Open Enterprise Server 2015 SP1
Upgrading to OES—Best Practices Guide

June 2016

Novell

Legal Notices

For information about legal notices, trademarks, disclaimers, warranties, export and other use restrictions, U.S. Government rights, patent policy, and FIPS compliance, see https://www.novell.com/company/legal/.

Contents

About This Guide

Open Enterprise Server (OES) 2015 SP1 is the next generation of the Novell services that have long been valued by a wide variety of businesses and other organizations, ranging from small businesses to multi-national enterprises.

When you install OES 2015 SP1, you install SUSE Linux Enterprise Server (SLES) 11 SP4 as the core OS and the OES components as an "add-on product."

What This Guide Provides

This guide provides an overview of the planning and implementation processes involved in upgrading from NetWare to OES 2015 SP1. It provides overview and planning information along with links to specific implementation instructions.

What This Guide Does Not Replace

This guide does not replace the specific upgrading and planning instructions found in the regular installation and migration guides that you should follow carefully to ensure a successful upgrade to OES.

Audience

This guide is intended for network administrators.

Feedback

We want to hear your comments and suggestions about this manual and the other documentation included with OES 2015 SP1. Please use the User Comments feature at the bottom of each page of the online documentation.

Documentation Updates

For the most recent version of this guide, see the OES 2015 SP1 Documentation Web site (http://www.novell.com/documentation/oes2015).

Documentation Conventions

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

1 Frequently Asked Questions

You probably have a few questions up front. Here are some answers.

1.1 Why Not Stay on NetWare?

There are distinct advantages to moving to OES over staying on NetWare.

For more information about latest features on OES, see What's New or Changed in OES 2015 SP1 in the OES 2015 SP1: Readme.

Here are a few of the benefits of upgrading to OES:

- **NetWare Entered Extended Support in 2010:** As Novell cautioned for a number of years, NetWare entered its extended support phase in 2010.

- **Continued Hardware Support:** When NetWare entered extended support, hardware vendors ceased to certify it on new server hardware.

- **Continued Third-party Solutions Support:** As hardware vendors ceased certification support, third-party software solutions providers, such as anti-virus and backup software vendors, stopped developing for the NetWare platform.

- **Dynamic Storage Technology:** This breakthrough Novell technology drastically reduces storage costs and runs only on OES, not on NetWare. However, NSS volumes on NetWare can be assigned as secondary volumes in a pair.

- **iFolder 3.9:** NetWare supports only Novell iFolder 2.x, which lacks important features found in the latest version, such as automatic server provisioning, multiple iFolders per user, iFolder sharing between users, reassigning iFolder ownership, provisioning for LDAP groups, and numerous administrative enhancements.

- **Open Source Solutions:** Open source initiatives such as Apache and Tomcat have been supported on NetWare only as Novell or others have ported them to the platform, but they are automatically available on OES.

- **Virtualization technologies:** Xen and KVM are no-cost virtualization solutions that run on OES servers. The Xen solution lets you create NetWare virtual machines for those services that you want to keep on NetWare for the time being. Both solutions support OES virtual machines.

- **Domain Services for Windows:** This OES technology integrates eDirectory and Active Directory users as well as Windows and Novell file services.

- ◆ **File Systems:** OES not only supports the Novell Storage Services (NSS) file system, but also traditional Linux file systems, such as Ext3, XFS, and Btrfs.
- ◆ **Novell Services enhancements:** As Novell services continue to evolve, the new features and technologies are available on OES.

1.2   What About My Older NetWare Servers?

NetWare 6.5 SP8 is the primary source server targeted by the OES Migration Tool.

Earlier versions of NetWare should be upgraded to OES 2015 SP1 as outlined in Table 1-1.

Table 1-1   *Upgrade Paths from Earlier Versions of NetWare*

NetWare Version	Minimum DS Version	Tool to Use	Other Information
NetWare 4.11 SP9	NDS 6.21	n/a	You must perform a down-server upgrade to NetWare 5.1 SP8 as an interim step.
NetWare 4.2	NDS 6.21	n/a	You must perform a down-server upgrade to NetWare 5.1 SP8 as an interim step.
NetWare 5.0 SP6a	NDS 7.62c of 8.85c	n/a	You must perform a down-server upgrade to NetWare 5.1 SP8 as an interim step.
NetWare 5.1 SP8	eDirectory 8.7.3.7 or later	OES Migration Tool	For more information, see "Transfer ID Migration" in the *OES 2015 SP1: Migration Tool Administration Guide*.
NetWare 6.0 SP5	eDirectory 8.7.3.7 or later	OES Migration Tool	For more information, see "Transfer ID Migration" in the *OES 2015 SP1: Migration Tool Administration Guide*.

1.3   What's New in OES?

The "What's New or Changed in OES 2015 SP1" section in the *OES 2015 SP1: Readme* includes information on the new features that are only available in OES.

1.4   What Do Novell Customers Recommend?

The table below summarizes customer advice from a survey of OES customers.

Table 1-2   *What Novell Customers Say about OES*

Customer Tip
Learn basic Linux skills first (before starting) or have someone handy who knows about it. Make sure you:

◆ Understand the Linux file system and rights.

For help, see "Understanding Directory Structures in Linux POSIX File Systems" in the *OES 2015 SP1: File Systems Management Guide* and "Aligning NCP and POSIX File Access Rights" in the *OES 2015 SP1: Planning and Implementation Guide*

◆ Know Linux command line tools for the equivalent NetWare commands (DSTrace, DSRepair, etc.). Learn the commands by setting up a test server and playing out the scenario you want to see on your production server.

For help, see the *OES 2015 SP1: Linux Tips for NetWare Administrators* guide.

◆ Understand that in-house Linux expertise is a necessary prerequisite. (The good news is that fully 89% of survey respondents who deployed OES discovered that they already had Linux expertise on their deployment teams.)

For help, see Section 1.6, "How Much Training Is Needed?," on page 20 and Section 1.7, "What Training Is Available?," on page 21.

Plan ahead and know your NetWare, OES, and eDirectory environments very well:

◆ Make sure eDirectory is clean and that you are current on all patches.

◆ Plan the deployment scenario and find the holes and gotchas.

◆ Plan data locations, file systems, and LUM configuration objects.

◆ Perform a complete inventory of all applications (and their dependencies) before you get too far into planning in case they or their dependencies can't be moved to OES/SLES.

Upgrade slowly and cautiously, but start now

◆ Start at a small scale (a couple of servers) or just move DHCP for a couple of weeks, then DNS for a couple of weeks, then GroupWise, WebAccess, etc.

◆ Be careful; you can harm your production environment if you don't understand what you are doing; don't start with your most important servers.

Test, test, test.

◆ Test everything multiple times, including third-party products like backup solutions, before full deployment.

◆ Create an initial test box if you don't have previous Linux experience.

◆ Use VMware (or other virtualization products) and install many times to get the feel for it, then test, test, test.

Give it a try.

◆ Moving to OES is easy and relatively painless.

Start your upgrade in a lab environment first and play with the product.

◆ Try installing Linux at home and use it as your primary OS.

◆ Make sure you have a test environment that mimics your production installation.

It works the same as NetWare.

◆ The Novell management Interfaces look the same. iPrint, iManager, etc.—all of the benefits of NetWare are available on OES.

Don't freak out about service and management differences

Customer Tip

- ◆ Learn the iMonitor and iManager Web tools for service and server management.
- ◆ Become familiar with the basic management commands, such as ndsconfig for eDirectory management.

Do your homework and read everything you can find.

- ◆ Scour the discussion forums and see what problems others have had and how they solved them, ask questions, and make notes.

Avoid mixing services on OES and NetWare, if possible.

- ◆ Create separate servers providing services such as DNS, DHCP, etc., on OES first to gain familiarity with Linux as a whole.

YaST is your friend.

- ◆ This SLES management tool is not always the answer, though. Learn which things are best configured in the configuration files and which things you really should use YaST for.

Find out how well your hardware vendor supports Linux.

- ◆ Make sure your hardware vendor not only "supports Linux," but also provides regular driver updates for the version of SLES you are planning to deploy.

1.5 What Are the Differences Between NetWare and OES?

1.5.1 System and Administrative User and Group Differences

Because OES services run on Linux rather than on NetWare, there are noticeable differences between the system and administrative users and groups on OES servers. For example, some OES services, such as Novell CIFS, require proxy users to retrieve service-related information and service attributes, and to write service information in eDirectory.

For more information, see "System User and Group Management in OES 2015 SP1" and "Administrative Users and Groups in OES 2015 SP1" in the *OES 2015 SP1: Planning and Implementation Guide*.

1.5.2 Comparing Services Between NetWare and OES

Table 1-3   *Service Comparison—NetWare 6.5 SP8 and OES 2015 SP1*

Service	NetWare 6.5 SP8	OES 2015 SP1	Platform Differences / Migration Issues
Access Control Lists	Yes	Yes	In combination with NCP Server, Linux supports the Novell trustee model for file access on NSS volumes and NCP (POSIX) volumes on Linux.
AFP (Apple File Protocol)	Yes - NFAP	Yes - Novell AFP	AFP services on NetWare and OES are proprietary and tightly integrated with eDirectory and Novell Storage Services (NSS).
Apache Web Server	Yes - NetWare port of open source product	Yes - Standard Linux	"Using Apache HTTP Server on OES Servers (Single Server or Cluster Nodes)" in the *OES 2015 SP1: Web Services and Applications Guide*. Administration Instance vs. Public Instance on NetWare. What's Different about Apache on NetWare.
Archive and Version Services (AVS) (Novell)	Yes	No	Discontinued from OES 2015.

Backup (SMS)
  ◆ SMS
  ◆ NSS-Xattr
	Yes	Yes	SMS provides backup applications with a framework to develop complete backup and restore solutions. For information, see the *OES 2015 SP1: Storage Management Services Administration Guide for Linux*.
			
			NSS provides extended attribute handling options for NSS on Linux. For information, see "Using Extended Attributes (xAttr) Commands" in the *OES 2015 SP1: NSS File System Administration Guide for Linux*.

CIFS (Windows File Services)	Yes - NFAP	Yes - Novell CIFS	Both NFAP and Novell CIFS are Novell proprietary and tightly integrated with eDirectory and Novell Storage Services (NSS).
Clustering	Yes	Yes	"Comparing Novell Cluster Services for Linux and NetWare" in the *OES 2015 SP1: Novell Cluster Services NetWare to Linux Conversion Guide*.
DFS (Novell Distributed File Services)	Yes	Yes	In combination with NCP Server, DFS supports junctions and junction targets for NSS volumes on Linux and NetWare. DFS also supports junction targets for NCP volumes on non-NSS file systems, such as Btrfs, Ext3, and XFS. The VLDB command offers additional options to manage entries in the VLDB for NCP volumes.

Service	NetWare 6.5 SP8	OES 2015 SP1	Platform Differences / Migration Issues
DHCP	Yes	Yes	For a comparison between what is available on OES and NetWare, see "DHCP Differences Between NetWare and OES 2015 SP1" in the *OES 2015 SP1: Planning and Implementation Guide*. To plan your DHCP implementations, see "Planning a DHCP Strategy" in the *OES 2015 SP1: DNS/DHCP Services for Linux Administration Guide* and "Planning a DHCP Strategy" in the *NW 6.5 SP8: Novell DNS/DHCP Services Administration Guide*.
DNS	Yes	Yes	For a comparison between what is available on OES and NetWare, see "DNS Differences Between NetWare and OES 2015 SP1" in the *OES 2015 SP1: Planning and Implementation Guide*. See "Planning a DNS Strategy" in the *OES 2015 SP1: DNS/DHCP Services for Linux Administration Guide* and "Planning a DNS Strategy" in the *NW 6.5 SP8: Novell DNS/DHCP Services Administration Guide*.
Dynamic Storage Technology (DST)	No	Yes	For more information, see the *OES 2015 SP1: Dynamic Storage Technology Administration Guide*.
eDirectory 8.8	Yes	Yes	No functional differences.
eDirectory Certificate Server	Yes	Yes	No functional differences.
eGuide (White Pages)	Yes	No	This functionality is now part of the Identity Manager User Application. For more information, see the *User Application: Administration Guide*.
Filr	No	Entitlement	See "Novell Filr" on page 17.
FTP Server	Yes	Yes	FTP file services on OES servers are provided by Pure-FTPd, a free (BSD), secure, production-quality and standard-conformant FTP server. The OES implementation includes support for FTP gateway functionality as on NetWare and offers a level of integration between eDirectory and Pure-FTP that allows users to authenticate to eDirectory for FTP access to the server. See "Novell FTP" in the *OES 2015 SP1: Planning and Implementation Guide*.

Service	NetWare 6.5 SP8	OES 2015 SP1	Platform Differences / Migration Issues
Health Monitoring Services	Yes	Yes	In OES, NRM provides health monitoring via the open source monitoring tools Ganglia and Nagios. These tools do not use SFCB.
			For help with diagnosing problems using Ganglia and Nagios in OES, see "Diagnosing Problems Using Ganglia and Nagios (OES 2015 SP1)" in the *OES 2015 SP1: Novell Remote Manager Administration Guide*.
			The NRM Health Monitor tool is no longer available in OES 11 SP2 and later.
			For information about using Health Monitor in OES 11 SP1 and earlier, see "Diagnosing Problems Using Health Monitor (OES 11 SP1)" in the *OES 2015 SP1: Novell Remote Manager Administration Guide*.
Identity Manager 4.0.2 Bundled Edition	No	Yes	See "Using the Identity Manager 4.0.2 Bundle Edition." (http://www.novell.com/documentation/oes2015/oes_implement_lx/data/b143d3j6.html).
iPrint	Yes	Yes	See " Overview" in the *OES 2015 SP1: iPrint Linux Administration Guide*, and "Overview" in the *NW 6.5 SP8: iPrint Administration Guide*.
IPX (Internetwork Packet Exchange) from Novell	Yes	No	No plans to port IPX to OES.
iSCSI	Yes	Yes	The iSCSI target for Linux does not support eDirectory access controls like the NetWare target does. Nor is the iSCSI initiator or target in OES integrated with NetWare Remote Manager management. You use YaST management tools instead.
			On the other hand, the iSCSI implementation for Linux is newer and performs better.
			See Linux-iSCSI Project on the Web (http://linux-iscsi.sourceforge.net).
			See "Overview" in the *NW 6.5 SP8: iSCSI 1.1.3 Administration Guide*.
KVM Virtualization Guest	No	Yes	Of the two OES virtualization solutions (KVM and Xen), only Xen is supported for running Netware.
KVM Virtualization Host Server	No	Yes	No functional differences.
LDAP Server for eDirectory	Yes	Yes	No functional differences.
Multipath Device Management	Yes	Yes	NetWare uses NSS multipath I/O. Linux uses Device Mapper - Multipath that runs underneath other device management services.

Service	NetWare 6.5 SP8	OES 2015 SP1	Platform Differences / Migration Issues
MySQL	Yes - NetWare port of open source product	Yes - Standard Linux	See MySQL.com on the Web (http://www.mysql.com). See "Overview: MySQL" in the *NW 6.5 SP8: Novell MySQL Administration Guide*. See also "Configuring MySQL with Novell Cluster Services" in the *OES 2015 SP1: Web Services and Applications Guide*.
NCP Volumes	No	Yes	NCP Server on Linux supports creating NCP volumes on Linux POSIX file systems such as btrfs, Reiser, Ext2, Ext3, and XFS. OES includes support for much larger NCP volumes. For information, see "Managing NCP Volumes" in the *OES 2015 SP1: NCP Server for Linux Administration Guide*.
NCP Server	Yes	Yes	NCP services are native to NetWare 6.5 and NSS volumes; to have NCP services on OES, the NCP Server must be installed. See "Benefits of NCP Server" in the *OES 2015 SP1: NCP Server for Linux Administration Guide*.
NetStorage	Yes	Yes	NetStorage on Linux offers connectivity to storage locations through the CIFS, NCP, and SSH protocols. NetWare uses only NCP.
NetWare Traditional File System	Yes	No	No plans to port the NetWare Traditional File System to Linux.
NetWare Traditional Volumes	Yes	N/A	
NFARM	No	Yes	The Novell Access Rights Management (NFARM) shell extension for Windows Explorer lets you manage Novell Trustee ACLs for AD users and groups who have access to AD-enabled NSS volumes. For more information, see "Managing the Rights of Active Directory Users Using NFARM"in the *OES 2015 SP1: NSS AD Deployment and Administration Guide*.
NFS	Yes - NFAP	Yes - native to Linux	For NetWare, see "Working with UNIX Machines" in the *NW 6.5 SP8: AFP, CIFS, and NFS (NFAP) Administration Guide*.
NICI (Novell International Cryptography Infrastructure)	Yes	Yes	No functional differences.

Service	NetWare 6.5 SP8	OES 2015 SP1	Platform Differences / Migration Issues
NIT	No	Yes	The Novell Identity Translator provides UID support for eDirectory and Active Directory users accessing NSS data through CIFS.
			For more information, see "NIT (Novell Identity Translator)"in the *OES 2015 SP1: NSS AD Deployment and Administration Guide*
NMAS (Novell Modular Authentication Services)	Yes	Yes	No functional differences.
Novell Audit	Yes	No	Novell Audit is 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).
Novell Client for Windows and Linux support	Yes	Yes	Novell Client connectivity to OES requires that the NCP Server be installed.
			Access to the larger NCP volumes supported by OES requires the latest Novell Client software.
Novell Cluster Services (NCS)	Yes	Yes	See "Product Features" in the *OES 2015 SP1: Novell Cluster Services for Linux Administration Guide*.
			See "Product Features" in the *NW6.5 SP8: Novell Cluster Services 1.8.5 Administration Guide*.
Novell Filr	No	Yes	Organizations with a current maintenance agreement are entitled to deploy Novell Filr at no cost.
			For more information, see the Novell website.
			Filr supports NSS-AD integration in OES 2015 or later.
Novell iFolder 2.*x*	Yes	No	For migration information, see "Migrating iFolder 2.x" in the *OES 2015 SP1: Migration Tool Administration Guide*
Novell iFolder 3.9	No	Yes	OES includes Linux, Macintosh, and Windows clients.
Novell Licensing Services	Yes	No	See OES Doesn't Support NLS in the *OES 2015 SP1: Planning and Implementation Guide*.
Novell Linux Volume Manager	No	Yes	The Novell Linux Volume Manager (NLVM) command line interface can be used to create and manage Linux POSIX file systems.
			For information about the syntax and options for the NLVM commands used in this section, see the *OES 2015 SP1: NLVM Reference*.

