directories and Samba," on page 277.</p> | <p>Add this parameter if you want to provide home directories in a non-standard (other than <code>/home/%S</code>) location.</p> <p>Specify the full path from the root of the file system.</p> <p>Be sure to end, end the path with <code>/%S</code>. Otherwise, all the Home directories will be visible to each Samba user.</p> |
| [all other share names] | | <p>These set up various other shares that are not required for simple home directory access.</p> | <p>Delete these lines.</p> <p>Alternatively, you can prevent these shares from displaying when users browse to the server by commenting out each line of the rest of the file. Insert a pound sign (#) at the beginning of each line.</p> |

Creating a New Share: An NSS/NCP Example

You can create shares with unique names, such as volumes that users are familiar with, and provide access to them.

For example, if your Samba users keep their work files in an NSS volume named PROJECTS, you could create a share to the `/media/nss/PROJECTS` directory as follows:

- 1 Open the `/etc/samba/smb.conf` file in an editor.
- 2 Create a [projects] share in the `smb.conf` file by inserting the following lines:

```
[projects]
    comment = Project folders
    path = /media/nss/PROJECTS
    browseable = Yes
    read only = No
    inherit acls = Yes
```

3 Save the file and restart Samba as directed in [Section , “Restarting Samba to Implement the Changes,” on page 271.](#)

4 Create folders for each project.

For example, you could create folders named `wheel` and `lever`.

5 Assign trustees to the projects using the `ncpcon > rights` command.

For example, if you want `user1` to have full rights to `wheel` but only read and filescan rights to `lever`, and you want `user2` to have full rights to `lever` but only read and filescan to `wheel`, you could assign the rights using the following commands:

```
rights add projects:wheel user1.users.example all
rights add projects:wheel user2.users.example rf
rights add projects:lever user2.users.example all
rights add projects:lever user1.users.example rf
```

Because Samba access to NSS volumes is controlled by NCP trustee rights, `user1` and `user2` can now work in their respective project folders, and they can see but not change the contents of the project folder belonging to their coworker.

Adjusting POSIX permissions is not required.

Creating a Share for Group Access: A POSIX Example

You can create shares for groups to use.

For example, if you have a group of Samba users who want to collaborate regarding usability ideas, you could create a `usability` folder and grant access to it as follows:

1 Create a folder named `usability` in `/usr`.

2 Create a `[usability]` share in the `smb.conf` file by inserting the following lines:

```
[usability]
    comment = Usability Ideas
    path = /usr/usability
    browseable = Yes
    read only = No
    inherit acls = Yes
```

3 Save the file and restart Samba as directed in [Section , “Restarting Samba to Implement the Changes,” on page 271.](#)

4 Create a LUM-enabled group and assign the Samba users to it. For example, create a group called `usetest`.

- 5 Change the group owner of the `/usr/usability` folder to `usetest` and grant the `usetest` group read, write and execute rights by entering the following at a shell prompt:

```
chown -R :usetest /usr/usability
chmod -R 775 /usr/usability
```

For more information on creating group work directories, see [Section 35.4.3, “Providing a Group Work Area,”](#) on page 224.

The users would then be able to collaborate with each other in the `/usr/usability` folder.

Restarting Samba to Implement the Changes

You must restart Samba for the changes you have made in the configuration file to take effect. Complete the following steps:

- 1 Save the `smb.conf` file.
- 2 Enter the following command:

```
/etc/init.d/smb restart
```

G.4 Samba User Tasks

When Novell Samba is properly configured on your OES Linux server, the Windows users on your network can access the shares you have created by doing one or more of the following tasks.

- [Section G.4.1, “Creating a Network Place That Points to a Share,”](#) on page 271
- [Section G.4.2, “Creating a Web Folder That Points to a Share,”](#) on page 272
- [Section G.4.3, “Mapping Drives to Shares,”](#) on page 273

G.4.1 Creating a Network Place That Points to a Share

From a Windows 2000 or XP workstation, you can add a Network Place (formerly known as a Web folder) that points to a share on the OES server by doing the following:

IMPORTANT: The directory you are linking to must already exist on the OES server, and the directory’s owner (eDirectory Samba user) must have the same login name and password as the logged in user on the Windows workstation you are using.

- 1 Log in to your Windows workstation.
- 2 From your desktop, access *My Network Places*.
- 3 Double-click *Add Network Place*.
- 4 On Windows 2000, do the following:
 - 4a In the location field, type the Samba server name and share name as follows:
`\\Samba_host_name\share_name`
where *Samba_host_name* is the name of the Samba server (by default this is *hostname-W*) and *share_name* is a share name specified in the `/etc/samba/smb.conf` file (the most common share name is “homes”). For more information, see [Section G.3, “Providing Access to Samba File Services,”](#) on page 267.
 - 4b Click *Next*.