Service	NetWare 6.5 SP8	OES 2015 SP1	Platform Differences / Migration Issues
NSS (Novell Storage Services)	Yes	Yes	Most NSS services are available on both platforms. For a list of NSS features that are not used on Linux, see "Cross-Platform Issues for NSS" in the *OES 2015 SP1: NSS File System Administration Guide for Linux*.
			In OES 11 and later, NSS supports both the DOS and GPT partitioning scheme.
			In OES 11 SP1 and later, NSSMU supports Linux volumes in addition to NSS pools and volumes.
NTPv3	Yes	Yes	The `ntpd.conf` file on NetWare can replace an OES server's NTP configuration file without modification.
OpenSSH	Yes	Yes	NetWare includes a port of the open source product. Linux includes the open source product itself.
			See "Functions Unique to the NetWare Platform" in the *NW 6.5 SP8: OpenSSH Administration Guide*.
PAM (Pluggable Authentication Modules)	No	Yes	PAM is a Linux service that Novell leverages to provide eDirectory authentication. eDirectory authentication is native on NetWare.
Pervasive.SQL	Yes	No	Pervasive.SQL is available for Linux from the Web (http://www.pervasive.com).
PKI (Public Key Infrastructure)	Yes	Yes	No functional differences.
Printing	Yes	Yes	See iPrint.
QuickFinder	Yes	No	See Search.
RADIUS	Yes	Yes	See the information on forge.novell.com (http://forge.novell.com/modules/xfmod/project/?edirfreeradius).
Salvage	Yes	Yes	Salvage is now supported for eDirectory and AD users using NFARM utility.
Samba	No	Yes	Samba is an open source technology available on OES. Novell provides automatic configuration for authentication through eDirectory. For more information, see the *OES 2015 SP1: Novell Samba Administration Guide*.
Search (QuickFinder)	Yes	No	Discontinued from OES 2015.

Service	NetWare 6.5 SP8	OES 2015 SP1	Platform Differences / Migration Issues
SLP	Yes - Novell SLP	Yes - OpenSLP	For OES, see SLP in the *OES 2015 SP1: Planning and Implementation Guide*. NetWare uses Novell SLP, which provides caching of Directory Agent scope information in eDirectory. This provides for sharing of scope information among DAs. OpenSLP on Linux is customized to provide DA information retention and sharing as well.
Software RAIDS (NSS volumes)	Yes (0, 1, 5, 0 1, 5 1)	Yes (0, 1, 5, 0 1, 5 1)	See "Understanding Software RAID Devices" in the *OES 2015 SP1: NSS File System Administration Guide for Linux*.
Storage Management Services (SMS)	Yes	Yes	The SBCON backup engine is not supported on Linux. The nbackup engine is available for exploring SMS capabilities, but in a production environment, you should use a third-party, full-featured backup engine. Beginning with OES 2015, SMS is enhanced to support the 64-bit storage enhancements and AD-user ACLs on AD-enabled NSS volumes.
TCP/IP	Yes	Yes	No functional differences.
Timesync NLM	Yes	No	Timesync will not be ported to Linux. However, NTPv3 is available on both Linux and NetWare. See Time Services in the *OES 2015 SP1: Planning and Implementation Guide*.
Tomcat	Yes	Yes	NetWare includes Tomcat 4 and a Tomcat 5 servlet container for iManager 2.7. OES includes Tomcat 6. There is no impact to any of the administration tools, which are tested and supported on both platforms. See "Administration Instance vs. Public Instance on NetWare"
Virtual Office (Collaboration)	Yes	No	Virtual Office has been replaced by Novell Vibe A separate purchase is required. For more information, see the Novell Vibe website (https://www.novell.com/products/vibe/).
WAN Traffic Manager	Yes	No	
Xen Virtualization Guest	Yes	Yes	NetWare 6.5 SP8 (and NetWare 6.5 SP 7) can run as a paravirtualized machine. OES can run as a paravirtualized machine or fully virtualized machine.
Xen Virtualization Host Server	N/A	Yes	

1.5.3 Services Not Included in OES

See "eGuide, IFolder 2, and Virtual Office Are Still Available on Netware" in the *NW 6.5 SP8: Planning and Implementation Guide*.

1.6 How Much Training Is Needed?

1.6.1 What Our Customers Tell Us

Some customers have found that their administrators need Linux training. Novell provides several training courses to help bring administers up to speed with administering OES services on Linux. Familiar tools, such as iManager and Novell Remote Manager (NRM), and utilities such as NSSMU and NLVM are also used to administer Novell services on OES. Many administrators are pleasantly surprised when they see that their knowledge and skills apply very well to managing Novell services on OES.

We recognize that time and resources are a problem for customers, and we recommend following the example of one of our customers: Four months prior to rollout, Novell provided OES and SLES training for their administrators at their site and on their hardware and software.

When we survey customers, they consistently tell us they want training that addresses:

- Differences in day-to-day support and management versus NetWare
- How to install and upgrade existing NetWare servers to OES
- Differences between NetWare and OES: services, features, and interoperability
- Troubleshooting

1.6.2 Conduct a Training Assessment

Novell recommends that you conduct a training needs assessment. You should determine whether current skill sets are absent, adequate, or proficient, so that you can recommend a training package. Three levels of Linux expertise are recommended:

Table 1-4   Recommended Linux Training Levels

Level of Expertise	Training Needed	Qualities of Potential Candidates
Certified Linux Expert	You will probably want at least some of your technical staff to be Linux certified (LPI level1 and/or LPI level 2). Many third-party Linux certification courses are available to meet this need.	• Are typically already UNIX (AIX, Solaris, etc.) experts. • Have some Linux experience. • Are willing to attend additional class and lab sessions. • Are willing to serve as trainers and mentors. • Have accredited certifications.

Level of Expertise	Training Needed	Qualities of Potential Candidates
Linux Administrator	Novell recommends SUSE Linux-specific training. Novell offers a variety of instructor-led and self-study certification and training options including Novell Advanced Technical Training (ATT), which is highly recommend. The comprehensive courses address a wide range of advanced topics including support issues, in-depth architectural reviews, and enterprise solutions. ATT classes provide real-world expertise that can be put to immediate use.	◆ Are currently UNIX or NetWare administrators who are willing to expand skills ◆ Have data center and server farm administrative experience. Deep technical skills are less important. ◆ Have expertise in services above the OS level. OS knowledge is necessary.
Linux Support Staff	Support staff need to be knowledgeable about how specific network services (eDirectory, edge services, iPrint, etc.) work on Linux. Novell offers service-specific courses for most major services.	◆ Support current file, print, and other network systems. ◆ Will need to move to more Linux support, but system focus will remain the same.

1.7 What Training Is Available?

Here are some of the avenues you can use to get the training you need:

- Section 1.7.1, "Novell Training Services," on page 21
- Section 1.7.2, "Complimentary Free Training," on page 21
- Section 1.7.3, "Product Documentation," on page 22

1.7.1 Novell Training Services

Novell certification and training options change periodically as new needs are identified and courses are developed. To learn more about these and other training options, visit the OES Novell training Web site at www.novell.com/training (http://www.novell.com/training/courseware/catalog.jsp?pl=7660).

- To find the dates and local availability of the Novell Advanced Technical Training and other Novell offerings, go to: www.novell.com/training/pep/map.html (http://www.novell.com/training/att/map.html).
- To request additional information on Novell Advanced Technical Training, send an e-mail to technicaltraining@novell.com (mailto:technicaltraining@novell.com)
- To subscribe to the Technical Training Newsletter, see http://www.novell.com/info/list (http://www.novell.com/company/subscribe/)

1.7.2 Complimentary Free Training

To help you get started with OES and Linux, Novell provides some training material at no cost on the Web (http://www.novell.com/training/complimentary/). See the topics under Novell Technical Training.

1.7.3 Product Documentation

Yes, the old adage is true: "If all else fails, read the documentation." This document contains numerous cross-references to sections relative to a specific topic or service. If you can't find what you need on Novell's documentation site, add a comment, tell us what we missed, and we'll see that you get the answer you need. Open Enterprise Server 11 documentation is available at the following URL: http://www.novell.com/documentation/oes11/index.html (http://www.novell.com/documentation/oes11/index.html).

One especially useful guide for those who are transitioning from NetWare to OES and Linux is the *OES 2015 SP1: Linux Tips for NetWare Administrators* guide.

SuSE publishes all of the SLES 11 documentation on the Web (http://www.suse.com/documentation/sles11/index.html).

1.8 Does Novell Have Community Support to Help Me with My Migration?

There are a two good places to connect with other administrators, ask questions, and find answers to your specific migration questions.

- ◆ Novell Forums (http://forums.novell.com/)
- ◆ Cool Solutions Upgrade to OES Community Page (http://www.novell.com/communities/coolsolutions/upgradetooes)

There is a list of the top TIDs (http://www.novell.com/communities/node/8781/top-oes-upgrade-tids) to help you troubleshoot and deal with migration issues.

Finally, you can get OES information from Twitter by following NovellOES (http://www.twitter.com/novelloes), and there's a FaceBook Page (http://www.facebook.com/desktopapp.php?api_key=97e8a45d27cbe2bd96a957cb9cd22f10#/pages/I-Upgraded-to-Novell-Open-Enterprise-Server-on-SUSE-Linux-Enterprise/154405544072?ref=ts) as well.

2 Getting Started

You can ensure a successful upgrade by

2.1 Assessing Your Current Network

2.1.1 Running Novell Support Advisor

To ensure you are equipped with the latest pre-upgrade information and area aware of known issues, we recommend you validate your OES upgrade readiness using the Novell Support Advisor 1.1 (or later) tool. For more information and to obtain this free tool, access the Novell Support Advisor Web page (http://support.novell.com/advisor).

2.1.2 Recording Your Current Network Information

Whether you will be upgrading on your own, using Novell Global Services, or working with another consulting firm, you need a complete and accurate record of your current network setup.

1 If you don't already have one, create one or more diagrams of your network, including the following information:

- Router/switch/subnet/firewall diagrams; note particularly any blocked ports
- Current WAN configuration, including link speeds for all sites running NetWare. Duplicate the following tables or use a spreadsheet, as necessary, to accommodate multiple sites.

Table 2-1 *Sample WAN Environment Overview*

Site Location	WAN Speed	# of Servers	Server Breakdown
Home Office	Local	25	3-NW4.11
			3-NW5.0
			4-NW5.1
			3-NW6.0
			3-NW6.5
			5-W2K3
			2-W2K
			2-RHEL3

Site Location	WAN Speed	# of Servers	Server Breakdown

Table 2-2   *Sample WAN Location Environment Overview*

Site Location	# of NetWare Servers	NetWare Versions	Server Notes	# of Clients	Client Breakdown	Client Notes
Southwest Office	6	2-NW4.11 1-NW5.1 3-NW6.5	All NetWare are being retired. Users will be moved to OES servers	30	4–Win98 6-W2K 20-WinXP	Win9x clients will be migrated to Windows XP Professional SP2

2 If you don't already have a current directory design document, create one that includes:

- ◆ NDS/eDirectory tree diagrams.
- ◆ Partition and replication diagrams.
- ◆ NDS versions, such as NDS v6, v7, and/or v8.
- ◆ Versions of NDS/eDirectory that are installed on non-NetWare operating systems.
- ◆ Other Novell applications that are directly dependent on eDirectory, such as Novell Account Management, DirXML, and Identity Manager.
- ◆ Any bindery contexts currently in use, including a brief description of how they are used.

3 List all of the NetWare servers in your tree along with their context, IP address information, and any other information you might need as you plan to migrate them.

4 Identify any NetWare traditional (non-NSS) volumes being used on your NetWare servers.

5 Identify the file services provided by NetWare servers, including AFP, CIFS, iFolder, NetStorage, FTP, and NCP (Novell Client), then list the servers that provide them and the contexts of the users that use them.

6 Identify the printers that are serviced by NetWare servers, along with the print services associated with them, including iPrint, NDPS-based printing, and legacy queue-based printing.

7 Identify any in-house applications developed specifically for NetWare and briefly describe the services that these provide.

8 Identify other Novell products, such as GroupWise, ZENWorks, or Identity Manager that are currently running on NetWare, and verify which of these are supported on OES.

9 Document how your e-mail infrastructure is currently set up.

10 Identify any third-party applications currently running on the NetWare servers, such as backup/restore and anti-virus solutions.

Verify with the vendors whether these applications are supported on SLES 11/OES and whether they are Novell YES Approved.

Specify which applications will be ported to OES and which must continue to run on NetWare for the time being.

11 List any databases (critical or otherwise) that are stored on NetWare servers.

12 Create a design document that outlines your network service configurations, including time synchronization, SLP, DNS, DHCP, and any other network protocols or services that might be impacted by an upgrade to OES, such as IPX.

13 Collect any standards documents you have, such as server standards and naming standards.

14 Collect or document the hardware information for your NetWare servers, including processor specs, RAM configuration and storage adapters.

15 Document any NetWare clusters in your network, both Novell Clustering Services (NCS) clusters and Business Continuity Clustering (BCC) clusters. Specify the function of each cluster node, including service failover configurations.

16 Specify any security standards that must be met on OES/Linux. Unlike NetWare, Linux security is much more modular/granular.

The tables in the next section suggest additional information you might need to collect before you begin planning your upgrade to OES.

2.2 Identifying Needed Improvements

2.2.1 Server Hardware Considerations

How is your server hardware holding up? Do you need to invest in some new hardware for the upgrade to OES to succeed?

Many customers tell us that choosing the right hardware is not a straightforward task.

Your best bet is to start with the Novell OES Partner Products page (http://www.novell.com/partnerguide/section/677.html).

If you don't already have an agreement with a hardware vendor, all Novell Partners deserve consideration. Be sure to communicate with your chosen hardware vendors regarding server sizing guidelines to ensure that you select the right server and hardware configuration.

Table 2-3 outlines both "minimum" and "recommended" requirements for running OES.

NOTE: The RAM and disk space amounts shown in Table 2-3 are for system components only. The OES components you install might require additional RAM and disk space.

Table 2-3 *Minimum and Recommended Hardware Requirements*

System Component	Minimum	Recommended
Computer	Server-class computer with an AMD64/Intel EM64T processor.	Server-class computer that has been certified by the hardware vendor for SLES 11 SP4.
Memory	1 GB of RAM	2 GB of RAM
Free Disk Space	7 GB of available, unpartitioned disk space.	10 GB of available, unpartitioned disk space. Additional disk space might be required depending on which OES components are selected and how they are used.
DVD Drive	DVD drive if installing from physical media	48X DVD drive if installing from physical media.
Network Board	Ethernet 100 Mbps	
Storage Adapter	N/A	When determining what hardware bus adapters (HBAs) to use for SAN-attached OES servers, take all of the software and hardware components into account. Linux drivers are available for almost all enterprise-class HBAs and many of them are OES certified. However, hardware vendors tend to be more restrictive with certification than the operating system is. Any HBA used with OES must be certified by both the storage vendor for a specific model as well as the Fibre Channel switch vendor.
IP Address	◆ One IP address on a subnet ◆ Subnet mask ◆ Default gateway	Internet connectivity from the server in order to complete registration and configure patches
Mouse	N/A	USB or PS/2
Server Computer BIOS	If you are doing a DVD installation, prepare the BIOS on your server computer so that it boots from the CD-ROM/DVD drive first.	

2.2.2 Consolidation Considerations

This might be a good time to consider taking advantage of today's more powerful hardware platforms and doing some server consolidation. Server consolidation often pays off in lower hardware costs, as well as lower cooling, power consumption, and rack space costs. For example, Novell consolidated fourteen older file and print servers to two new servers.

Which combinations of eDirectory, file, print, GroupWise, etc., might reasonably work together on the same host server?

2.2.3 Virtualization Considerations

To help with the transition from NetWare to OES, virtualization has been optimized so that you can run NetWare 6.5. SP7 and later as a paravirtualized guest operating system on OES servers.

Doing this provides another option for running NetWare-dependent applications and services. For example, most third-party NLM software can be accommodated this way until suitable alternatives can be developed for Linux.

Which NetWare-dependent applications and services will you need to run on an interim basis as part of your transition to OES? Will virtualization help with this?

Installing Hosts: For information about installing a virtual machine host and setting up virtual machines in general, see *Virtualization with Xen* (http://www.suse.com/documentation/sles11/book_xen/data/book_xen.html), particularly "Setting Up Virtual Machines" (http://www.suse.com/documentation/sles11/book_xen/data/cha_xen_vm.html).

Installing Guest Operating Systems: For information about installing NetWare as a guest operating system, see "Installing and Managing NetWare on a Xen-based VM" in the *OES 2015 SP1: Installation Guide*. For information about installing OES as a guest operating system, "Installing, Upgrading, or Updating OES on a VM" in the *OES 2015 SP1: Installation Guide*.

2.2.4 File System Considerations

Which file system should be used: Linux traditional volumes (Ext3, Btrfs, XFS), NSS, or another file system?

- Does it make sense to have different servers using different file systems depending on the server's primary role?
- Are you already using Novell Storage Services (NSS) volumes on NetWare?

  If so, you should probably preserve all the rights, metadata, and trustee information associated with the data on those volumes, so it makes sense to stay with Novell Storage Services.

- Are your volumes already in a SAN environment with NSS?

  If so, switching to a SAN environment that uses NSS on Linux is quite easy. Using DFS junctions also requires NSS to support volume moves and splits. And if business continuity clusters are in your plans, you might find them easier to implement if you're using NSS.

  NOTE: For GroupWise under Linux, the recommended file system for GW2012 is ext3 (http://www.novell.com/documentation/groupwise2012/gw2012_guide_install/data/b3kipez.html#b77qw4a).

2.2.5 Method Considerations

Which of the various tools best meets your needs? Knowing which tools you will use is important to planning your upgrade strategy.

2.2.6 Network Considerations

Is the network functioning optimally, or do you need to make changes before you upgrade?

Are required ports available?

Make sure that services such as DNS, DHCP, and SLP are optimally configured and in good working order. This is critical for all installations and upgrades.

2.2.7 eDirectory/LDAP Considerations

Is the eDirectory partition and replication layout optimal:

- Where are the replica rings located?
- Which servers have partitions on them?
- Where do your want replication rings and partitions to be after you finish your upgrade to OES?

    If you fail to plan properly in this area, you can count on running into network replication problems. Refer to the *NetIQ eDirectory 8.8 SP8 Administration Guide*, particularly "Designing Your NetIQ eDirectory Network" for detailed information.

- If your current eDirectory tree structure doesn't meet your needs, is it time to redesign it?

Novell recommends implementing multiple LDAP servers because of the critical nature of the LDAP service. LDAP servers should be fronted with an L4 switch for load sharing and redundancy. If an L4 switch is not available, then DNS round-robin could be used as an alternative.

2.2.8 Time Synchronization

Is time synchronization on your network in order?

- Are all NetWare virtual machines using Timesync rather than NTP?
- Is the TCP/IP protocol loaded on any physical NetWare servers that use NTP?
- Is only one server used as the *ultimate* time source?

    NTP uses a time provider group in which all servers in a geographical network obtain time from other servers in the same network. Only one network server should communicate with a server outside the network in order to keep traffic across routers and WANs at a minimum.