- 4c** (Optional) modify the name of the Network Place.
- 4d** Click *Finish*.
The folder opens, ready for access.
- 5** On Windows XP, do the following:
 - 5a** In the Add Network Wizard dialog box, click *Next*.
 - 5b** Select *Choose another network location*, then click *Next*.
 - 5c** In the *Internet or network address* field, type either the IP address of the server or the Samba server name followed by the share name as follows:
`\\Samba_host_or_IP\share_name`
 where *Samba_host_or_IP* is the IP address or name of the Samba server (by default this is *hostname-W*) and *share_name* is a share name specified in the `/etc/samba/smb.conf` file (the most common share name is “homes”). For more information, see [Section G.3, “Providing Access to Samba File Services,” on page 267](#).
 - 5d** Click *Next*.
 - 5e** (Optional) modify the name of the Network Place.
 - 5f** Click *Next*.
 - 5g** Click *Finish*.
The folder opens, ready for access.

Network places are pervasive and are automatically available in Network Neighborhood each time the user logs in.

G.4.2 Creating a Web Folder That Points to a Share

Using the Internet Explorer browser, you can add a Web folder that points to a share on the OES server by doing the following:

IMPORTANT: The directory you are linking to must already exist on the OES server, and the directory’s owner (eDirectory Samba user) must have the same login name and password as the logged in user on the Windows workstation you are using.

- 1** Log in to your Windows workstation.
- 2** Open Internet Explorer.
- 3** Click *File > Open*.
- 4** Click *Open as Web Folder*.
- 5** In the *Open* field, type the Samba server name and share name as follows:
`\\DNS_Name_or_IP\share_name`
 where *DNS_Name_or_IP* is the IP address or DNS name of the Samba server and *share_name* is a share name specified in the `/etc/samba/smb.conf` file (the most common share name is “homes”).

 For more information, see [Section G.3, “Providing Access to Samba File Services,” on page 267](#).
- 6** Click *OK*.
- 7** To make the folder automatically available, click *Favorites > Add to Favorites > OK*.

G.4.3 Mapping Drives to Shares

From a Windows 2000 or XP workstation, you can map a network drive letter that points to a share on the OES server by doing the following:

IMPORTANT: The directory you are linking to must already exist on the OES server, and the directory's owner (eDirectory Samba user) must have the same login name and password as the logged in user on the Windows workstation you are using.

- 1 Log in to your Windows workstation.
- 2 From your desktop, access *My Computer > Tools > Map Network Drive*.
- 3 From the *Drive* drop-down menu, select an unused drive letter.
- 4 In the *Folder* field, type the Samba server name and share name as follows:
`\\Samba_host_name\share_name`
where *Samba_host_name* is the name of the Samba server (by default this is *hostname-W*) and *share_name* is a share name specified in the `/etc/samba/smb.conf` file (the most common share name is "homes"). For more information, see [Section G.3, "Providing Access to Samba File Services," on page 267](#).
- 5 Click *Finish*.
The folder opens, ready for access.

G.5 Samba Caveats

See [Section 5.1.11, "Samba Enabling Problems and the Base Context for Samba Users Field," on page 58](#) and [Section 10.4, "Samba," on page 77](#).

G.6 Additional Information

- [Section G.6.1, "Components," on page 273](#)
- [Section G.6.2, "Samba and NSS Volumes," on page 276](#)
- [Section G.6.3, "Home Directories and Samba," on page 277](#)
- [Section G.6.4, "Methods for Creating Home Directories and Enabling Access to them for Samba Users," on page 278](#)
- [Section G.6.5, "Samba Passwords," on page 279](#)
- [Section G.6.6, "Security Implications," on page 281](#)
- [Section G.6.7, "Understanding the Option to Enable Samba Users," on page 281](#)
- [Section G.6.8, "Web Links," on page 283](#)

G.6.1 Components

The Samba distribution included with OES consists of the RPMs and configuration files outlined in this section.

- ["Samba RPM" on page 274](#)
- ["The smb.conf Configuration File" on page 274](#)
- ["The ldap.conf Configuration File" on page 276](#)

Samba RPM

OES includes a Novell customized version of the Samba package (`novell-samba-3.0. ...`).

In compliance with Samba standards, we have added the switches `-with-ldapsam` and `-with-ssl` to provide secure LDAP authentication support for Samba users.

The `smb.conf` Configuration File

In compliance with Linux Standards Base (LSB) requirements, we have placed the Samba configuration file (`smb.conf`) in the `/etc/samba` directory on the OES server.

The Novell implementation of Samba modifies that the `smb.conf` file that ships with SLES 9 as explained in [Table G-3](#).

Table G-3 Modified/Added Entries in the `smb.conf` File

| Section | Entry Name | Description | Example or Default |
|----------|-------------------------------|--|---|
| [global] | <code>workgroup =</code> | Specifies the Windows workgroup that the Samba server either joins (if it exists) or effectively creates (if the name is new). | This is modified from TUX-NET to <code>workgroup</code> |
| | <code>netbios name =</code> | Sets the NetBIOS name that a Samba server is known and advertised as. If Samba is installed for the first time by OES, Novell appends <code>-W</code> to the hostname for this entry. This is necessary to prevent a conflict with NCP on Linux, which uses the hostname. | This entry is added. Default: <code>netbios name = %h-W</code> <code>%h</code> is the server's host name. |
| | <code>passdb backend =</code> | Specifies that Samba account information is stored in eDirectory LDAP database. | This entry is added. Do not modify this line. |
| | <code>ldap admin dn =</code> | Specifies the Distinguished Name (DN) that Samba uses for contacting the eDirectory LDAP server to retrieve user account information for users requesting access to Samba shares. The password for the DN specified at install time is encrypted by the installation process and stored in the SecretStore (<code>secrets.tdb</code>) on the OES server. If the DN name is changed in eDirectory, the name specified in this file must also be changed. If the DN password is changed, the new password must be stored using the <code>smbpasswd</code> command. For more information, see Section G.6.5, "Samba Passwords," on page 279. | This entry is added. Example: <code>ldap admin dn = cn=admin,o=novell</code> |

| Section | Entry Name | Description | Example or Default |
|---------|-----------------------|---|---|
| | ldap suffix = | Specifies the context that is used to search for user and computer accounts. | This entry is added. The default setting is specified during install time as the Base context for Samba users. |
| | ldap idmap suffix = | Specifies the location of sambaldmapEntry objects. | This entry is added. The default setting is the O parent container. For example, o=novell. |
| | ldap machine suffix = | Specifies where machine trust accounts are stored. | This entry is added. The default setting is the O parent container. For example, o=novell. |
| | ldap passwd sync = | Specifies that password encoding support is on or off. | This entry is added. Default: ldap password sync = on |
| | security = | Specifies the security mode. The value must be set to user. For more information, see samba.org (http://www.samba.org) on the Web. | This entry is added. Default (required): security = user |
| | encrypt passwords = | Specifies that passwords received from Windows clients are encrypted. This value must be set to yes. For more information, see samba.org (http://www.samba.org) on the Web. | This entry is added. Default (required): encrypt passwords = yes |

A full explanation of the `smb.conf` file is well beyond the scope of this guide. **Table G-4** briefly explains the purpose of other sections found in the file. For detailed explanations, search for `smb.conf` on the Web.

Table G-4 A Brief Summary of the Other Entries in the `smb.conf` File

| Section | Description |
|------------|--|
| [profiles] | This section sets up a network profiles service for playing media files through Samba. |
| [users] | This section sets up a share that displays all the home directories in <code>/home</code> . |
| [groups] | This section sets up a share that displays any directories contained in <code>/home/groups</code> . |
| [printers] | This section sets up a share for Samba printing, which is not supported on OES Linux. iPrint is the OES printing solution. |
| [print\$] | |

The ldap.conf Configuration File

Samba on Linux uses the OpenLDAP client libraries `libldap.so` and `libldap_r.so`. `ldap.conf` is the configuration file for OpenLDAP.

In compliance with Linux Standards Base (LSB) requirements, we have placed the `ldap.conf` file in the `/etc/openldap` directory on the OES server.

If you install the OES server into an existing tree, you must specify a trusted root certificate during OES installation if you want to use SSL. The `ldap.conf` file on your OES server then has the following certificate-related entries:

- `TLS_CACERT /etc/ssl/certname.cert`
- `TLS_REQCERT demand`

If you are installing a new directory tree, the `ldap.conf` file has the following entry:

- `TLS_REQCERT allow`

For more information on the `ldap.conf` file, see the `ldap.conf` man page.

G.6.2 Samba and NSS Volumes

Be aware of the following when using Samba to access NSS volumes.

- [“Access Requires Additional Setup” on page 276](#)
- [“Mounting NSS Volumes for Use with Samba” on page 276](#)
- [“Samba on NSS Can Be a Good Combination for Performance” on page 277](#)

Access Requires Additional Setup

Samba-enabled users cannot access an NSS volume using Samba until they are granted NSS trustee rights to the volume. (Rights are automatically granted for home directories on NSS volumes that are created in iManager.)