To understand time synchronization requirements and possibilities in an OES network, see "Time Services" in the *OES 2015 SP1: Planning and Implementation Guide*.

2.2.9 Cluster Considerations

If clusters are part of your plan, how will your cluster environment impact your efforts to upgrade to OES?

- What is the primary role of your cluster (GroupWise high availability, file and print services, directory services)?
- Do you need to consider splitting large clusters into multiple smaller clusters, one for each service?

    By separating clusters this way, problems in one service cluster won't spill over and potentially affect other clustered services.

    Splitting your clusters can also simplify administration efforts, because you can independently manage each cluster. Also, if you need to do a cluster update, a rolling upgrade of a six-node cluster is much easier than a rolling upgrade of a 32-node cluster.

◆ Are you planning to implement Novell Business Continuity Clustering to allow automated management of site-to-site failovers? If so, how will this affect your efforts and will your network topology be affected? Business Continuity Clustering lets you define which of your resources are considered "vital," so only those services move to an off-site location rather than the entire cluster.

◆ Will a rolling upgrade help you upgrade your clustered services?

Refer to the "Converting NetWare Cluster Nodes to OES (Rolling Cluster Conversion)" in the *OES 2015 SP1: Novell Cluster Services NetWare to Linux Conversion Guide* for detailed information.

2.2.10 Application Compatibility Considerations

What applications are currently hosted on your NetWare servers? Are comparable Linux applications available and are they certified for OES or SLES.

Because of the multitude of applications being used by our customers, it is impossible for Novell to make recommendations in every instance, so you might need to contact the vendor directly. But first check the Novell Partner Products site (http://www.novell.com/partnerguide/section/677.html) for the latest certifications.

2.2.11 LAN/WAN Connection Considerations

Is the performance of all of your WAN links within acceptable limits? Are there any indications of systemic problems? Are all replica rings maintaining proper synchronization?

It is essential that all of your LAN/WAN connections be performing within the expected parameters before you begin your upgrade to OES.

3 Upgrading eDirectory to OES

This section discusses upgrading eDirectory to OES and includes the following sections:

3.1 About eDirectory in OES

3.1.1 The Role of eDirectory in OES

eDirectory Is Essential to OES Services

eDirectory is an integral component of the services that make up OES. As with NetWare, service users are created as User objects in eDirectory and authenticate to gain service access.

OES servers exist as Server objects and there are numerous other objects and configurations stored "behind the scenes" in eDirectory that work together to deliver the same functionality that people are accustomed to with NetWare.

eDirectory even provides eDirectory users with access to some services that would normally require the creation of local user accounts on the server itself.

About Installing eDirectory and OES Services

During the install, when you reach the software selections screens, none of the OES services is selected by default.

You can specifically select eDirectory for installation, or, if you select a service that requires eDirectory, eDirectory is automatically selected for installation.

If you are installing into an existing eDirectory tree and you don't want eDirectory installed on the server, you can deselect it.

When you configure the services that require eDirectory, you enter the information for an eDirectory server in the tree (either the server you are installing or an existing server), including the name, context, and password of an administrative user with rights to install the required objects in the tree.

The First Server Is Critical

If you are creating a new eDirectory tree on your network, the first server you install is important for two reasons:

- The basic eDirectory tree structure is created during the first installation.
- The first server permanently hosts the Certificate Authority for your organization.

eDirectory Provides Additional Security for the Server

When you install eDirectory on a server, the server is configured by default to use eDirectory certificates for HTTPS services, providing a significantly enhanced level of security for the server.

For more information, see "Certificate Management" in the *OES 2015 SP1: Planning and Implementation Guide*.

3.1.2 eDirectory Version Considerations

Novell recommends that all servers in a tree be of the same fully supported eDirectory and OS versions.

- "eDirectory 8.8.8" on page 32
- "eDirectory 8.7.3 on NetWare 6.5 SP8" on page 32
- "Migrating Earlier DS Versions" on page 32

eDirectory 8.8.8

OES includes eDirectory 8.8.8. Where possible, you should upgrade existing servers to eDirectory 8.8.8 before or during the process of introducing OES into the environment.

For complete information, refer to the *NetIQ eDirectory 8.8 SP8 What's New Guide* available at www.novell.com/documentation/edir88 (http://www.novell.com/documentation/edir88/).

eDirectory 8.7.3 on NetWare 6.5 SP8

Novell supports eDirectory 8.7.3.9 or later on NetWare to facilitate the transition from NetWare to OES. Although they have somewhat different feature sets, these two versions of eDirectory are tested and certified to inter-operate within the same tree.

eDirectory must be hosted on a current fully supported OS. At this time, the only version of NetWare that is under support is NetWare 6.5, which is under extended support.

Migrating Earlier DS Versions

Earlier versions of DS/eDirectory should be migrated to eDirectory 8.7.3.7 as outlined in Table 1-1, "Upgrade Paths from Earlier Versions of NetWare," on page 10.

3.1.3 About eDirectory Management Tools in OES

Several tools, many of them Web-based, can be used to manage aspects of eDirectory. The primary tools are listed here.

- **iManager 2.7:** A browser-based tool that lets you set up and manage your NetIQ eDirectory tree; manage eDirectory objects, schema, partitions, and replicas; and create and manage users, groups, and other objects. For more information, see *NetIQ® iManager Administration Guide*.

- **iMonitor:** A browser-based tool that provides cross-platform monitoring and diagnostic capability for all servers in an eDirectory tree. For more information, see "Using NetIQ iMonitor" in the *NetIQ eDirectory 8.8 SP8 Administration Guide*.

- **Novell Remote Manager for OES:** A browser-based utility for monitoring server health, changing the server configuration, or performing diagnostic and debugging tasks. Novell Remote Manager (NRM) provides functionality that is not available in other management utilities. For information, see the *OES 2015 SP1: Novell Remote Manager Administration Guide*.

- **Novell Import Conversion Export Utility (ICE):** You use ICE to:
  - Import data from LDIF files to an LDAP directory
  - Export data from the LDAP directory to an LDIF file
  - Move data between LDAP servers
  - Perform a schema compare and update
  - Load information into eDirectory by using a template
  - Import schema from SCH files to an LDAP directory

  For more information, see "NetIQ Import Conversion Export Utility" in the *NetIQ eDirectory 8.8 SP8 Administration Guide*.

- **DSBK:** This is a thin command line parser that performs the same operations as the Backup eMTool, but it lets you initiate a backup from the server console without logging in first or setting up Role-Based Services.

  For more information, see "Using DSBK " in the *NetIQ eDirectory 8.8 SP8 Administration Guide*.

- **eDirectory Management Toolbox (eMBox):** Lets you access all of the eDirectory back-end utilities remotely or on the server and works with Novell iManager to provide Web-based access to eDirectory utilities such as DSRepair, DSMerge, and Service Manager.

  For more information, see "The eDirectory Management Toolbox" in the *NetIQ eDirectory 8.8 SP8 Administration Guide*.

- **Terminal Prompt Configuration Tools.** The following tools are also available:
  - **ndsconfig:** Lets you configure eDirectory, add an eDirectory replica server to an existing tree, or create a new tree. For usage information, enter `man ndsconfig` at the terminal prompt.

    ldapconfig: On OES servers, only use this when explicitly instructed to in the OES-specific documentation.

    nmasinst: Lets you configure Novell Modular Authentication Service (NMAS) and install login methods. For usage information, enter `man nmasinst` at the terminal prompt.

    General Utilities. Refer to "NetIQ eDirectory Linux Commands and Usage" in the *NetIQ eDirectory 8.8 SP8 Administration Guide* for a list and description of command line tools along with syntax, and refer to "LDAP-Specific Commands" for LDAP-specific commands.

- **ConsoleOne:** This utility is not supported to perform administration tasks on OES server. However, if you have a service that requires ConsoleOne, such as Novell GroupWise, it is supported for administration of those applications.

3.2 Planning Your eDirectory Upgrade

Installing eDirectory on OES provides an excellent opportunity to review your current directory structure to ensure that it meets your organization's needs and growth patterns.

3.2.1 Deciding Whether to Redesign Your Tree

Upgrading to OES provides an excellent opportunity to evaluate whether changes are necessary to better accommodate your current and future needs.

Questions to Ask

- **Type of Tree:** Does a Traditional (pyramid-shaped, single tree environment) or specialized tree (flat tree designed for a specific situation such as an identity vault or LDAP authentication) make better sense in your environment? Many Novell customers are opting for a flat tree so LDAP can walk the tree more efficiently to find a user object.
- **Physical Network Layout—Location-based and Designed Around WAN links):** Analyze the number of offices, where they are located, how many users are at each site, how sites communicate with each other, whether offices share the same data, and how data is routed among the sites.
- **Organizational Structure—Function-based Design):** Is your organization static or dynamic? What growth patterns do you anticipate?
- **Security:** How secure does your data need to be? Does some data need enhanced security?
- **Server configuration:** What types of servers are on your network? Do they need to interact? Where are they located? What applications and services does each host? Are they managed locally or centrally?
- **User accessibility needs:** Which applications and services are needed by which users? Do users need to read data or modify it? which rights need to flow from the root? How many users need remote access? Where will remote users access data from?
- **Application needs:** Which offices use the same applications? How many users are there per application? Are applications installed locally or centrally?
- **Administrative strategies:** Do you intend to manage eDirectory centrally or from many dispersed locations?
- **Naming standards for eDirectory objects:** What naming standards are in force? Do any of them need to be changed or updated?
- **Scalability and interoperability:** How important are these on your network? Are you willing to compromise scalability and/or performance for other worthwhile goals?
- **Speed and efficiency:** How important are these on your network? Are you willing to compromise speed and efficiency for other worthwhile goals?

◆ **Fault tolerance:** What steps have you taken to provide fault tolerance? Do additional options need to be implemented?

Deciding Whether to Move Services

If you decide to redesign your system, you need to determine whether to keep services in their original tree or move them to a new tree. As part of this process, you probably also want to remove any objects that are no longer being used.

For File and Print, Design around Your WAN

It is important that the WAN configuration is the first and foremost consideration for designing any eDirectory tree that caters primarily to file and print, particularly if your organization includes several remote facilities. In most cases, you should provide a partition for each remote location, even when it is a single-server site.

For example, if you plan to have five OES servers in place that are primarily dedicated to providing eDirectory replica services, all of the Master replicas could be contained on one of these servers along with multiple replicas of the higher levels of the tree. Each remote server should include an R/W replica of its local partition. Make sure you have three writable replicas in place to provide adequate redundancy.

Verify Your Redesign in a Lab First

If you decide to re-engineer your tree, it's a good idea to create the new tree in a lab to make sure you can work with its structure and that it's actually going to work the way you want before you put it into production.

3.2.2 Checking eDirectory Health

Problems with eDirectory can derail a rollout very quickly. Make sure there are no significant health issues before you begin the upgrade. Determine whether the prerequisites have been met for introducing OES and eDirectory 8.8 into an existing tree or for transferring eDirectory from NetWare to OES.

What to Check For

NOTE: When you upgrade to eDirectory 8.8, a server health check is conducted by default to ensure that the server is safe for the upgrade.

Whichever option you choose, make sure each of the following is checked:

- **eDirectory Version:** Running different versions of NDS or eDirectory on the same version of NetWare can cause synchronization problems. All NDS versions should be at the latest version on their respective operating system platforms. If your version of NDS or eDirectory is outdated, download the latest software patch from Novell Directory Services Patches and Files (http://support.novell.com/patches.html).

- **Time Synchronization:** NDS communication uses time stamps to uniquely identify objects and the object's modification time for synchronization purposes. Time stamps are assigned to each object and property to ensure the correct order for object and property updates. If servers in the tree are not synchronized to the correct local time (or more importantly, to each other) replica synchronization is not reliable and severe object corruption and data loss can be experienced. To avoid these problems, time needs to be in sync across all servers in the network.

- **Server-to-Server Synchronization:** NDS servers communicate changes made to objects and partition boundaries. This step verifies that no errors exist when NDS performs synchronization processes.

- **Replica Ring Synchronization:** This operation reads the Synchronization Status attribute from the replica object on each server that holds replicas of the partitions. It displays the time of the last successful synchronization to all servers as well as any errors that have occurred since.

- **Synchronization Tolerances:** This operation indicates the time periods since a server has synced with inbound and outbound data changes, how much data is outstanding, etc.

- **Background Processes:** These processes perform a variety of tasks, including replication of changes and maintenance of system information.

- **External References:** This check determines whether a replica containing the object can be located.

- **Stuck Obituaries:** These are object delete and move operations that have not completed successfully because mixed versions of DS have been used. Significant overhead is expended by the replica servers in retrying the obituary process constantly without success. Check the Flag States of the obituaries on all servers in the backlink lists for the obituaries.

  - **Collision and Unknown Objects:** In most cases, these objects can be deleted, but each should be investigated for origin and references first.

  - **Replica States:** Check the partitions and states of the replicas stored in the server's NDS database files.

  - **eDirectory Schema Synchronization:** Each NDS server has schema definitions that are used for creating and maintaining objects. Verify that schema synchronization between servers is working correctly.

Health Check Tools To Use

Depending on your preference, you can perform an eDirectory server health check in several ways:

- **Use the health check utilities in eDirectory 8.8:** NetIQ eDirectory 8.8 runs a health check by default with every upgrade before the actual package upgrade.

  - OES health checks are run by default before an upgrade operation starts.

  - NetWare health checks happen as part of the installation wizard.

  You can run the diagnostic tools (`ndscheck` on OES; `dscheck` on NetWare), to complete a health check at anytime.

  For additional information, including command parameters for each operating system, refer to "eDirectory Health Checks" in the *NetIQ eDirectory 8.8 SP8 Installation Guide*.

- **Use iMonitor:** You can use either of two methods (manual and automated) in iMonitor, a web-based diagnostic tool:
  - Use the Navigator Frame (**iMonitor > Navigator > Reports**).
  - Use the Assistant Frame (**iMonitor > Assistant > Agent Health**).

  Even with a large number of servers, this procedure tends to run very quickly (less than 5 minutes for 15-20 servers if all of the servers are healthy). The process is the same for all operating systems.

- **Use TID 10060600:** You can view a tutorial or access a text version of the TID at http://support.novell.com/additional/tutorials/index.html (http://support.novell.com/additional/tutorials/index.html)

Check Requirements, Prerequisites, and Compatibility

For system requirements and prerequisites, see Installing or Upgrading NetIQ eDirectory on Linux in the *NetIQ eDirectory 8.8 SP8 Installation Guide* for a complete listing and explanation.

Check Application Compatibility

Check currently installed Novell and third-party applications to determine if eDirectory 8.8 is supported before upgrading your existing eDirectory environment. You can find the current status for Novell products in TID 31714342 "What Novell products are supported with NetIQ eDirectory 8.8" (http://www.novell.com/support/php/search.do?cmd=displayKC&docType=kc&externalId=3171434&sliceId=1&docTypeID=DT_TID_1_1&dialogID=48117155&stateId=0%200%2048113961)

If a product is not supported:

- Do not install eDirectory 8.8 on the same server as the product.
- Do not configure the product to search an eDirectory 8.8 server.

As long as these conditions are met, you can still upgrade unaffected servers and services to OES and eDirectory 8.8 and run with a mixed tree until a replacement for the older application is found.

3.2.3 For More Information

For additional eDirectory design information, refer to "Designing Your NetIQ eDirectory Network" in the *NetIQ eDirectory 8.8 SP8 Administration Guide*.

3.3 Upgrading eDirectory

Use the information in the following sections to ensure a smooth eDirectory upgrade in connection with upgrading NetWare to OES.

- Section 3.3.1, "Do Not Install or Upgrade to eDirectory 8.8 Separately from OES," on page 38
- Section 3.3.2, "Choosing an Upgrade Strategy," on page 38
- Section 3.3.3, "Moving, Creating, or Importing eDirectory Users," on page 39

3.3.1 Do Not Install or Upgrade to eDirectory 8.8 Separately from OES

Because OES services are tightly integrated with eDirectory, both the services and eDirectory must be upgraded at the same time. The OES install is not designed to handle a separate installation or upgrade of eDirectory 8.8.

3.3.2 Choosing an Upgrade Strategy

There are several basic strategies for setting up eDirectory on OES or upgrading to the OES platform:

- ◆ "Transferring eDirectory to a New Server" on page 38
- ◆ "Starting Fresh with OES" on page 38
- ◆ "Adding a branch to an existing tree" on page 38
- ◆ "Manual Upgrade Using Replicas" on page 39

Transferring eDirectory to a New Server

If your current tree is meeting your needs, the simplest upgrade method is to transfer an existing NetWare server to a new OES server.

Use the OES Migration Tool for this purpose, specifically the Identity Transfer functionality. For more information, see "Transfer ID Migration" in the *OES 2015 SP1: Migration Tool Administration Guide*.

Starting Fresh with OES

This is a good choice if you are unhappy with your existing tree (the tree hasn't kept up with organizational changes and growth). Moving to OES provides an opportunity to update the tree by starting from scratch. You might consider consolidating more services while adding new OES servers. Some Novell customers have incorporated specialty trees, such as an identity vault on SLES rather than on OES.

In cases where eDirectory or the operating system and services are outdated, it sometimes makes sense to just redo the whole environment (new tree design, partitioning, replication strategies, newer utilities/services) rather than port the existing structure.

The single biggest issue in many organizations is that NetWare and eDirectory haven't been patched, so starting fresh is the easier option. This is true of file and print as well. Most customers who use this strategy are moving to OES from NetWare 5 and NDS 6 (which is limited to 1500 users).

Adding a branch to an existing tree

Some Novell customers transfer objects to a new OES branch and then gradually retire the older NetWare branch. By adding a branch, it's easier to drag and drop users and login scripts, certificates, and PKI so they don't need to be re-created.

Manual Upgrade Using Replicas

If all you want to do is copy the existing eDirectory information from a NetWare server to a new OES server, without the OES server assuming the NetWare server's identity, you can move objects to a new OES branch and then gradually retire the older NetWare branch. When you've added a branch, it's easy to drag and drop users and login scripts, certificates, and PKI so they don't need to be re-created.

1 Create a new OES server with a new eDirectory 8.8 tree.

2 Create an eDirectory replica on the target OES server by attaching it to the same replica ring as the source NetWare server.

   This creates two instances of eDirectory in the environment. The OES Migration Tool does a non-destructive move of all services, and it needs both servers with their respective directories up and running.

3 Allow the OES eDirectory installation to synchronize.

   If necessary, you can rework the layout of your tree structure, remap the location of all user objects in your new tree, and delete any user objects that are no longer needed.

4 When eDirectory synchronization of the replica is complete, move the impacted services with the OES Migration Tool.

5 Retire the older NetWare server.

Except where dependencies exist, there is no required order for moving services in the same tree. An example of a dependency would be that the Archive and Versioning service depends on the file system.