You can grant NSS trustee rights on a per-object basis using either the `ncpcon > rights` command at the OES Linux server shell prompt or by using an NCP client (provided the NCP server is running at the time).

If you are granting the same rights to multiple Samba users, it is more efficient to assign those users to a LUM-enabled group and then grant trustee rights to the group.

For more information on granting NSS trustee rights, see [“Using the Novell Client to Manage Trustees and Trustee Rights”](#) and [“Trustee Rights Utility for Linux”](#) in the *File Systems Management Guide for OES*.

Mounting NSS Volumes for Use with Samba

Because Windows is case insensitive, we strongly recommend that you mount NSS volumes as case insensitive when they are accessed through Samba.

When mounting an NSS volume for use with Samba:

- 1 In iManager > the *Storage* plug-in > *Volumes* > *Properties*, set the *Lookup Namespace* option to *Long* and remount the volume.

- 2 On the OES Linux server, open the `/etc/samba/smb.conf` file in a text editor and check for a case sensitive parameter in [global] section of the file. If the parameter exists (normally it does not) and if it is set to `yes`, change the setting to `no`.

Samba on NSS Can Be a Good Combination for Performance

If you will have more than 2,000 files and folders accessed through Samba, you should consider using NSS as the underlying file system. Above that number, Samba on NSS outperforms Samba on traditional Linux volumes, such as EXT3 or Reiser. As you add more files and directories above the 2,000 mark, the performance advantage increases.

G.6.3 Home Directories and Samba

NOTE: The information discussed in this section generally applies to all data directories and files. This discussion centers on home directories because they are a common data storage location in many network installations.

There are three basic locations for user home directories:

- Traditional Linux volumes (`/home`)
- Traditional Linux volumes that are also configured as NCP volumes
- NSS volumes that are also NCP volumes by definition

Table G-5 summarizes the Samba accessibility to each volume type:

Table G-5 Home Directory Accessibility by Volume Type

| Volume Type | Creation Method | Access Control | Visibility, Browseability, Modifiability for the User | Notes and Caveats |
|-------------------|------------------------------|-----------------------|---|---|
| Traditional Linux | Log in after user is created | POSIX file attributes | Everything is browseable; only the user's home directory is modifiable. | You can make home directories private (non-browseable) by changing the file attributes (<code>chmod</code> or <code>Konqueror</code>). For more information, see Section 35.4.2, "Providing a Private Work Directory," on page 224. |

| Volume Type | Creation Method | Access Control | Visibility, Browseability, Modifiability for the User | Notes and Caveats |
|--------------------------|--------------------------------|-------------------------|--|--|
| NCP on Traditional Linux | iManager at user-creation time | POSIX file attributes | Initially, the user's home directory is only visible. After making the changes suggested in the next column, it is also browseable, and modifiable. Other home directories are visible but are not browseable because iManager assigns no <i>group</i> or <i>other</i> file attributes at creation time. (Only the <i>owner</i> has rights.) | To make home directories accessible, you must use <code>chown</code> or Konqueror to change the owner from the eDirectory Admin user to the actual user. For instructions, see “NCP Volumes on Traditional Linux File Systems” on page 279 . |
| | Log in after user is created | POSIX file attributes | Everything is visible and browseable; only the user's home directory is modifiable. | |
| NSS | iManager at user-creation time | NCP trustee assignments | Only the user's directory is visible, browseable, and modifiable. | |

G.6.4 Methods for Creating Home Directories and Enabling Access to them for Samba Users

If you have previously administered Samba servers outside of an OES context, you might expect that user home directories are automatically created the first time a user logs in to Samba.

This is not the case in OES because Samba is not a PAM-enabled service (see [Section 18.1.5, “Services in OES Linux That Require Linux-Enabled Access,” on page 121](#)). Therefore, if you plan to provide Samba users with home directories, you must determine an alternate method for creating them.

The following sections briefly explain your options for creating user home directories.

- [“Creating Home Directories Using iManager 2.5” on page 278](#)
- [“Logging In to Create Home Directories” on page 279](#)
- [“Using Linux User Management Commands to Create Home Directories” on page 279](#)

Creating Home Directories Using iManager 2.5

If you plan to create home directories for eDirectory users on an NSS/NCP volume, and you have the NCP server installed and running (the OES default), you can create user home directories in iManager at the same time you create the user objects. (iManager cannot create home directories on non-NCP volumes.)

There is one important caveat: directories created using this method are owned from a POSIX standpoint by the eDirectory admin user who creates the user.

NSS Volumes

POSIX ownership is generally not a problem for home directories on NSS volumes, but if you are concerned about it, you can reassign directory ownership after the user is enabled for Samba by using the `chown` command. For example, to change ownership of the `/home/user1` directory from the Admin user to `user1`, you would enter `chown -R user1: /home/user1`. The `-R` option applies the operation recursively to all subdirectories and files.

NCP Volumes on Traditional Linux File Systems

POSIX ownership is an issue when the NCP volume is defined on a traditional Linux file systems. Because access to traditional Linux file systems is controlled through POSIX, users cannot access their own home directories until ownership is changed.

You can reassign directory ownership after the user is enabled for Samba by using the `chown` command. For example, to change ownership of the `/home/user1` directory from the Admin user to `user1`, you would enter `chown -R user1: /home/user1`. The `-R` option applies the operation recursively to all subdirectories and files.

Logging In to Create Home Directories

Home directories are automatically created and appropriate file access rights are automatically assigned the first time an eDirectory user who is enabled for Linux access (LUM) logs in to the OES server using a **PAM-enabled service**, such as login, ssh, ftp, or a telnet connection.

The simplest approach for many network administrators is to log in to the OES Linux server as the `root` user and use the `su` command at the shell prompt to create a home directory for each user, as follows:

```
su username
exit
```

where *username* is the login name of the user for which the home directory is being created.

Alternatively, if your users access the OES server using a **PAM-enabled service**, such as ssh, you could have them log in to the server to create their own home directories.

Using Linux User Management Commands to Create Home Directories

You can use either the `namuseradd` or `namusermod` command with the `-m` option to create home directories as documented in the *Novell Linux User Management Technology Guide*.

G.6.5 Samba Passwords

Before creating or enabling eDirectory users for Samba access, it is important to understand certain requirements regarding Samba passwords.

The preferred method for Samba authentication in OES involves the use of a Universal Password (UP) policy in eDirectory. The primary reason for this is that it eliminates the need for password synchronization when users change their passwords in eDirectory.

When you install Samba on the first OES Linux server, the install creates a Universal Password (UP) policy named Samba Default Password Policy in eDirectory > *Security* > *Password Policies*.

As you use iManager to create new Samba users or enable existing users for Samba access, the Samba iManager plug-in ensures that a qualified UP password policy is assigned to the user.

If a nonqualifying password policy is already in place for the user, you have the option to assign a qualifying password policy in its place.

Alternatively, you can choose the Samba hash method of authentication, but this is not recommended.

The following sections explain the issues associated with Universal Password and Samba hash passwords. For instructions on creating or enabling Samba users, see [Section G.2.4, “Creating and Enabling Samba Users and Groups in iManager,”](#) on page 264.

Be Sure to Use Samba-Qualified UP Policies

For a Password Policy to qualify for use by Samba users, the following configuration options must be enabled on the iManager > *Roles and Tasks* > *Passwords* > *Password Policies* > the *Universal Password* tabbed page:

- Enable Universal Password
- Allow Admin to Retrieve Password

Creating New Samba-Qualified Password Policies

- 1 Log in to iManager, then click *Roles and Tasks* > *Passwords* > *Password Policies* > *New*.
- 2 Name the policy, then click *Next*.
- 3 At the *Enable Universal Password?* prompt, click *Yes*.
- 4 Click *View Options*.
- 5 Select the *Allow Admin to Retrieve Password* option.
- 6 Continue creating the policy and assign it to a User, Organizational Unit, or Organization object.

Modifying Existing Samba-Qualified Password Policies

- 1 Log in to iManager, then click *Roles and Tasks* > *Passwords* > *Password Policies*
- 2 Select a policy, then click *Edit*.
- 3 Click the *Universal Password* tab, then click the *Configuration Options* link.
- 4 Make sure the *Enable Universal Password* and the *Allow Admin to Retrieve Password* options are both selected.
- 5 Click *Apply*.

About Samba Hash Passwords

Passwords can be stored as a Samba hash in eDirectory, but this is not recommended because Samba hash passwords are less secure and users must remember to synchronize their password with each password change.

When you create a new Samba user or enable an existing user for Samba, if the user has a nonqualifying password policy associated with it, you get a message encouraging you to replace the

policy with the default Samba policy. The alternative is to use the Samba hash password and the existing nonqualifying password policy.

NOTE: The choice to use a Samba hash is presented only when the user has a nonqualifying password policy assigned.

If you choose to use the Samba hash password instead of a qualifying Samba password policy, and users change their eDirectory password in Virtual Office, they must ensure that the Synchronize Samba Password option is selected (checked). Otherwise, their passwords are not synchronized and they cannot access Samba.