3.3.3 Moving, Creating, or Importing eDirectory Users

If you have opted to create a new tree, you need to decide how to move user objects from one tree to another. Several options are available:

- ◆ "Using Novell Identity Manager" on page 39
- ◆ "Creating and Importing an LDIF file" on page 39
- ◆ "Using the OES Migration Tool" on page 40

Using Novell Identity Manager

One method is setting up a Novell Identity Manager connection between your old tree and your new one. This lets you easily synchronize user objects to the new tree. You can also use Identity Manager to remap the location of all user objects in your new tree.

Creating and Importing an LDIF file

Create an LDIF file containing user objects and use iManager to import it. Configure the LDIF file so it creates a Users' organization container and then places an object for each user in it.

IMPORTANT: Replica and partition information cannot be imported by using an LDIF file.

Using the OES Migration Tool

If you are creating a new tree, the Migration Tool can not only move the data but also create new users in the tree and match them to the data being moved. It can also match up users and trustees in the old tree with those in the new tree.

It is probably easiest to create the new users by using one of the other methods and then match them up through the Migration Tool.

3.4 Post-Upgrade Checks

Check to be sure that your upgraded tree is healthy, that the services are running correctly, and that services are usable by all network users as expected.

3.5 About Domain Services for Windows

Novell Domain Services for Windows (DSfW) allows eDirectory users on Windows workstations to access storage on both OES servers and Windows servers by using native Windows and Active Directory authentication and file service protocols.

DSfW enables companies with Active Directory and NetIQ eDirectory deployments to achieve better coexistence between the two platforms.

- ◆ Users can work in a pure Windows desktop environment and still take advantage of some OES back-end services and technology, without the need for a Novell Client™ or even a matching local user account on the Windows workstation.
- ◆ Network administrators can use either Microsoft Management Console (MMC) or iManager to administer users and groups within the DSfW domain, including their access rights to Samba-enabled storage on OES servers.

For planning and implementation information, see the *OES 2015 SP1: Domain Services for Windows Administration Guide*.

- ◆ Section 3.5.1, "File Access," on page 41
- ◆ Section 3.5.2, "User Management," on page 42
- ◆ Section 3.5.3, "Storage Management," on page 43

3.5.1 File Access

Figure 3-1 *DSfW File Access Overview*
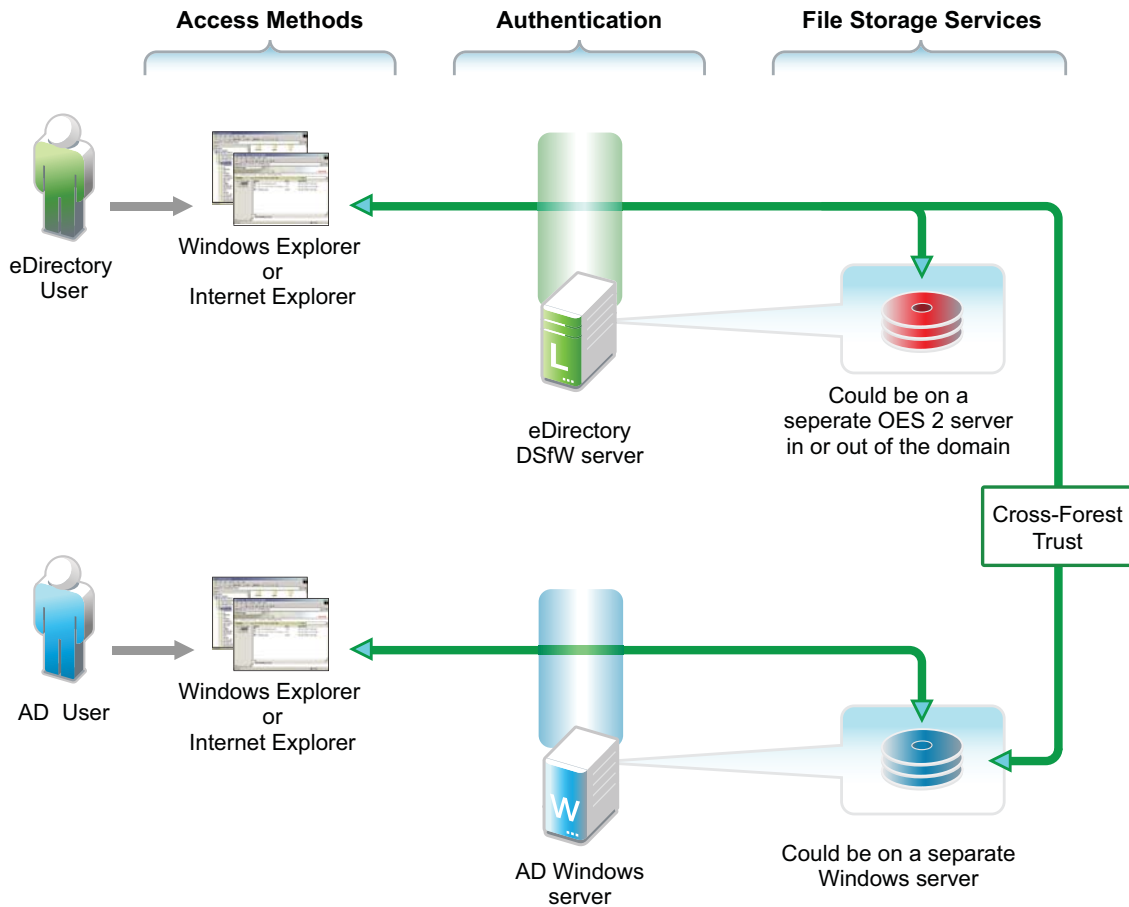
Table 3-1 *DSfW File Access*

Access Methods	Authentication	File Storage Services
eDirectory and Active Directory users on Windows workstations can access files through Windows Explorer (CIFS) or Internet Explorer (WebDAV Web Folders). No Novell Client is needed on the machine. Unlike Windows workgroup or Novell Samba, the user doesn't need to have a matching username and password on the local workstation. Although not shown, Novell Client users can also access files through a normal NCP connection.	For eDirectory users, file service access is controlled by authentication through the eDirectory server using common Windows authentication protocols, including Kerberos, NTLM, and SSL/TLS. For AD users, file service access is controlled by authentication through the AD server.	On OES servers, file storage services are provided by Samba to NSS or traditional Linux file systems. For eDirectory users, access to storage on Windows servers is available through a cross-forest trust. Access rights are granted by the AD administrator following the establishment of the cross-forest trust.

3.5.2 User Management

Figure 3-2 *DSfW User Management Overview*
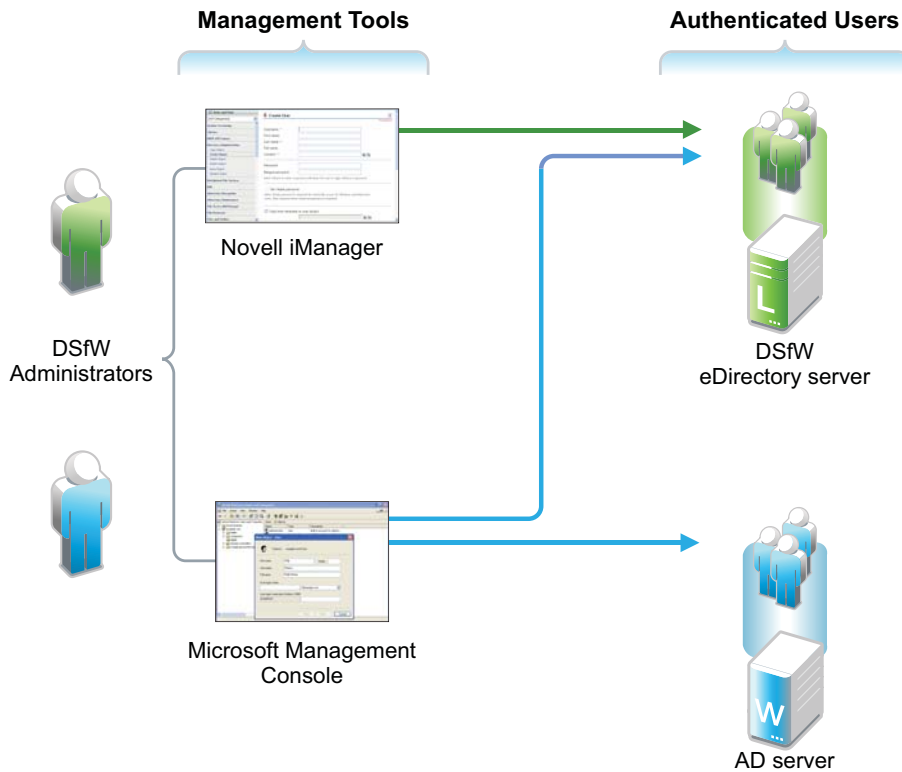
Table 3-2 *DSfW User Management*

Management Tools	Users
iManager manages DSfW users like other eDirectory users.	DSfW users must have the Default Domain Password policy assigned and a valid Universal Password.
MMC manages both AD users and DSfW users as though they were AD users.	DSfW users are automatically enabled for Samba and LUM.

3.5.3 Storage Management

Figure 3-3 *DSfW Storage Management Overview*
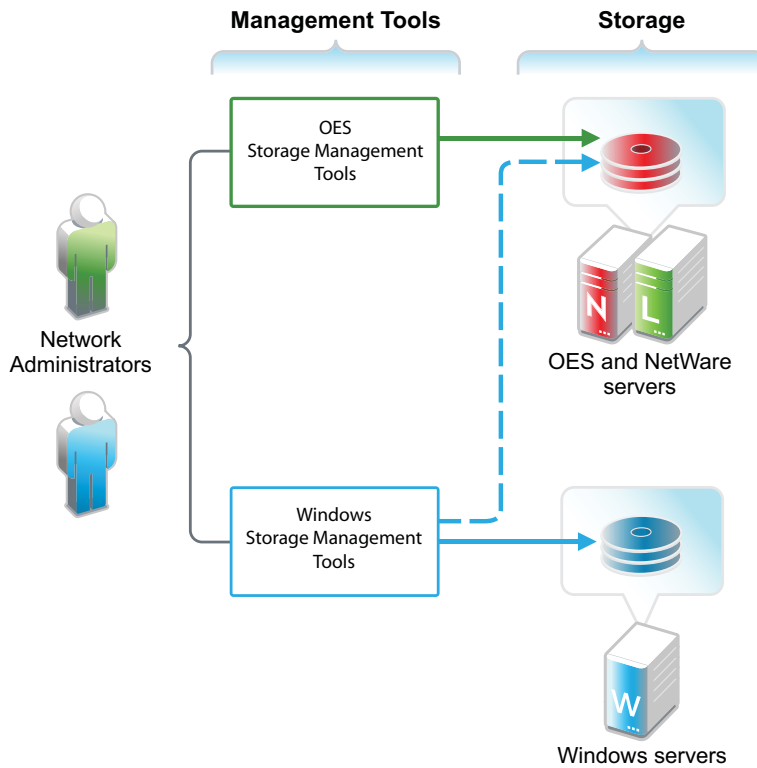
Table 3-3 *DSfW Storage Management*

Management Tools	Storage
Network administrators use native OES and Windows storage management tools to create and manage storage devices on OES and Windows servers, respectively. Windows management tools can also manage share access rights and POSIX file system rights on DSfW storage devices after the shares are created. They cannot create the shares or perform other device management tasks.	Storage devices on OES servers can be either NSS or traditional Linux volumes. Samba management standards apply to both volume types.

3.6 Additional eDirectory Resources

Click the following links to access additional eDirectory resources.

- eDirectory 8.8 Documentation (http://www.novell.com/documentation/edir88/)
- eDirectory Health Check - Online Tutorial (http://support.novell.com/additional/tutorials/tid10060600/)
- eDirectory Training Courses (http://www.novell.com/training/courseware/catalog.jsp?pl=112)

4 Upgrading NSS and Data Storage to OES

4.1 About NSS in OES

Novell Storage Services is available with NetWare 5.0 and later. The NSS kernel has been open sourced and is included in Novell SUSE SLES 9 SP1 Linux distribution and later and with Novell OES. The tools to manage NSS are available only in OES.

4.1.1 NSS Is Designed for the Enterprise

The NSS file system is unique in many ways, mostly in its ability to simultaneously manage and support shared file services from different file access protocols. It is designed to manage access control in enterprise file sharing environments.

One of its key features is the Novell Access Control Model, which securely scales to hundreds of thousands of users accessing the same storage. NSS and its predecessor (NWFS) are the only file systems that can restrict the visibility of the directory tree based on the user accessing the file system. Both NSS and NWFS have built-in ACL rights inheritance.

NSS includes mature and robust features tailored for the file sharing environment of the largest enterprises.

Dynamic Storage Technology works with NSS volumes on OES.

4.1.2 More Reasons to Consider NSS

Novell Storage Services is generally the best file system solution for customers transferring file sharing services from NetWare to OES. NSS file systems created on NetWare can be mounted on OES servers.

The following characteristics of NSS on OES should be noted in your planning:

- NSS volumes are cross-compatible between OES and NetWare. NSS data volumes can be mounted on either NetWare or OES and the data can be moved between them.
- NSS devices and storage can be managed in the Web-based Novell iManager utility. NSS also supports third-party tools on both platforms for advanced data protection and management, virus scanning, and traditional archive and backup solutions.

- In a mixed-platform cluster with Novell Cluster Services, NSS volumes can fail over between OES and NetWare, allowing for full data, trustee, and file system feature preservation when moving data to OES. However, best practice requires that you create all of the NSS volumes you need in the cluster on NetWare before you join any OES nodes to the cluster. After that point, you should not create additional NSS volumes or modify any of them until the cluster has only OES servers remaining.
- In addition, NSS on OES:
  - Retains all files, rights, metadata, restrictions, etc.
  - Includes NetWare Trustee access control (richer than POSIX)
  - Retains file system access (NCP)
  - Retains all file system administration and management features
  - Can be easily clustered with Novell Cluster Services (NCS)
  - Is best for shared LAN file serving: excellent scalability in number of files; scales to millions of files in a single directory
  - Supports multiple data streams and rich metadata (its features are a superset of existing file systems on the market for data stream, metadata, namespace, and attribute support)
  - Is journaled

4.2 Platform Differences in NSS

Most NSS features that have been available on NetWare are now also available on OES.

For the most up-to-date feature comparison, see "Comparison of NSS on NetWare and NSS on Linux" in the *OES 2015 SP1: NSS File System Administration Guide for Linux*.

4.3 Planning to Upgrade NSS

As you plan your NSS implementation, the following file system guidelines should be noted:

- Section 4.3.1, "Identify NSS Coexistence and Migration Issues," on page 46
- Section 4.3.2, "Limitations," on page 47

4.3.1 Identify NSS Coexistence and Migration Issues

For a complete discussion of the issues involved in the coexistence and migration of Novell Storage Services for OES that might affect your planning, see the following sections in the *OES 2015 SP1: NSS File System Administration Guide for Linux*:

- "Cross-Platform Issues for NSS"

  Discusses pool snapshots, NSS volumes and features, file access, and management tools
- "Migrating NSS Devices to OES 2015 SP1"

  Includes guidelines for moving NSS pools and volumes between NetWare and OES servers and instructions for moving both clustered and non-clustered devices from previous versions of NetWare to OES.

4.3.2 Limitations

Traditional NetWare File System Is Not Supported

The NetWare File System (NWFS) was used in NetWare 3.x through 5.x as the default file system, and is supported in NetWare 6.x for compatibility. It is one of the fastest file systems available; however, it does not scale and is not journaled. An Open Source version of this file system is available for Linux to allow access to its file data. However, the open source version lacks the identity management tie-ins, and therefore, has little utility.

NWFS is not supported on OES and should, therefore, be moved—probably to the Novell Storage Services (NSS) file system.

Samba Access Requires LUM

For a broad explanation of Linux User Management (LUM), see "Linux User Management: Access to Linux for eDirectory Users" in the *OES 2015 SP1: Planning and Implementation Guide*. For information specific to NSS, see "Planning NSS Storage Solutions " in the *OES 2015 SP1: NSS File System Administration Guide for Linux*.

The Linux OS Can't Be Installed on NSS

You cannot install the Linux operating system on an NSS volume. OES requires a Linux traditional file system volume for the operating system, such as Ext3, Btrfs, or XFS.

Moving Volumes Cross-Platform Has Limitations

You can move an NSS volume that was created on NetWare cross-platform to an OES server. However, you should not move an NSS system (SYS:) volume from NetWare to OES unless you intend to use it as a data volume (or not at all) while it is mounted on the OES server.

If you move an NSS system pool cross-platform, any volumes it contains function as data volumes on the OES server, including the SYS: volume.

You can move storage devices containing NSS volumes between NetWare servers and OES servers. When you move an unshared device to a different server, you must decommission its volumes in eDirectory for the current server, then recommission them for the new server. For shared NSS pools and volumes, Novell Cluster Services provides this service automatically.

NSS volumes that were originally created on NetWare can be moved cross-platform to an OES server. But only volumes that were originally created on NetWare can be moved back from OES to NetWare.

Pool Snapshots Cannot Be Moved

NSS pools that are a source pool or a destination pool for NSS pool snapshots on NetWare cannot move cross-platform if you want to keep the pool snapshots. A pool snapshot is no longer available if you move its source pool or destination pool to an OES server. The snapshot no longer works even after you move the pools back to NetWare.

Before you move an NSS pool cross-platform, make sure you delete any of its snapshots stored on other pools and any snapshots for other pools that it might contain.

4.4 Moving NSS and Data

- Section 4.4.1, "Moving NSS Devices Cross-Platform," on page 48
- Section 4.4.2, "Moving Data from NSS on NetWare to NSS on OES," on page 48
- Section 4.4.3, "Moving Data from NSS to Other Volume Types," on page 48

4.4.1 Moving NSS Devices Cross-Platform

This is arguably the simplest method of all. NSS supports moving devices containing NSS volumes between any servers that support a compatible media format, including moves between NetWare servers and OES servers. For instructions, see "Moving Non-Clustered Devices From NetWare 6.5 SP8 Servers to OES 2015 SP1" in the *OES 2015 SP1: NSS File System Administration Guide for Linux*.

For issues with moving NSS volumes cross-platform between servers, see "Cross-Platform Issues for NSS."

4.4.2 Moving Data from NSS on NetWare to NSS on OES

The OES Migration Tool supports transferring data from a source NSS volume on NetWare to a target NSS volume on OES. This method preserves both the Novell Trustee Rights for eDirectory users and the NSS directory and file attributes supported by only the NSS file system.

For more instructions, see "Migrating File Systems to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

4.4.3 Moving Data from NSS to Other Volume Types

The OES Migration Tool also supports moving data from an NSS volume on NetWare to a Linux POSIX volume on OES.

- If you configure the target Linux POSIX volume as an NCP volume and carefully follow the instructions, the Novell Trustee Rights are retained and only the NSS file and directory attributes are lost.
- If you move the data to a Linux POSIX volume target without configuring it as an NCP volume, the POSIX access model applies. eDirectory users must be enabled for Linux User Management to access data on Linux POSIX volumes.