G.6.6 Security Implications

If you plan to implement Samba on your network, be aware of the following security implications:

- [“Universal Password” on page 281](#)
- [“Samba Access Vs. NCP Access” on page 281](#)

Universal Password

By default, Samba uses Novell Universal Password (UP) for authentication. Changing the default UP setting is not recommended because the alternative Samba hash method is not as secure.

Before using Samba, you might want to investigate the implications for using Universal Password as documented in [“Issues to Watch For”](#) in the *Novell Modular Authentication Services (NMAS) 2.4 Administration Guide*.

Alternatively, you might choose to provide Windows users with file services using Novell Client software, Novell iFolder[®] 2.1x, or NetStorage. For more information, see [“File Services” on page 207](#).

For more information on Samba password options, see [Section G.6.5, “Samba Passwords,” on page 279](#).

Samba Access Vs. NCP Access

Samba uses the POSIX/Linux security model and NCP uses the NetWare security model.

The POSIX/Linux model requires that users be granted rights to see all directories in the path up to the `root` directory. On NSS volumes, permissions are tied to NSS trustee assignments so that users experience similar access privileges for both Samba and NCP.

On traditional Linux volumes, however, additional steps are often required to provide similar access as explained in [Section 35.4, “Aligning NCP and POSIX File Access Rights,” on page 222](#).

G.6.7 Understanding the Option to Enable Samba Users

When you are enabling users for Samba access, additional text and options might appear below the option to enable Samba access, depending on what the iManager plug-in finds as it searches for a Samba-qualified Universal Password (UP) policy. The following section explains the policy search process.

The Policy Search Process

To determine whether the user has a qualifying Universal Password policy, the iManager Samba plug-in searches for a password policy in the following order:

1. User object
2. Parent Container object
3. Container object at the root of the tree (usually an Organization object)
4. Login Policy object in Security

If the search finds a password policy, it evaluates whether the policy is valid for Samba, meaning that the policy

- Has Universal Password enabled.
- Allows the Admin user to retrieve the password.

If the policy is valid for Samba, it is used.

If the policy is not valid for Samba, the plug-in prompts the Admin with two choices:

- Replace the existing policy with default Samba policy
- Keep the existing policy and use Samba hashes (*not* recommended)

If the search doesn't find a password policy, it automatically assigns the default Samba policy to the User object.

If No Additional Text Appears below the Option

If only the option to enable Samba access through eDirectory appears (there is no additional text below the option), one of the following applies:

- There is no Universal Password policy associated with the user
In this case, the Samba Default Password policy is assigned to the user.
- There is already an associated policy that qualifies as a Samba policy

If you want to enable the user for Samba access, you must click *OK* to continue.

If the Universal Password has not been previously specified, you are prompted to specify and confirm a password for the user. If you choose to not specify a password, you need to instruct the user to create a Universal Password by logging in to the network through iManager or using the Novell Client.

If Additional Text Appears below the Option

If additional text appears below the *Also Enable This User* option, then the policy search has found a password policy that doesn't qualify for enabling Samba access.

In this case, you have three choices:

- Replace the existing policy with the Samba Default Password policy
- Cancel the creation process and put a qualifying password policy in place.

For assistance, see [“Be Sure to Use Samba-Qualified UP Policies” on page 280](#).

- Use a Samba hash password for access.

For more information, see [“About Samba Hash Passwords”](#) on page 280.

G.6.8 Web Links

For more information about the origin, purposes, and functionality of Samba, refer to the following links:

- www.samba.org (<http://www.samba.org>)
- www.openldap.org/samba-2.2.8/docs/htmldocs/Samba-LDAP-HOWTO.html (<http://www.openldap.org>)
- www.unav.es/cti/ldap-smb/ldap-smb-2_2-howto.html (http://www.unav.es/cti/ldap-smb/ldap-smb-2_2-howto.html)
- www.google.com/grphp (<http://www.google.com/grphp>)

G.7 Troubleshooting Samba Access

The following sections should help you solve Samba access problems. If you don't find the answers you need, please use User Comments feature in the online documentation to let us know what is missing.

G.7.1 I Can't Enable eDirectory Users for Samba

The most common cause for this problem is explained in [Section 5.1.11, “Samba Enabling Problems and the Base Context for Samba Users Field,”](#) on page 58.

G.7.2 Users Can't Log In to the Samba Server

To access Samba, users must meet the requirements found in [“Samba Users Are Both Windows and eDirectory Users”](#) on page 264.

G.7.3 Users Can See Everyone's Home Directories

The Linux (POSIX) file security model is public by default, whereas the traditional Novell model is private. For a comparison of the two models, see [Section 30.5, “Comparing the Linux and the NetWare Core Protocol \(NCP\) File Security Models,”](#) on page 166.