If you are unsure about the implications briefly stated above, you should read the following sections in the OES documentation:

- *OES 2015 SP1: Planning and Implementation Guide*
  - "The Traditional Novell Access Control Model"
  - "NSS Access Control on OES"
  - "Novell Client (NCP File Services) Access"
  - "eDirectory User Access to OES Servers"
- *OES 2015 SP1: File Systems Management Guide*
  - "Understanding File System Access Control Using Trustees"
  - "Coexistence and Migration Issues"

4.5 Post-Upgrade Procedures

After files are transferred, file permissions might need to be reset. As discussed earlier, Linux file system permissions are different from and not as granular as those used by NetWare. This becomes especially apparent for directories where multiple groups previously had access to the data within a file. On Linux file systems, this is not possible, so an alternative must be found.

Novell recommends the following permissions as a starting point. You might need to change the permissions to better fit your needs.

Table 4-1   File Permissions Recommended for File Types

Type of files	Permissions:	
	user group other	numeric value
Home directories, such as `/home/userid`	`rwx --- ---`	700
User files, such as `/home/userid/myfile`	`rw- r-- ---`	640
Shared team directory (where the group is used for access.)	`rwx rwx ---`	770 (execute on the directory allows accessing the directory; read allows seeing its contents)
Shared team files (where the group is used for access.)	`rw- rw- ---`	660

4.6 Upgrading Distributed File Services (DFS) to OES

The DFS junction support on OES brings the NetWare Novell Distributed File System feature set to Linux with the following additions:

- VLDB services are cluster-enabled.
- Junctions can point to subdirectories, not just the root of a volume.
- All administration is performed via iManager.
- Junctions can be created on any file system, not just Novell Storage Services.

Novell Distributed File Services (DFS) for the Novell Storage Services (NSS) file system provides location transparency of file data to end users. You can modify the underlying physical organization of data on NSS volumes to maximize the use and performance of available storage resources. With DFS, you can create a single virtual file system for data on NSS volumes that span multiple machines.

DFS preserves the logical file organization from the user perspective by maintaining a Volume Location Database (VLDB) for all volumes in a DFS management context. Using junctions and the VLDB eliminates the user's need to know the path to the physical location of the data.

For information and instructions, see "Migrating DFS from NetWare to OES 2015 SP1." in the *OES 2015 SP1: Novell Distributed File Services Administration Guide for Linux*.

For additional instructions for moving NSS devices cross-platform, see "Migrating NSS Devices to OES 2015 SP1" in the *OES 2015 SP1: NSS File System Administration Guide for Linux*.

5 Upgrading File Services to OES

5.1 Upgrading AFP File Services to OES

5.1.1 About AFP File Services in OES

The AFP file services that were available on NetWare through the Native File Access Protocols (NFAP) service have been ported to OES as Novell AFP.

The Novell AFP service lets users on Macintosh workstations access and store files on OES servers with NSS volumes using AFP (see Figure 5-1).

Figure 5-1   *How Novell AFP Works*
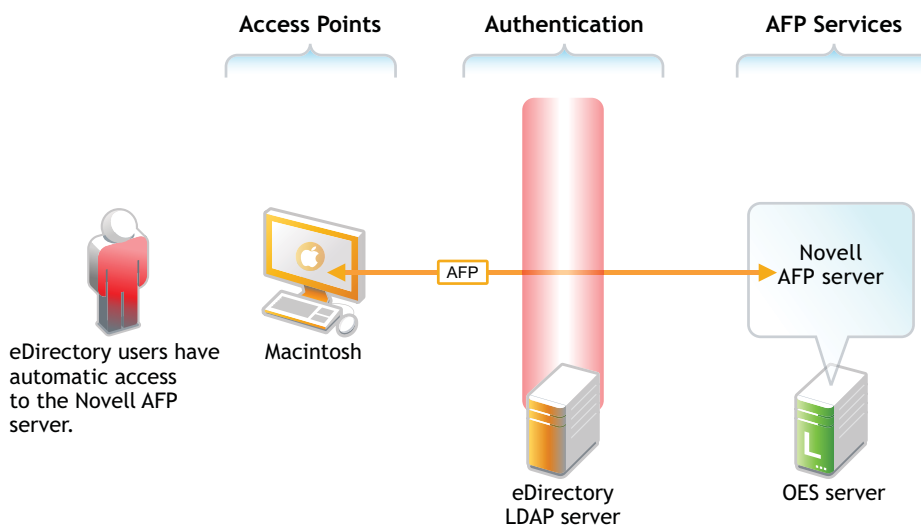
The following table explains the information illustrated in Figure 5-1.

Access Points	Authentication	AFP File Services
eDirectory users on Macintosh workstations have native access to the OES server.	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.	Of course, the same files can also be accessed through other OES file services (such as NetStorage) that connect to Linux volumes.

5.1.2 Platform Differences in AFP File Services

The differences in AFP services on NetWare and OES are summarized in the following table.

Table 5-1 *Platform Differences in AFP File Services*

Feature Description	AFP for NetWare	AFP for OES
Administering	Limited to starting and stopping the server. See "Enabling and Disabling AFP" in the *NW 6.5 SP8: AFP, CIFS, and NFS (NFAP) Administration Guide*	Ability to configure AFP server parameters through iManager. See "Administering the AFP Server" in the *OES 2015 SP1: Novell AFP for Linux Administration Guide*.

Filenames and Paths	`sys:\etc\ctxs.cfg`
	
	`sys:\etc\afpvol.cfg`
	
	`sys:\etc\afptcp.log`
		`/etc/opt/novell/afptcpd/ afpdircxt.conf`
		
		`/etc/opt/novell/afptcpd/ afpvols.conf`
		
		`/etc/opt/novell/afptcpd/ afptcpd.conf`
		
		`/var/log/afptcpd/afptcp.log`

Installation	Customized installation during installation of NetWare 6.5. See, "Installing Novell Native File Access Protocols on a NetWare 6.5 Server" in the *NW 6.5 SP8: AFP, CIFS, and NFS (NFAP) Administration Guide*	Installation through YaST along with associated dependencies. See "Installing and Setting Up AFP" in the *OES 2015 SP1: Novell AFP for Linux Administration Guide*.
Simple Password support	Yes	No
Universal Password	Yes. Limited to 8 characters.	Yes. Over 8 characters.
Upgrade/migration support	Not Applicable	Support to upgrade AFP from NetWare to OES. See "Migrating AFP to OES 2015 SP1" in the *OES 2015 SP1: Novell AFP for Linux Administration Guide*.
Mac versions supported	Classic Mac, Mac OS 10.3, 10.4 and 10.5	Mac OS 10.3 thru 10.7

Feature Description	AFP for NetWare	AFP for OES
Cross-protocol locking	Supported among AFP, CIFS, and NCP.	Supported among AFP, CIFS, and NCP.
Authentication methods	Clear text	Clear text
		Two-Way Random Key Exchange
		Random Exchange
		Diffie-Hellman Exchange
Dynamic detection of volumes	Yes	Yes, but the AFP server needs to be reloaded.
Choosing volumes to be exported	Yes	No. Exports all the volumes.
Support for 64-bit architecture	No	Yes

5.1.3 Planning to Transfer AFP Services

The OES Migration Tool supports transferring AFP file services from NetWare to OES. The process is quite straightforward, but there are, of course, some planning steps that you must take to ensure a successful upgrade.

- "Requirements" on page 53
- "Limitations" on page 53
- "Universal Password" on page 54

Requirements

Table 5-2 *AFP Source and Target Server Requirements*

Source Server	Target Server
NetWare 5.1 or later	OES 2015 or later
	The Novell AFP service pattern is installed but not configured.
	Data can be moved independently of the service. Users can always see what they have rights to see.

Limitations

The OES Migration Tool does not support transferring AFP services across eDirectory trees. However, AFP services can be effectively transferred by first moving the data to an OES target server in the other tree, and then configuring AFP on the target server.

For details, see "Migrating Data to a Server in a Different Tree" in the *OES 2015 SP1: Migration Tool Administration Guide* and "Installing and Setting Up AFP" in the *OES 2015 SP1: Novell AFP for Linux Administration Guide*.

Universal Password

Although Simple Passwords were an option with AFP on NetWare, Novell AFP requires Universal Password, as listed in Section 5.1.2, "Platform Differences in AFP File Services," on page 52.

The process of upgrading AFP services to OES ensures that a Universal Password policy is assigned to all of the eDirectory contexts listed for AFP users on the NetWare server. If users currently have a Universal Password policy assigned, the tool checks for compliance with AFP requirements and modifies the policy if required.

5.1.4 Upgrading AFP

You can use either of the two migration types offered by the Migration Tool to transfer AFP file services from NetWare to OES:

 ◆ **Migrate:** If you are transferring just the AFP service and associated data to an OES server, you should perform a migration. For more information, see Section A.1.1, "Migrating Selected Data or Services," on page 95.

 ◆ **Transfer ID:** If you are transferring an entire NetWare server, including the AFP service and associated data, to an OES server, you should transfer the entire server configuration. For more information, see Section A.1.2, "Transferring an Entire NetWare Server," on page 96.

To transfer Novell AFP from NetWare to OES, follow the instructions in "Migrating AFP to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

5.1.5 Post-Upgrade Checks

 ◆ "Verify Upgrade Success" on page 54
 ◆ "Preparing for the First Login" on page 54

Verify Upgrade Success

After the process is complete, be sure to complete the instructions in "Verifying the Migration Process" in the *OES 2015 SP1: Migration Tool Administration Guide*.

Preparing for the First Login

You must do two things to ensure that users can authenticate seamlessly to the transferred AFP service:

 1. Restart eDirectory with the environment variable NDSD_TRY_NDSLOGIN_FIRST set to TRUE.
 2. Make sure that each user logs in for the first time by using either the Diffie-Hellman Exchange or clear-text authentication method.

For more information, see "Cross-Platform Issues" in the *OES 2015 SP1: Migration Tool Administration Guide*.

5.2 Upgrading CIFS File Services to OES

 ◆ Section 5.2.1, "About CIFS File Services in OES," on page 55
 ◆ Section 5.2.2, "Platform Differences in CIFS File Services," on page 56

5.2.1 About CIFS File Services in OES

The CIFS file services that were previously available only on NetWare through the Native File Access Protocols (NFAP) service have been ported to OES as Novell CIFS.

The Novell CIFS service lets users on Windows workstations access and store files on OES servers with NSS volumes without installing any additional software, such as the Novell Client (see Figure 5-2).

Figure 5-2 *How Novell CIFS Works*
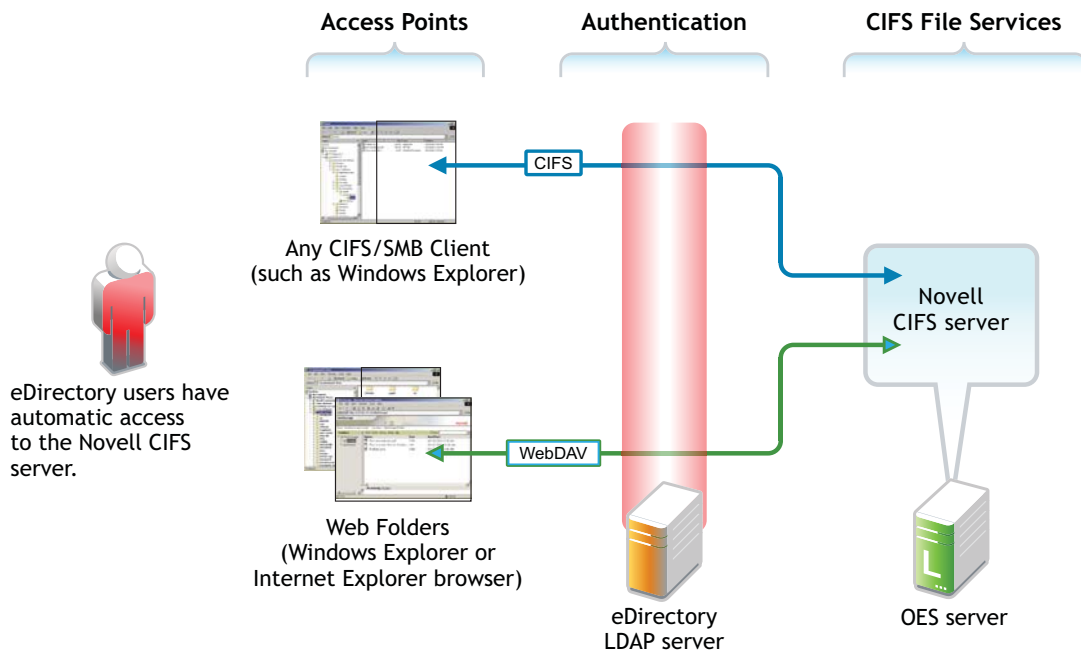
The following table explains the information illustrated in Figure 5-2.

Access Methods	Authentication	CIFS File Services
eDirectory users on Windows workstations have two native Windows file access options: ◆ **CIFS Client Access:** Windows Explorer users can access and modify files on the OES server just as they would on any workgroup server share. ◆ **Web Folder:** Users can create Web Folders in Windows Explorer or Internet Explorer. Files on the OES server are accessed and maintained with the HTTP-WebDAV protocol.	All file service access is controlled by LDAP-based authentication through the eDirectory LDAP server. Although it is shown separately, eDirectory could be installed on the OES server.	Of course, the same files can also be accessed through other OES file services (such as NetStorage) that connect to NSS volumes.

5.2.2 Platform Differences in CIFS File Services

The differences in CIFS services on NetWare and OES are summarized in the following table.

Table 5-3 *CIFS services on NetWare and OES*

Service	NetWare	OES 2015 SP1
64-Bit Support	No	Yes
CIFS-enabled shared NSS pool/ volume in a mixed NetWare-to-OES cluster	No	No
CIFS-enabled shared NSS pool/ volume in a NetWare-to-NetWare or OES-to-OES cluster	Yes	Yes
Cross Protocol Locking	Yes	Yes
Distributed File Services for NSS Volumes	Yes	Yes
Domain Emulation	Yes	Future
Dynamic Storage Technology Support	No	Yes
File and Record Locking	Yes	Yes
iManager Support and Administration tool	Yes	Yes
LDAP User (Subtree) Search	No	Yes
Monitoring	No	Yes
Multi-File System Support	No	Future

Service	NetWare	OES 2015 SP1
Multi-processor/Multicore Server Support	No	Yes
NSS Support	Yes	Yes
NTLMv2	No	Yes
OpLocks	Yes	Yes
Xen Virtualized Guest Server Environment	Yes	Yes
Xen Virtualized Host Server Environment	NA	No

5.2.3 Planning to Upgrade CIFS Services

The OES Migration Tool supports transferring CIFS file services from NetWare to OES. The upgrade process is quite straightforward, but there are, of course, some planning steps that you must take to ensure success.

Requirements

Table 5-4   CIFS Source and Target Server Requirements

Source Server	Target Server
NetWare 5.1 or later	OES or later
	The Novell CIFS service pattern is installed but not configured.
	Data can be moved independently of the service. Users can always see what they have rights to see.

Limitations

Cross-Tree Migration Not Supported

The OES Migration Tool does not support transferring CIFS services across eDirectory trees. However, CIFS services can be effectively transferred by first moving the data to an OES target server in the other tree, and then configuring CIFS on the target server.

For details, see "Migrating Data to a Server in a Different Tree" in the *OES 2015 SP1: Migration Tool Administration Guide* and "Installing and Setting Up AFP" in the *OES 2015 SP1: Novell AFP for Linux Administration Guide*.

Server Configuration Information Not Transferred with Migration

The CIFS shares configuration and CIFS Users contexts are transferred by using both migration types (Migrate and Transfer ID), but the server configuration information is transferred only with a Transfer ID migration.

Upgrading Novell Samba Not Supported

The OES Migration Tool does not support Novell Samba as a source service for transferal to Novell CIFS.

Universal Password

A Universal Password policy is required for Novell CIFS.

5.2.4 Upgrading CIFS

You can use either of the two migration types offered by the Migration Tool to transfer CIFS file services from NetWare to OES:

- ◆ **Migrate:** If you want to move just the CIFS shares and associated data to an OES server, you can perform a migration. The CIFS server configuration is not transferred. For more information, see Section A.1.1, "Migrating Selected Data or Services," on page 95.
- ◆ **Transfer ID:** If you are transferring an entire NetWare server, including the CIFS service and associated data, to an OES server, then you should perform a Transfer ID migration. For more information, see Section A.1.2, "Transferring an Entire NetWare Server," on page 96.

To upgrade Novell CIFS from NetWare to OES, follow the instructions in "Migrating CIFS to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

5.2.5 Post-Upgrade Checks

- ◆ "Restarting CIFS" on page 58
- ◆ "Verifying Success" on page 59

Restarting CIFS

After the CIFS service is transferred, restart CIFS at a terminal prompt by using the following command:

```
rcnovell-cifs restart
```

Verifying Success

Be sure to complete the instructions in "Verifying the Migration" in the *OES 2015 SP1: Migration Tool Administration Guide*.

5.3 Upgrading Novell FTP to OES

5.3.1 About FTP File Services on OES

Novell FTP (File Transfer Protocol) is integrated with NetIQ eDirectory so that users can securely transfer files to and from OES or NetWare volumes.

5.3.2 Platform Differences in FTP File Services

There are no significant differences.

5.3.3 Planning

Requirements

Table 5-5 *FTP Source and Target Server Requirements*

Source Server	Target Server
NetWare 5.1 or later	OES with the Novell FTP service pattern installed but not configured.

Limitations

If a configuration exists on the target server, it is overwritten regardless of the migration type.

5.3.4 Transferring FTP Services to OES

You can use either of the two migration types offered by the Migration Tool to transfer FTP file services from NetWare to OES:

- **Migrate:** Both migration on the same tree and migration to a different tree are supported. For more information, see Section A.1.1, "Migrating Selected Data or Services," on page 95.

- **Transfer ID:** If you are transferring an entire NetWare server, including the FTP service and associated data, to an OES server, then you should transfer the entire server configuration. Transfer ID migrations must occur within in the same tree. For more information, see Section A.1.2, "Transferring an Entire NetWare Server," on page 96.

To transfer Novell FTP from NetWare to OES, follow the instructions in "Migrating FTP to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

5.3.5 Post-Upgrade Checks

Verify a successful upgrade by making sure that the FTP service works as expected. For more information, see "Post-Migration Procedure" in the *OES 2015 SP1: Migration Tool Administration Guide*. For help with LUM-enabling FTP users, see TID 3503915 (http://www.novell.com/support/php/search.do?cmd=displayKC&docType=kc&externalId=3503915&sliceId=1&docTypeID=DT_TID_1_1&dialogID=76627759&stateId=0%200%2076625913).