You can adjust the default permissions on Linux to more closely match the traditional Novell model by following the instructions in [Section 35.4, “Aligning NCP and POSIX File Access Rights,”](#) on page 222 .

G.7.4 Users Can't See Their Home Directories

Check for the following:

Does the Directory Exist?

The Samba implementation in OES doesn't automatically create home directories when users log in to Samba. For more information, see [Section G.6.4, "Methods for Creating Home Directories and Enabling Access to them for Samba Users,"](#) on page 278.

Does the Directory exist in the Share Path?

By default, the [homes] share points to individual home directories is /home at the root of the file system. If the home directories were created in another location, for example through iManager on an NCP volume that doesn't point to /home, you need to either include a path statement in the [homes] share definition that points to the correct location, or create another share that users can access. For more information, see [Section G.3.1, "Creating Work Directories for Users,"](#) on page 267, [Section G.3.2, "Setting Up Workgroups and Shares,"](#) on page 268.

G.7.5 Users Get Errors When Trying to Access Their Directories

The most common cause for this problem involves home directories that were created in iManager on NCP volumes that point to traditional Linux file systems.

Home directories created in iManager are owned (from a POSIX standpoint) by the Admin user who creates the user object. If a Samba share points to a traditional Linux file system, then the Samba user must have POSIX access rights to access directory contents. For more information, see ["NCP Volumes on Traditional Linux File Systems"](#) on page 279.

Documentation Updates



This section summarizes the changes made to this manual since the initial release of Novell® Open Enterprise Server.

H.1 May 5, 2006

| Chapter or Section Changed | Summary of Changes |
|---|--|
| “Services in OES Linux That Require Linux-Enabled Access” on page 121 | Added SMS to the list. |
| “Refreshing the User List in the KDE Login Screen” on page 127 | New section. |
| “Aligning NCP and POSIX File Access Rights” on page 222 | New section that also includes information that was in the Samba documentation. |
| “Implementing Samba File Services” on page 233 | Replaced most of the information with a link to Section G.2, “Implementing Samba,” on page 261 . |
| “Samba Support in OES” on page 261 | Entire section reworked. |

H.2 April 3, 2006

| Chapter or Section Changed | Summary of Changes |
|---|--|
| “Services in OES Linux That Require Linux-Enabled Access” on page 121 | Added clarification that Samba is not a PAM-enabled service and logging in through Samba will not create home directories. |
| “Methods for Creating Home Directories and Enabling Access to them for Samba Users” on page 278 | Added clarification that Samba is not a PAM-enabled service and logging in through Samba will not create home directories. |

H.3 February 28, 2006

| Chapter or Section Changed | Summary of Changes |
|---|---|
| “Links to Product Security Considerations Sections” on page 169 | Added more links to security sections in the OES documentation set. |

H.4 February 23, 2006

| Chapter or Section Changed | Summary of Changes |
|---|--|
| "Nsure® Audit" on page 35 "Auditing" on page 131 | Updated OES Linux auditing availability information. |

H.5 January 19, 2006

| Chapter or Section Changed | Summary of Changes |
|--|---|
| Section 4.3.3, "Downloading OES Software from the Novell Web Site," on page 51 | Revised the download instructions to provide a more reliable path for getting SP2 files, the SLES activation code, etc. |

H.6 January 17, 2006

| Chapter or Section Changed | Summary of Changes |
|--|--|
| Section 4.3.3, "Downloading OES Software from the Novell Web Site," on page 51 | Updated download instructions for SP2 release. |

H.7 December 23, 2005

| Chapter or Section Changed | Summary of Changes |
|---|---|
| Various | Updated references to OES SP1. Statements that reflected changes in SP1 now refer to OES SP1 and later. Statements that apply to all OES versions now simply refer to OES. |
| Table 3-1, "OES Services Available on OES LINUX and OES NetWare," on page 34 | Added information about AFP, CIFS, and NFS file protocols. |
| Section 8.1, "OES Linux," on page 65 | Removed the statement that the Red Carpet® GUI is not supported. |
| Section 10.4.1, "File Trustee Rights Changes Do Not Affect Current Samba Connections," on page 77 | Added explanation that Samba treats rights changes in the same way as Windows. This is different from NFAP and has caused some confusion. |

H.8 November 1, 2005

| Chapter or Section Changed | Summary of Changes |
|----------------------------|--|
| Entire Guide | Page design reformatted to comply with revised Novell documentation standards. |

H.9 October 4, 2005

| Chapter or Section Changed | Summary of Changes |
|---|---|
| Section 5.1.5, "iFolder 3.x Considerations," on page 56 | Added this section. |
| Table D-1 on page 253 | Added information regarding rendering differences between Internet Explorer and Mozilla-based browsers. |