5.4 Upgrading iFolder to OES

5.4.1 About iFolder on OES

NetWare runs only iFolder 2.*x* while OES runs iFolder 3.9, and as the version numbers imply, iFolder 3.9 is much more robust and flexible.

Figure 5-3 *How Novell iFolder 3.9 Works*
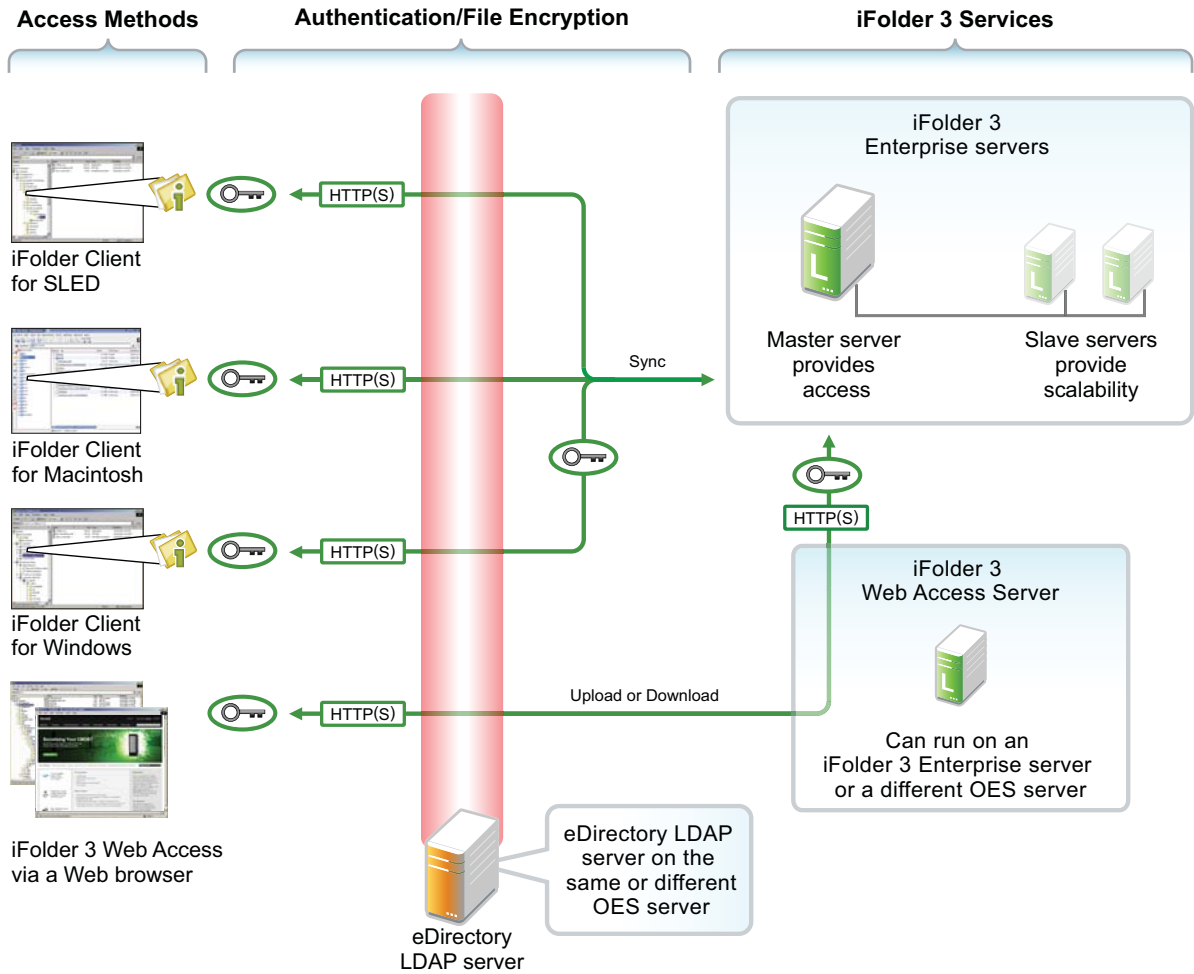
The following table explains the information illustrated in Figure 5-3.

Access Methods	Authentication/File Encryption	Novell iFolder 3.9 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 3.9 Enterprise servers. A Web interface lets users access their files from any computer with an active network or Internet connection.	All file service access is controlled by LDAP- based authentication through the eDirectory LDAP server. Although it is shown separately, eDirectory could be installed on the OES server. Files can be encrypted for transport using SSL connections (HTTPS).	Slave servers can be added as needed, providing the ability to dynamically grow iFolder services without disrupting users. Local and network copies of each file are automatically synchronized by the Novell iFolder Client and Server pieces.

Additional overview information is available in "Overview of Novell iFolder" in the *Novell iFolder 3.9.2 Administration Guide*.

5.4.2 Platform Differences in iFolder File Services

There are numerous significant differences between iFolder 2.x and iFolder 3.9, including:

- **Automatic Service Provisioning:** Multiple servers participate in a single iFolder domain, and iFolder user assignments are automatically balanced across the domain.
- **Multiple iFolders:** Users can use a virtually unlimited number of iFolders.
- **Sharing iFolders:** Users can share their iFolders with other iFolder users, granting them full, read/write, or read only access.
- **File-type Synchronization:** If desired, you can limit which file types are synchronized.

For a complete list of differences, see "Comparing Novell iFolder 2.x with 3.9" in the *Novell iFolder 3.9.2 Administration Guide*.

5.4.3 Planning

- "Requirements" on page 62
- "Limitations" on page 62

Requirements

Table 5-6   iFolder Source and Target Server Requirements

Source Server	Target Server
NetWare server with iFolder 2.*x* installed	One or more OES servers installed.
	The iFolder 3.9 service pattern is installed on each server but not configured.
	All iFolder 3.9 servers, the iFolder 3.9 Web Access server, and eDirectory are up and running.
	Data must be moved before the iFolder service is transferred.
	If multiple servers are targeted, data migration is balanced by default. Users are then assigned to the appropriate iFolder. However, other provisioning options are available.
	For more information, see "Multi-Server Migration" in the *OES 2015 SP1: Migration Tool Administration Guide*.

Limitations

- "Moving Encrypted iFolders" on page 63
- "iFolder 2.x User Policies Not Transferred" on page 63

Moving Encrypted iFolders

The Migration Tool doesn't move encrypted iFolders because user passphrases are needed. Each user with an encrypted iFolder needs to perform a client-side migration if they want their iFolder 2.x data moved to iFolder 3.9. For more information, see "Migrating from iFolder 2.x to iFolder 3.9.2" in the *Novell iFolder 3.9.2 Cross-Platform User Guide*.

iFolder 2.x User Policies Not Transferred

iFolder 2.x configuration settings, such as user policies, are not compatible with iFolder 3.9 and are therefore not transferred. You must set the policies for each user after the migration is complete.

5.4.4 Upgrading iFolder

You can use either of the two migration types offered by the Migration Tool to upgrade iFolder file services from NetWare to OES:

- **Migrate:** Both migration on the same tree and migration to a different tree are supported. For more information, see Section A.1.1, "Migrating Selected Data or Services," on page 95.
- **Transfer ID:** If you are transferring an entire NetWare server, including the iFolder service and associated data to an OES server, then you should transfer the entire server configuration. Transfer ID migrations must occur within in the same tree. For more information, see Section A.1.2, "Transferring an Entire NetWare Server," on page 96.

To upgrade Novell iFolder on NetWare to OES, follow the instructions in "Migrating iFolder 2.x" in the *OES 2015 SP1: Migration Tool Administration Guide*.

5.4.5 Post-Upgrade Checks

As mentioned in "iFolder 2.x User Policies Not Transferred" on page 63, you must set a policy for each user after the upgrade is finished.

5.5 Upgrading NetWare Core Protocol (NCP) File Services

The NetWare Core Protocol (NCP) Server provides the same file services on OES that are available on NetWare.

- Section 5.5.1, "About NCP File Services in OES," on page 63
- Section 5.5.2, "Planning to Upgrade NCP File Services," on page 65
- Section 5.5.3, "Only Data Transfers Are Required," on page 66

5.5.1 About NCP File Services in OES

- "What NCP Server Provides" on page 64
- "What NCP Server Alone Doesn't Provide" on page 65

What NCP Server Provides

With NCP Server, you can define NCP volumes (NCP shares on Linux Ext3 and Reiser file systems). The advantage of using an NCP server is that you can control access using the Novell trustee model. Windows and Linux workstations running Novell Client software can access data and manage file sharing on OES servers just as they do on NetWare servers, unless they need NSS file attributes (see "What NCP Server Alone Doesn't Provide" on page 65).

Novell NCP Server for OES enables support for login scripts, mapping drives to OES servers, and other services commonly associated with Novell Client access. This means that Windows users with the Novell Client installed can be seamlessly transitioned to file services on OES.

Services provided by NCP include file access, file locking, security, resource allocation tracking, event notification, and synchronization with other servers.

NCP is a client/server LAN protocol. Workstations create NCP requests and use TCP/IP to send them over the network. At the server, NCP requests are received, unpacked, and interpreted.

Figure 5-4 illustrates the basics of NCP file services.

Figure 5-4 *NCP Services for OES and NetWare*
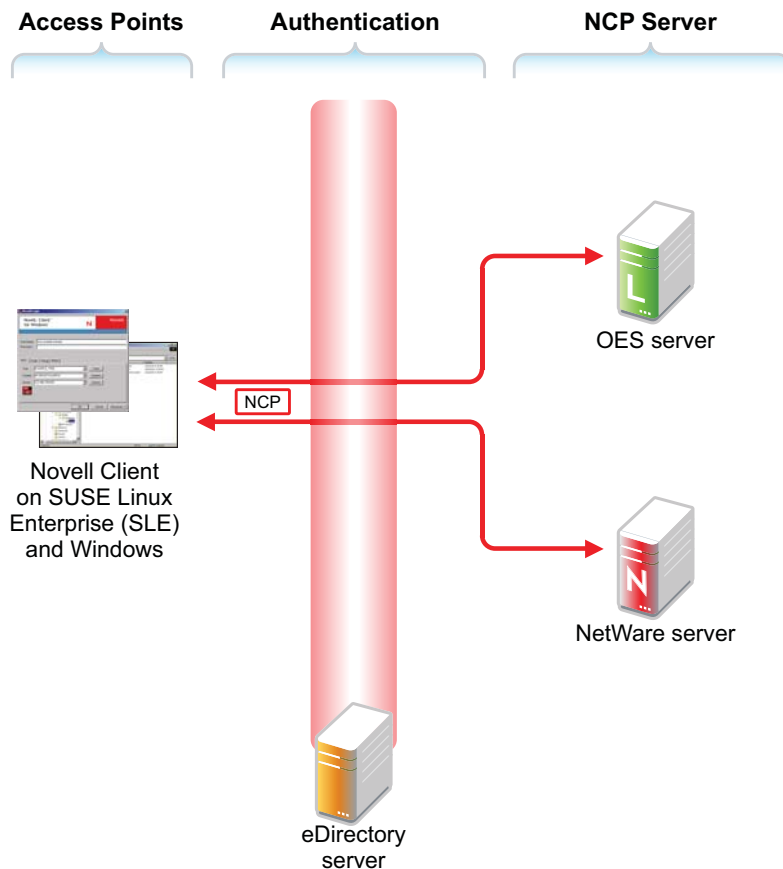
The following table explains the information illustrated in Figure 5-4.

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 OES and NetWare.

What NCP Server Alone Doesn't Provide

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

Salvage (undelete) and Purge are other features that are available only on NSS and only where the Salvage attribute has been set (the NSS default). They can be managed in the NCP client and through NetStorage, but they are not available on NCP volumes where the underlying file system is Linux POSIX.

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

5.5.2 Planning to Upgrade NCP File Services

Requirements

Table 5-7   *NCP Source and Target Server Requirements*

Source Server	Target Server
NetWare 5.1 or later	OES or later
	The NCP Server pattern is installed.
	Data can be moved independently of the server. Users can always see what they have rights to see.

Deciding Between a Linux POSIX File System and NSS

For most system administrators, the most critical point of this decision is whether your organization relies on NSS file and directory attributes as a key component of the Novell Trustee Access model. If the answer is yes, then you should move your data to NSS volumes on OES, or mount existing NSS volumes on the OES servers.

If your organization doesn't rely on NSS file and directory attributes and wants to transition to NCP volumes defined on Linux POSIX file systems, then you can create those volumes on the target servers and move the data by using the OES Migration Tool.

The Novell Client Is Required

Novell Client software is required to initiate an NCP connection between a Windows or Linux workstation running Novell Client software and an OES server running NCP Server services. Intelligence at both ends of the connection works together to verify that clients are who they claim to be, and that access controls are followed when using shared server files.

5.5.3 Only Data Transfers Are Required

You provide NCP services on an OES server by installing the NCP Server pattern. There is no upgrade path for the NCP server running on NetWare to NCP Server on OES.

If the data is properly moved to ensure that trustee assignments are left intact, users can access their data using a Novell Client on a Linux or Windows workstation just as they did when the data resided on a NetWare server.

5.6 Upgrading NetStorage

- Section 5.6.1, "About NetStorage," on page 66
- Section 5.6.2, "Platform Differences in NetStorage File Services," on page 68
- Section 5.6.3, "NetStorage Is Not Transferred," on page 69

5.6.1 About NetStorage

NetStorage provides secure Web access to files and folders on your OES and NetWare servers. It is a bridge between a company's protected Novell storage network and the Internet. Using a Web browser, your eDirectory users can securely copy, move, rename, delete, read, write, recover, and set trustee assignments for their files from any Internet-attached workstation, anywhere in the world, with nothing to download or install on the workstation.

NetStorage on OES provides local and Web access to files on many systems without requiring the Novell Client (see Figure 5-5).

Figure 5-5   *How NetStorage Works on OES*
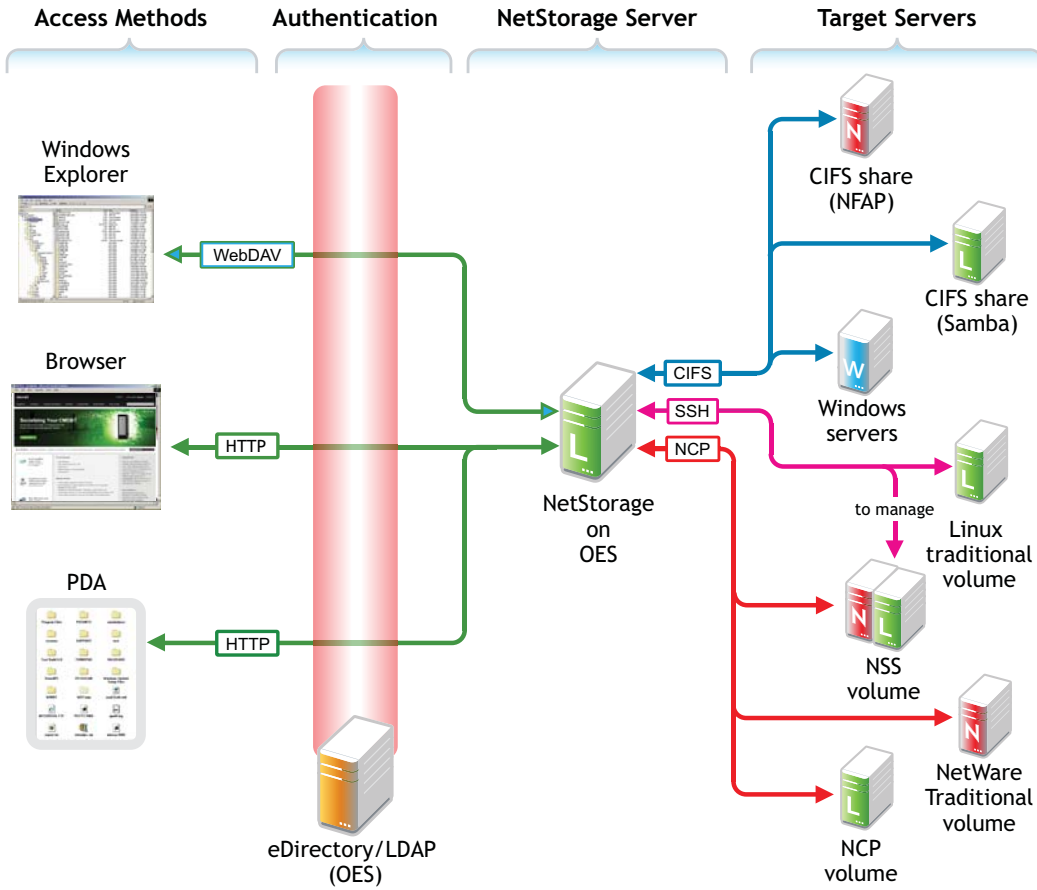
The following table explains the information illustrated in Figure 5-5.

Access Methods	Authentication	NetStorage Server	Target Servers
Users have read and write access to files from • **Windows Explorer:** 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 also access their files. Access is granted through login script drive mapping (NCP server required) or through Storage Location Objects.	File service access is controlled by LDAP-based authentication through the eDirectory LDAP server. Although it is shown separately, eDirectory could be running on the OES server.	The NetStorage server receives and processes connection requests and provides access to storage on various servers on the network.	NetStorage on OES can connect eDirectory users to their files and folders stored in the following locations: • The same targets as NetWare if the NCP server is running • Windows workgroup shares (CIFS or Samba shares) • Linux POSIX volumes through an SSH connection. Linux volumes can also be made available as NCP volumes. Management of NSS volumes on OES through NetStorage requires SSH access to the server. See "When Is SSH Access Required?" in the *OES 2015 SP1: Planning and Implementation Guide*.

5.6.2 Platform Differences in NetStorage File Services

Although NetStorage provides the same basic services on NetWare and OES, there are significant configuration differences, most of which are a natural result of the platform differences between NetWare and OES:

Table 5-8   *NetStorage Platform Differences*

NetWare	OES 2015 SP1
NetWare servers store data on NSS volumes.	OES servers accommodate many different file systems, including NSS.
NetStorage is completely integrated with eDirectory and NetWare.	NetStorage is well integrated with eDirectory and OES.
NetStorage relies heavily on NCP login scripts to provision user access to the storage locations it points to.	NetStorage uses Storage Location Objects to provision storage locations that users access based on their rights.
NetStorage provides automatic Web access for iFolder 2.x when that service is installed on the same server as NetStorage.	An integration with iFolder 3.9 is not needed because the iFolder 3.9 Web Server provides Web access for iFolder users.

Despite these differences, NetStorage on OES is every bit as valuable as NetStorage on NetWare and is well worth the small amount of time required to install and configure it.

5.6.3 NetStorage Is Not Transferred

Because of the differences explained above, it doesn't make sense to transfer an exact NetStorage configuration from NetWare to OES. Instead, you should move your data by using the Migration Tool, then install and configure NetStorage on the OES2 server.