H.10 September 19, 2005

| Chapter or Section Changed | Summary of Changes |
|---|---|
| Section , "Novell Cluster Services (Linux)," on page 23 | Revised the list of features as directed by product management. |

H.11 September 7, 2005

| Chapter or Section Changed | Summary of Changes |
|--|--|
| Section 4.3, "Evaluating OES Software," on page 50 | Revised the information and instructions to reflect changes to the download process. |

H.12 August 31, 2005 (Support Pack One)

| Chapter or Section Changed | Summary of Changes |
|--|--|
| Chapter 1, "What's New," on page 19 | New Section |
| Figure 2-5 on page 31 | Updated to reflect new services organization |
| Table 3-1 on page 34 | Updated service information |
| Section 3.4.2, "Service Differences on the OES Platforms," on page 38 | Updated to reflect current service mix |
| Section 3.11.4, "Use Predefined Server Types (Patterns) When Possible," on page 46 | Updated explanations |

| Chapter or Section Changed | Summary of Changes |
|---|---|
| “Getting and Preparing OES Software” on page 49 | Updated the explanation to reflect changes in distribution of OES |
| Section 5.1, “Installation/Upgrade/Migration Caveats,” on page 55 | New section |
| Chapter 6, “Upgrading to OES,” on page 61 | New chapter |
| Chapter 7, “Migrating/Consolidating Existing Servers and Data,” on page 63 | New chapter |
| Chapter 8, “Updating/Patching OES Servers,” on page 65 | New chapter |
| Chapter 9, “Adding OES Services to OES Servers,” on page 67 | Updated |
| Section 10.3.3, “iPrint,” on page 74 | Two caveats added |
| Section 10.3.4, “NCP Server (OES Linux),” on page 75 | New section |
| Section 10.3.5, “NSS (OES Linux),” on page 75 | Caveats added |
| Section 11.2, “Coexistence and Migration,” on page 81 | Added link to section in this guide |
| Section 12.2, “Coexistence and Migration of NetWare Services,” on page 83 | Added link to section in this guide |
| Section 12.2, “Coexistence and Migration of NetWare Services,” on page 83 | Added link to section in this guide |
| Chapter 16, “Identity Management Services,” on page 111 | Added bullet list at beginning of chapter |
| Section 18.1.1, “A Graphical Preview of Linux User Management,” on page 120 | Modified explanation below illustration |
| Section 18.1.6, “Services That Do Not Require Linux-Enabled Access but Have Some LUM Requirements,” on page 123 | Modified explanations |
| Section 18.4, “LUM Implementation Suggestions,” on page 124 | Modified explanations because of iManager plug-in changes |
| Section 28.1, “The OES Licensing Model,” on page 159 | New section |
| Section 30.5, “Comparing the Linux and the NetWare Core Protocol (NCP) File Security Models,” on page 166 | New section |
| Section 33.1.5, “Novell Client (NCP File Services),” on page 194 | Added new headings and link to information about Linux client |
| Section 33.5.3, “NSS (and NetWare) File and Directory Trustee Management,” on page 200 | Added new sections for changing file and directory attributes |

| Chapter or Section Changed | Summary of Changes |
|---|---|
| Section 35.1.6, "Novell iFolder 3.1," on page 217 | New section |
| Table 35-1 on page 219 | Added iFolder 3.x entry |
| Section 35.2.2, "Planning Your File Services," on page 220 | Added iFolder 3.x entries |
| Section 35.2.2, "Planning Your File Services," on page 220 | Added iFolder 3.x entries |
| Section 35.9, "Novell iFolder 3.x Implementation and Maintenance," on page 231 | New section |
| Table E-1 on page 255 | Added note entries |
| Section F.2, "System Users Created in eDirectory," on page 258 | Updated information |
| Section F.4, "System Groups Created in eDirectory," on page 259 | Updated information |
| Section G.1, "Overview of Samba," on page 261 | Updated information |
| Section G.6.2, "Samba and NSS Volumes," on page 276 | New section |
| Section 30.5, "Comparing the Linux and the NetWare Core Protocol (NCP) File Security Models," on page 166 | New section |
| Section G.2.4, "Creating and Enabling Samba Users and Groups in iManager," on page 264 | Extensive changes to reflect iManager plug-in changes |
| Section , "Samba Access Vs. NCP Access," on page 281 | New section |

H.13 July 11, 2005

| Chapter or Section Changed | Summary of Changes |
|----------------------------|---|
| All | Fixed broken links to OES online documentation. |

H.14 June 1, 2005

| Chapter or Section Changed | Summary of Changes |
|----------------------------|-------------------------|
| All | Made copy edit changes. |