For most networks, NetStorage needs to be installed on only one server; however, this might vary depending on the size of your network and your organization's needs. For example, if your company is geographically dispersed, you might want to install NetStorage on one server in each geographic region.

NetStorage can also be set up in a clustered environment so that if a NetStorage server goes down, another NetStorage server in the cluster can take over the function of the downed server, and users don't lose access to data.

For more information, see

◆ "NetStorage Implementation and Maintenance" in the *OES 2015 SP1: Planning and Implementation Guide*

◆ *OES 2015 SP1: NetStorage Administration Guide for Linux*.

6 Upgrading Print Services to OES

TIP: If any printers in your environment have IPX enabled but not configured, you should disable them to free up JetDirect and LAN bandwidth.

6.1 About iPrint

The currently supported Novell print service, iPrint, is a greatly enhanced version of NDPS that is:

◆ Completely IP-based and platform independent on both the client and server side
◆ Not dependent on the Novell Client
◆ Web-based for both printer provisioning and deployment
◆ Fully cluster-aware

6.2 Platform Differences in iPrint

There are two basic differences between iPrint on NetWare and iPrint on OES, neither of which should impact your upgrade plans:

◆ The back end infrastructures are different
◆ iPrint on OES does not support NDPS/NCP client-based printing

Both OES and NetWare support the same iPrint workstation agent.

6.3 Planning to Upgrade iPrint to OES

6.3.1 Requirements and Recommendations

Platforms

Table 6-1   *iPrint Source and Target Server Requirements*

Source Server	Target Server
NetWare 5.1 or later	OES with iPrint installed and the Driver Store configured

Prepare the Workstations First

Novell recommends deploying the iPrint agent to workstations before converting the backend infrastructure to OES. This will allow for the phased removal of the NDPS-based printers from the workstations and for a phased and transparent transition to OES printing services for users.

Automated tools are available to deploy the iPrint agent to any workstations still using NDPS. This can also be done using a ZENworks application deployment. A silent install option is available.

Use DNS Names Rather than IP Addresses

An additional consideration is the use of literal IP addresses vs. DNS entries with the printer configurations deployed to the workstations. If the printer/manager configurations are using IP address assignments rather than DNS, Novell recommends deploying the iPrint agent to all of the workstations and changing the existing iPrint managers to a DNS configuration. This will allow you to convert to iPrint in OES without having to revisit the workstations.

If you use DNS, the new iPrint infrastructure can be transferred to OES in phases while leaving the existing NetWare infrastructure in place. The users are converted over when the DNS entry for each individual print manager is changed.

6.3.2   Limitations

You can't migrate printer object ACL (Access Control List) assignments when migrating cross-tree.

6.4   Upgrading iPrint to OES

iPrint can be installed and configured on OES in parallel with an existing print environment to allow for a phased migration of users to the iPrint infrastructure. While iPrint can be used to support queue-based printing, it is not the preferred method (the only normal requirement to maintain a queue is to support legacy DOS-based applications that print directly to a queue rather than to a Windows printer or LPT port).

Novell recommends the following steps to bring a current printing environment up to supported standards before transferring your print infrastructure to OES clusters as required:

- Install and configure iPrint on any NetWare 6.5 clusters.
- Install and configure all network printers in iPrint.
- Install and configure web-based client deployment tools.
- Set up iPrint on OES.
- Deploy iPrint agents to workstations.

The OES Migration Tool is available to copy a NetWare-based iPrint/NDPS environment to an OES iPrint infrastructure. This allows for a phased parallel installation approach to an OES upgrade with minimal user and administrative impacts. Using a mixed OES and NetWare based printing environment within the same tree is fully supported.

6.5 Additional Information

See "Migrating iPrint to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

7 Upgrading Backup Services to OES

7.1 About Upgrading Storage Management Services (SMS)

The Novell Storage Management Services (SMS) backup infrastructure provides backup applications with the framework to develop a complete backup and restore solution.

SMS helps back up file systems (such as NSS) or application data, such as data from GroupWise on NetWare and SUSE Linux Enterprise Server (SLES), to removable tape media or other media for off-site storage. It provides a single consistent interface for all file systems and applications across NetWare and SLES.

The upgrade path for SMS is to install it on the OES server.

8 Upgrading Network Services to OES

Network services are critical to event coordination and service discovery.

- Section 8.1, "Upgrading DNS Services to OES," on page 77
- Section 8.2, "Upgrading DHCP Services to OES," on page 78
- Section 8.3, "Time Synchronization," on page 79
- Section 8.4, "Service Location Protocol (SLP)," on page 81

8.1 Upgrading DNS Services to OES

DNS on OES has been integrated with eDirectory. This means you can transition your existing DNS infrastructure from NetWare to OES, as well as centrally administer it the same way you do on NetWare.

- Section 8.1.1, "About Novell DNS in OES," on page 77
- Section 8.1.2, "Platform Differences in Novell DNS," on page 77
- Section 8.1.3, "Planning to Upgrade Novell DNS," on page 78
- Section 8.1.4, "Upgrading DNS," on page 78

8.1.1 About Novell DNS in OES

To accomplish eDirectory integration for DNS, Novell did a full port of NetWare DNS to OES to make it functionally equivalent to DNS in NetWare 6.5. Novell plans in the future to fully integrate all of the required functionality into the open source BIND project.

Starting with OES, the iManager plug-in is no longer supported for management of DNS on OES. Java Console is the DNS administrative tool. If you are using the Novell NetWare DNS and DHCP services and hosting it via a cluster, this configuration can also be carried forward into an OES environment.

8.1.2 Platform Differences in Novell DNS

DNS platform differences are summarized in "DNS Differences Between NetWare and OES 2015 SP1" in the *OES 2015 SP1: Planning and Implementation Guide*.

8.1.3 Planning to Upgrade Novell DNS

-

Requirements

Table 8-1 *DNS Source and Target Server Requirements*

Source Server	Target Server
NetWare 5.1 SP8 NetWare 6.0 SP5 or later NetWare 6.5 SP5 or later	OES or later
	The Novell DNS service pattern is installed.
	The schema is extended, the DNS-DHCP group is created, and the RootServerInfo and DNS-DHCP Locator objects are created.
	The installing administrator has rights to update files on the target server and is a member of the DNS-DHCP Group.

8.1.4 Upgrading DNS

DNS servers can be transferred both within and across eDirectory trees by using the Java Console. The OES Migration Tool doesn't support DNS migrations.

For instructions, see "Migrating DNS to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

8.2 Upgrading DHCP Services to OES

DHCP on OES has been integrated with eDirectory. This means you can transition your existing DHCP infrastructure from NetWare to OES, as well as centrally administer it the same way you do on NetWare.

-
-
-
-

8.2.1 About Novell DHCP in OES

The DHCP services in OES have been enhanced to store configuration information in eDirectory just as NetWare implementations do.

After the DHCP information has been migrated to OES, administration can be performed through the DNS/DHCP Java Console.

8.2.2 Platform Differences in Novell DHCP

DHCP platform differences are summarized in "DHCP Differences Between NetWare and OES 2015 SP1" in the *OES 2015 SP1: Planning and Implementation Guide*.

8.2.3 Planning to Upgrade Novell DHCP

Table 8-2 *DHCP Source and Target Server Requirements*

Source Server	Target Server
NetWare 5.1 or later	OES or later
	The Novell DHCP service pattern is installed and configured.
	The source and target servers have their times synchronized.

8.2.4 Upgrading DHCP

To transfer Novell DHCP services from NetWare to OES, follow the instructions in "Migrating DHCP to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

8.3 Time Synchronization

Time synchronization is critical to maintaining the integrity of the tree.

- Section 8.3.1, "About Time Synchronization in OES," on page 79
- Section 8.3.2, "Planning to Upgrade Time Synchronization Services," on page 80
- Section 8.3.3, "Transferring Time Synchronization Services," on page 80

8.3.1 About Time Synchronization in OES

In earlier versions of eDirectory, replica synchronization required proper time synchronization. Currently, replica synchronization uses time stamps from host servers without checking for proper time synchronization. This means that if the host servers are not time-synchronized, events can be logged out of sequence, resulting in inconsistent information about what took place and in what order.

What NTP Provides

All servers with Internet access can get time from NTP servers on the Internet. NTP synchronizes clocks to the Universal Time Coordinated (UTC) standard, which is the international time standard. The hierarchy that indicates where each server is getting its time is referred to as a stratum, with the first time provider designated as stratum 1.

A server that gets its time from a stratum 1 server is stratum 2, and so on.

The TIMESYNC NLM can consume and provide NTP time, but it always functions as stratum 5.

Use a Reliable, External Time Source

By default, NTP uses the server's internal clock as its time provider, but it can be configured to use other time providers via the `/etc/ntp.conf file`.

NTP time can be supplied from several sources:

- **Public Time Server.** For small organizations (fewer than 100 servers), synchronizing servers to accurate public NTP servers provides sufficient time synchronization. To reduce traffic, it's best to have one or two servers synchronize with a public NTP source and have those servers provide time for the remaining servers. See http://ntp.isc.org/bin/view/Servers/WebHome.

  Reference Clock. Reference clocks are devices that synchronize via a variety of technologies including long wave radio signals, GPS transmissions, or CDMA technology. These can be expensive.

  Server's Local Clock. The server's internal clock can be used as a time source, but because time can wander, this is generally not a preferred solution.

  Network NTP Time Source. This is the recommended option for larger networks. In this case, you need to set up a server as an NTP time provider and then add the IP address of the time source to the `/etc/ntp.conf` file for servers that will use the designated server as the time provider.

8.3.2 Planning to Upgrade Time Synchronization Services

Both the OES and the NetWare installs automate the time synchronization process where possible. For complete information about planning and implementing a time synchronization strategy and setting up time providers and consumers, see "Time Services", particularly "Implementing Time Synchronization" in the *OES 2015 SP1: Planning and Implementation Guide*.

Also consider the following points.

- Designate the most reliable server in the subnet as the time provider.
- Configure at least two time providers to set fault tolerance.
- Configure time consumers to contact a time provider within its own local network (so they don't contact time providers across costly WANs).
- Generally, only one server in a network should communicate with an external time provider. This reduces network traffic across geographical locations and minimizes traffic across routers and WANs.

NOTE: The time synchronization modules in Novell Open Enterprise Server (OES) have been designed to ensure that OES servers can be introduced into an existing network environment without disrupting any of the products and services that are in place.

8.3.3 Transferring Time Synchronization Services

You can use either of the two migration types offered by the Migration Tool to transfer time synchronization services from NetWare to OES:

- **Migrate:** Both migration on the same tree and migration to a different tree are supported. For more information, see Section A.1.1, "Migrating Selected Data or Services," on page 95.
- **Transfer ID:** Transfer ID migrations must occur within in the same tree. For more information, see Section A.1.2, "Transferring an Entire NetWare Server," on page 96.

To transfer time synchronization services from NetWare to OES, follow the instructions in "Migrating NTP to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

8.4   Service Location Protocol (SLP)

SLP is not a migratable service, however, it is a critical component of OES and must be planned for in your upgrade strategy.

- Section 8.4.1, "About SLP in OES," on page 81
- Section 8.4.2, "Platform Differences in SLP Services," on page 81
- Section 8.4.3, "Setting Up SLP on OES," on page 82

8.4.1   About SLP in OES

SLP lets network services register their availability on the network. SLP agents then keep track of which services are available and provide that information to applications that need it.

8.4.2   Platform Differences in SLP Services

- "SLP on NetWare" on page 81
- "SLP on OES" on page 81
- "Caveats" on page 81

SLP on NetWare

NetWare uses a Novell customized version of SLP called Novell SLP.

On NetWare, SLP services are integrated with and configured to automatically work with eDirectory and other services.

If you have a NetWare tree, you automatically have Novell SLP on your network and you can continue to use it as the SLP service during your upgrade to OES.

SLP on OES

Novell provides a basic level of SLP support when eDirectory is installed on an OES server. OES servers are configured with an SA that registers SLP-aware applications (such as eDirectory) with the server.

Caveats

- If you are running NetWare 5.1 in your tree, it must be at SP8 to have SLP version 2 functionality. Older versions are not compatible with OpenSLP running on OES.
- If your workstations can connect to the server using its IP address but not its DNS name, you need to update to Novell Client 4.91 SP5 or later. See TID 3890003 (http://www.novell.com/support/php/search.do?cmd=displayKC&docType=kc&externalId=3890003&sliceId=1&docTypeID=DT_TID_1_1&dialogID=66172729&stateId=0%200%2066174133).

8.4.3   Setting Up SLP on OES

Enabling Multicasting

SLP relies on multicasting by default; however, most Linux systems are not configured, by default, to provide multicast support. Enter the following at the shell prompt to determine whether multicasting is supported:

```
route -n
```

If multicasting is supported, you see an entry in the routing table for the 224.0.0.0 destination.

If not:

1 Open a terminal session.

2 Change to the root user account.

3 At the shell prompt, enter the following command:

```
route add -net 224.0.0.0 netmask 240.0.0.0 dev interface
```

(eth0 is usually the *interface* parameter)

4 Verify that the route has been added by entering `route -n` at the shell prompt.

Installing and Configuring OpenSLP

OpenSLP is included with SLES 11 SP4 and installed as part of the eDirectory support infrastructure on OES servers. Installation instructions are included in "Specifying SLP Configuration Options" in the *OES 2015 SP1: Installation Guide*.

For additional OpenSLP setup instructions, see "Setting Up OpenSLP on OES 2015 SP1 Networks" in the *OES 2015 SP1: Planning and Implementation Guide*.

Additional Information

 ◆ *NetIQ eDirectory 8.8 SP8 Administration Guide*, "Configuring OpenSLP for eDirectory"

9 Upgrading Novell Cluster Services to OES

Novell Cluster Services is a server clustering system that allows you to configure up to 32 OES servers into a high-availability cluster. You can move resources, either manually or automatically, to any server in the cluster. It is enabled for NetIQ eDirectory and supports failover, failback, and load balancing of individually managed cluster resources including data, applications, and services.

9.1 Overview

You can add OES nodes to an existing NetWare 6.5 cluster without bringing down the cluster, or you can create an all-OES cluster. With a mixed cluster, you can transfer services between OS kernels, and if services (such as NSS) are alike on both platforms, you can set the services to fail over across platforms.

Typical cluster configurations normally include a shared disk subsystem connected to all servers in the cluster. This disk subsystem can be connected via high-speed Fibre Channel cards, cables, and switches for best performance, or by a shared SCSI or iSCSI for a low-cost SAN. If a server fails, another designated server in the cluster automatically mounts the shared disk directories previously mounted on the failed server. This gives network users continuous access to the directories on the shared disk subsystem.

Novell Cluster Services can be set up on OES in several ways:

- Implementing a new installation on OES that is separate from your NetWare cluster. The pattern install also installs these complementary services:
    - Novell Backup/Storage Management Services (SMS)
    - Novell Linux User Management (LUM)
    - Novell Remote Manager (NRM)
- Adding OES nodes to an existing NetWare cluster
- Changing existing NetWare cluster nodes to OES cluster nodes (Rolling Cluster Conversion)
- Using a mixed NetWare/OES cluster

Using the Novell Cluster Services tool to manage live cluster transfers from the Novell NetWare OS to Novell SUSE Linux via a rolling conversion is one of the easier methods and is documented here.

9.2   Planning to Upgrade Novell Cluster Services

9.2.1   Reviewing the Current Cluster

Typically, the primary purpose of a cluster is to provide file and print services. Make sure you check the volume resources because it is easy to overload these services. As a general guideline, Novell recommends that NSS volume resources be kept at a total capacity of 80% or less. If you need to reduce the number of standalone servers in production, the logical approach is to move data and transfer services into the high availability resources of a cluster.

- Review the health of NCS background operations to resolve any operational issues with the cluster.
- Make sure all cluster nodes are up to the latest support pack levels.
- Avoid spanning LUNs across NSS pools
- Where necessary, review and modify the cluster design to take full advantage of the High Availability capabilities of current release software.

Novell recommends the following steps to address both the reliability and the performance of your current cluster:

- Make sure all NetWare nodes are at NetWare 6.5 SP7 or later
- Use relatively small LUNs and data volumes
- Introduce OES nodes as required
- Reconfigure the SAN to host DST shadow volumes

9.2.2   Upgrading Novell Cluster Services to OES

There are a two paths for moving existing NetWare clusters to OES: converting the existing clusters (also referred to as a rolling cluster conversion) or using a parallel build.

- **Cluster Conversion (Same Cluster).** In order to convert existing clusters, new OES servers need to be built with the same LUN visibility as the existing NetWare nodes and the new servers added to the existing cluster. The new OES nodes then mount the existing volumes and services, and the NetWare servers are removed from the cluster and removed from eDirectory. Although it is feasible to use a mixed NetWare and OES cluster temporarily as an upgrade strategy, Novell does not recommend it as a permanent production implementation.
- **Parallel Build (New Cluster).** A parallel-build OES upgrade strategy entails building a new separate OES cluster on the same SAN as the existing NetWare clusters. Doing so allows resources to be moved to the new cluster by changing LUN visibility from the old cluster nodes to the new. This can also be done in a phased approach. After the last resource is moved, the NetWare cluster can be removed from the tree. Because it is a new cluster, the virtual server names will change and login scripts and other references will need to be updated during the upgrade process.

There are pros and cons to each approach so you need to do a more detailed analysis and have assistance from Novell Consulting before upgrading a cluster.

Novell Cluster Services software must be running on the OES server (SLES 11 and OES must be installed on every server you want to add to a cluster). You can install Novell Cluster Services and create a new cluster, or add a server to an existing cluster either during the SLES 11/OES installation or afterwards, using YaST.

See "Installing Novell Cluster Services during an OES Installation" and "Installing Novell Cluster Services on an Existing OES Server" in the *OES 2015 SP1: Novell Cluster Services for Linux Administration Guide*.

9.2.3 Additional Information

Refer to the following sections in the *OES 2015 SP1: Novell Cluster Services for Linux Administration Guide* for additional information about transferring Novell Cluster Services to OES:

- "Converting NetWare Clusters to OES Clusters"
- "Upgrading Clusters from OES 2 SP3 to OES 2015 SP1"

9.3 Prerequisites

- Any NetWare cluster to be converted must be running at least NetWare 6.0. If you have a NetWare 5.1 cluster, you must upgrade to a NetWare 6.5 cluster before adding new OES cluster nodes or converting existing NetWare cluster nodes to OES cluster nodes. The process for converting 6.0 and 6.5 nodes is the same.
- Each OES server must contain at least one local disk device.
- At least 512 MB of memory must be available on each server in the cluster.

  While identical hardware for each cluster server is not required, having servers with the same or similar processors and memory can reduce differences in performance between cluster nodes.
- All nodes in a given cluster, whether NetWare or OES:
  - Must be configured with a static IP address.

    An additional IP address needs to be available for the cluster and for each cluster resource and cluster-enabled pool.
  - Must reside on the same IP subnet and in the same eDirectory tree.
- A shared disk subsystem should be connected to all servers in the cluster (optional, but recommended for most configurations) and should be properly set up and functional according to the manufacturer's instructions.
- We recommend configuring the disks contained in the shared disk system to use mirroring or RAID to add fault tolerance to the shared disk system.
- At least 20 MB of free disk space on the shared disk system needs to be available for creating a cluster partition.

  The Novell Cluster Services installation automatically allocates one cylinder on one drive of the shared disk system for the cluster partition. Depending on the location of the cylinder, the actual amount of space used by the cluster partition might be less than 20 MB.
- High-speed Fibre Channel cards, cables, and switch or SCSI cards and cables need to be installed to connect the servers to the shared disk subsystem.
  - If you are using a fibre channel SAN, the host bus adapters (HBAs) for each cluster node should be identical.
  - If you are using iSCSI for shared disk system access, make sure you have configured iSCSI initiators and targets prior to installing Novell Cluster Services.

- Novell Cluster Services software must be running on the OES server (SLES 11 and OES must be installed on every OES server added to a cluster). You can install Novell Cluster Services and create a new cluster, or add a server to an existing cluster either during the SLES 11/OES installation or afterwards, using YaST.

  See "Installing Novell Cluster Services during an OES Installation" and "Installing Novell Cluster Services on an Existing OES Server" in the *OES 2015 SP1: Novell Cluster Services for Linux Administration Guide*."

9.4 Caveats

There are several caveats that you need to be aware of:

- Resources created on OES cannot run on NetWare.
- You cannot add additional NetWare nodes to your cluster after adding a new OES node or changing an existing NetWare cluster node to an OES cluster node. If you want to add NetWare cluster nodes after converting part of your cluster to OES, you must first remove the OES nodes from the cluster.
- The server that holds the master eDirectory replica needs to be converted last, at the end of the rolling cluster conversion, not first.
- You can't change existing shared pools or volumes (storage reconfiguration) in a mixed NetWare/OES cluster. If you need to make changes to existing pools or volumes, you must temporarily bring down either all OES cluster nodes or all NetWare cluster nodes prior to making changes. Attempting to reconfigure shared pools or volumes in a mixed cluster can cause data loss.

9.5 Rolling Cluster Conversions

Performing a rolling cluster conversion from NetWare 6.5 to OES is one of the easier ways to upgrade Cluster Services to OES and keep your cluster up and running during the process.

In this method, one server is converted to OES while the other servers in the cluster continue running NetWare 6.5. Then, as needed, other nodes can be converted to OES incrementally until all servers in the cluster have been converted. Although it is feasible to use a mixed NetWare and OES cluster temporarily as an upgrade strategy, Novell does not recommend it as a permanent production implementation.

Refer to "Converting NetWare Clusters to OES Clusters" in the *OES 2015 SP1: Novell Cluster Services NetWare to Linux Conversion Guide* for instructions on performing a rolling cluster upgrade.

10 Upgrading Other Novell Products to OES

The information in this section was contributed by the GroupWise and ZENworks teams.

10.1 GroupWise

10.1.1 Source Platform Requirements

You can migrate directly from any of the NetWare platforms that support GroupWise as listed in the GroupWise documentation (http://www.novell.com/documentation/groupwise2012/gw2012_guide_svrmig/data/ab32nt1.html).

10.1.2 Target Platform Requirements

Although other supported platforms are listed in the GroupWise documentation (http://www.novell.com/documentation/groupwise2012/gw2012_guide_svrmig/data/ab32nt1.html), this guide focuses on migrating to OES.

For specific planning instructions, see the following information:

- **GroupWise 7:** "Planning Your Basic GroupWise System" (http://www.novell.com/documentation/gw7/gw7_install/data/a4bblzn.html) in the *GroupWise 7 Installation Guide* (http://www.novell.com/documentation/gw7/gw7_install/data/a20gkue.html).
- **GroupWise 8:** "Planning a Basic GroupWise System" (http://www.novell.com/documentation/gw8/gw8_install/data/a4bblzn.html) in the *GroupWise 8 Installation Guide* (http://www.novell.com/documentation/gw8/gw8_install/data/a20gkue.html).
- **GroupWise 2012:** "Planning Your GroupWise Server Migration" (http://www.novell.com/documentation/groupwise2012/gw2012_guide_svrmig/data/b65pbe1.html) in the *GroupWise Server Migration Guide* (http://www.novell.com/documentation/groupwise2012/gw2012_guide_svrmig/data/ab32nt1.html).

10.1.3 Preparing to Migrate

Probably the most important tip to a successful migration is to make sure, before starting the migration, that the source NetWare server has the latest GroupWise support pack installed, and that GroupWise is running without problems.

The GroupWise documentation includes thorough migration planning instructions in "Planning Your GroupWise Server Migration" (http://www.novell.com/documentation/groupwise2012/gw2012_guide_svrmig/data/b65pbe1.html) in the *GroupWise Server Migration Utility Installation and Migration Guide* (http://www.novell.com/documentation/groupwise2012/gw2012_guide_svrmig/data/ab32nt1.html).

10.1.4 Caveats

- **Earlier Version of GroupWise:** If you are running an earlier version of GroupWise on NetWare, you must upgrade to GroupWise 7 or GroupWise 8 with the latest support pack before migration to OES.
- **Migrating vs. installing GWIA and WebAccess:** Novell Support recommends deleting the NetWare-based GWIA and WebAccess objects and then installing new GWIA and WebAccess services on OES, even though there are instructions for migrating the GWIA and WebAccess services from NetWare to OES in the documentation.

10.1.5 Tool Options

You have two options for migrating GroupWise from NetWare to OES:

- **GroupWise Server Migration Utility:** This lets you identify the components (Post Office agents, etc.) to be migrated from NetWare to OES and then installs GroupWise, configures the agents, and migrates the data—all in real time. The process is flexible, allowing you to choose which components to migrate when.

  During the initial transfer, the original server is maintained, letting you continue to run GroupWise on NetWare until the migration is complete and you are satisfied with the results.

  After the initial transfer, the utility guides you through testing the system on the new OES server, and then when you are ready to switch, it migrates any data that was altered since the initial transfer and activates GroupWise on the OES server. This is the only point in the process when post office agents are taken down.

- **Manual Process:** Although it is much more involved and labor-intensive, some prefer to migrate GroupWise manually. The results are the same as the automated process, if all of the instructions are followed carefully.

Installation Is Included

Some administrators have incorrectly assumed that they must install GroupWise on the target server prior to the migration. Actually, GroupWise is installed on the OES server as part of the migration.

Upgrading the GroupWise Version Is Not Part of an OES Migration

You cannot upgrade GroupWise as part of the migration to OES.

10.1.6 Migration Instructions

- "Manual Method" on page 89
- "Automated Method" on page 89

Manual Method

Table 10-1   *Instructions for Manual GroupWise Migrations*

GroupWise Version	See
GroupWise 7	"Migration" (http://www.novell.com/documentation/ gw7/gw7_install/data/b2qqon2.html) in the *GroupWise 7 Installation Guide* (http://www.novell.com/ documentation/gw7/gw7_install/data/a20gkue.html)
GroupWise 8	"Manual Migration Steps" (http://www.novell.com/ documentation/gwutilities/gw8_svrmig/data/ b2qqon2.html) in the *GroupWise Server Migration Utility Installation and Migration Guide* (http:// www.novell.com/documentation/gwutilities/ gw8_svrmig/data/ab32nt1.html)
GroupWise 2012	"Manual Server Migration" (http://www.novell.com/ documentation/groupwise2012/ gw2012_guide_svrmig/data/b2qqon2.html) in the *GroupWise Server Migration Guide* (http:// www.novell.com/documentation/groupwise2012/ gw2012_guide_svrmig/data/ab32nt1.html)

Automated Method

Table 10-2   *Instructions for an Automatic GroupWise Migration*

GroupWise Version	See
GroupWise 7 and GroupWise 8	*GroupWise Server Migration Guide* (http:// www.novell.com/documentation/groupwise2012/ gw2012_guide_svrmig/data/ab32nt1.html)

10.1.7 Migrating GroupWise as Part of a Transfer ID Migration

Migrating GroupWise as part of a Transfer ID migration is essentially a three-phase process.

- "Migrating GroupWise" on page 90
- "Verifying that the GroupWise Migration Succeeded" on page 90
- "Transferring the NetWare Server's Identity" on page 90

Migrating GroupWise

If your NetWare server is currently running GroupWise, you must run the GroupWise Server Migration Utility before performing the Transfer ID migration.

The GroupWise Server Migration Utility does the following:

- It moves all GroupWise data and agents from a NetWare source server to an OES target server.
- It sets up the GroupWise Agents to run on the IP address and DNS name of the target OES server.

For instruction on running the GroupWise Server Migration Utility, see the *GroupWise Server Migration Guide* (http://www.novell.com/documentation/groupwise2012/gw2012_guide_svrmig/data/ab32nt1.html).

Verifying that the GroupWise Migration Succeeded

You should verify that GroupWise has migrated correctly and is running successfully for several weeks in the OES environment before completing the Identity Swap.

After the GroupWise migration, a copy of the GroupWise data is still located on the NetWare server. After you perform the Transfer ID migration, the GroupWise data is no longer accessible on the NetWare server.

Transferring the NetWare Server's Identity

1 In ConsoleOne, change the IP address or DNS names for the POA, WebAccess, and GWIA to reflect the NetWare server IP address or DNS information. This is only required for the agents that were transferred using the GroupWise Server Migration Utility.
2 Ensure that the changes have replicated through the system.
3 If a domain was transferred during the GroupWise Server migration, change the IP address or DNS name for the MTA.
4 Shut down the GroupWise agents running on the OES server.
5 Perform the Identity Swap.
6 After the Identity Swap has completed, bring up the GroupWise agents on the Linux server.

10.1.8 Additional Information

- Product Documentation:
    - GroupWise 7 (http://www.novell.com/documentation/gw7).
    - GroupWise 8 (http://www.novell.com/documentation/gw8).
    - GroupWise 2012 (http://www.novell.com/documentation/groupwise2012).
- Novell GroupWise Web site (http://www.novell.com/products/groupwise/)

10.2 Identity Manager

For information about upgrading from NetWare to OES Linux, check the Cool Solutions Web site (http://www.novell.com/communities/coolsolutions).

10.3 ZENworks

Many ZENworks features, such as policies and application distribution, are completely eDirectory and file system dependent. There is no dependency on the server OS. The remaining services that do have modules that run on a server, such as inventory and imaging, are dependent on a host OS.

ZENworks 11 Configuration Manager is fully supported on OES 2 SP2 and later. If you are running an older version of ZENworks on NetWare, the following guides will help you upgrade to ZENworks 10 running on OES.

- *ZENworks 11 SP2 Configuration Management ZENworks Migration Guide* (http://www.novell.com/documentation/zenworks11/zen11_am_migration/data/bookinfo.html)

IMPORTANT: If you are upgrading using an Transfer ID migration, be sure to complete the upgrade to Linux before migrating to ZENworks 11.

---

11 About Third-Party Applications

Two of the most important categories of third-party applications are anti-virus software and backup software.

Anti-Virus Software

For a current list of antivirus software vendors that support Novell Open Enterprise Server, see Novell Open Enterprise Server Partner Support: Backup and Antivirus Support (http://www.novell.com/products/openenterpriseserver/partners_communities.html). This list is updated quarterly.

IMPORTANT: If you run server-based anti-virus software, configure it so that it does not scan GroupWise directory structures such as domains and post offices where file locking conflicts can create problems for the GroupWise agents. If you need virus scanning on GroupWise data, check the GroupWise Partner Products page (http://www.novell.com/partnerguide/section/468.html) for compatible products.

Backup Software

For a current list of backup software vendors that support Novell Open Enterprise Server, see Novell Open Enterprise Server Partner Support: Backup and Antivirus Support (http://www.novell.com/products/openenterpriseserver/partners_communities.html). This list is updated quarterly.

A Tools for Upgrading to OES

The following utilities are available to assist with migrations to OES or later. Each tool fulfills a specific migration or service-consolidation purpose as explained in the following sections:

A.1 OES Migration Tool

The OES Migration Tool is the main tool for upgrading from NetWare to OES. The Migration Tool includes a migrated GUI interface that lets you drag and drop the volumes and services that you want to migrate. Terminal commands are also provided for those who prefer to work at a terminal prompt (command line). Both the GUI and command line methods are documented in the *OES 2015 SP1: Migration Tool Administration Guide*.

The OES Migration Tool runs exclusively on the destination OES server and pulls service configuration information and data from the NetWare source server. A Windows workstation is not required.

The OES Migration Tool is installed on every OES server.

When you run the GUI Migration Tool, after selecting the source and target servers, you are prompted to specify one of two migration types, as explained in the sections that follow.

A.1.1 Migrating Selected Data or Services

The first option is the Migration type.

Just as the name implies, a Migration is designed to migrate the services on multiple servers to a single, more powerful OES server. However, the type is very adjustable, letting you specify only a single volume or service to migrate at a time. Obviously this lets you move data and services with absolute flexibility.

As with all migrations using the Migration Tool, the target server must be installed using the Pre-Migration Server installation pattern, and the patterns for the services you are planning to migrate to the server must be installed but not configured.

For more information on this type of migration, see "Server Consolidations" in the *OES 2015 SP1: Migration Tool Administration Guide*.

A.1.2   Transferring an Entire NetWare Server

The second option is the **Transfer ID** migration type.

This powerful functionality lets you transfer an existing NetWare server's identity, including its IP address, host name, eDirectory and security components, services, and data to an OES server.

There are, of course, preparation steps to ensure that eDirectory and the NetWare server are healthy, and the services being migrated must be shut down during the migration process, but after the migration is finished, network users won't realize that anything has changed.

Those customers who have used this tool have been very pleased with the results.

For more information on this type of migration, see "Transfer ID Migration" in the *OES 2015 SP1: Migration Tool Administration Guide*.

A.1.3   More About Using the Migration Tool

Data Migration Support

The primary purpose of the OES Migration Tool is to migrate data from the NetWare platform to the OES platform. Data migration tools can also be used to migrate data from OES 1 servers. A good place to start is "Migrating File Systems to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

Batch Data Migration Support

If you want to migrate data from multiple NetWare servers to a single OES server, you can create a cron job to automatically run multiple instances of the `migfiles` command sequentially. The Migration Tool GUI interface doesn't currently support batch migrations.

Service Migration Support

Information about transferring individual services is in "Migration Scenarios" in the *OES 2015 SP1: Migration Tool Administration Guide*

In most cases, you first need to install the service on the OES target server. Refer to the following sections in the *Migration Tool Administration Guide*:

- "Migrating AFP to OES 2015 SP1"
- "Migrating CIFS to OES 2015 SP1"
- "Migrating DHCP to OES 2015 SP1"
- "Migrating DNS to OES 2015 SP1"
- "Migrating FTP to OES 2015 SP1"
- "Migrating iFolder 2.x"

- ◆ "Migrating iPrint to OES 2015 SP1"
- ◆ "Migrating NTP to OES 2015 SP1"

eDirectory Migration Support

In OES, you migrate eDirectory using the new Identity Transfer functionality in the Migration Tool. See "Migrating eDirectory to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

A.2 Server Consolidation and Migration Tool (SCMT)

Support for migrating from newer NetWare platforms has not been removed from SCMT (as reflected in the *Novell Server Consolidation and Migration Toolkit Administration Guide*). However, Novell recommends using the OES Migration Tool rather than SCMT when possible.

A.3 NetWare Migration Wizard

The primary purpose of the Novell NetWare Migration Wizard is to migrate NetWare servers to new hardware or NetWare virtual machines.

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

IMPORTANT: For migrating to OES, use the new Identity Transfer feature found in the OES Migration Tool. For more information, see "Transfer ID Migration" in the *OES 2015 SP1: Migration Tool Administration Guide*.

A.4 Additional Information

- ◆ **Novell Upgrade or Migrate Web site.** For information on the tools and resources currently available from Novell, visit the OES Upgrade or Migrate Web site (http://www.novell.com/promo/upgradeormigrate.html).
- ◆ **Links to Documentation.** For a complete list of links to data and service migration instructions in the OES documentation, see the OES Documentation Web site (http://www.novell.com/documentation/oes2015).

B About the Management Tools in OES

B.1 Novell iManager 2.7.*x*

Novell iManager is a Web-based administration console that provides secure, customized access to network administration utilities and content from virtually anywhere administrators have access to the Internet and a Web browser.

For more information about iManager and its latest features, see What's New in the NetIQ iManager 2.7.7 Patch 4 Readme.

B.1.1 Supported Web Browsers

See "Using a Supported Web Browser" in the *NetIQ® iManager Administration Guide*.

B.1.2 Caveats

- In order for some iManager wizards and help to work, you must enable pop-up windows in your Web browser.
- iManager 2.7 can coexist in the same eDirectory tree with iManager 2.6.
- If your network has more than three servers, or one or more servers that do not host eDirectory replicas, you must have SLP properly configured for iManager to log in. For more information, see "SLP" in the *OES 2015 SP1: Planning and Implementation Guide*.
- iManager 2.7 can manage any server running Novell eDirectory 8.6.2 or later.
- iManager 2.7 plug-ins are not compatible with previous versions of iManager. Additionally, any custom plug-ins you want to use with iManager 2.7 must be re-compiled in the iManager 2.7 environment.

B.1.3 Upgrading to iManager 2.7

In light of the Caveats mentioned above, Micro Focus recommends that you simply install iManager 2.7.*x* on your OES or later servers and download all of the plug-ins that apply to your services. For more information, see the *NetIQ iManager Installation Guide*.

B.2 Novell Remote Manager (NRM)

Novell Remote Manager for OES is a browser-based utility that can be used to manage one or more OES servers from a remote location to monitor server health, change the server configuration, or perform diagnostic and debugging tasks.

- It does not require a special client.
- It provides a graphical interface that makes interpreting diagnostic information much more comprehensive and easier to manage.
- It provides added functionality that is not available in other management utilities.
- Section B.2.1, "Prerequisites," on page 100
- Section B.2.2, "About Novell Remote Manager and OES," on page 100

B.2.1 Prerequisites

- OES services must be installed when you install the OES server.
- Supported browsers include Mozilla Firefox 1.0, Microsoft Internet Explorer 8, KDE 3.2 Konqueror (limited functionality), or Safari 1.2 (limited functionality).
- The HTTPSTKD module must be loaded and running on the server. This module is selected, installed, and configured with a default configuration when you install any of the OES patterns (unless you deselect it).

B.2.2 About Novell Remote Manager and OES

There is no need to migrate Novell Remote Manager (NRM) from NetWare to OES. Instead, this service can be installed when any Open Enterprise Server pattern is installed. Then, if you have created server groups for monitoring NetWare 6.5 servers, they can be accessed and monitored from Remote Manager on OES just as they can from a NetWare server running NetWare 6.0 or later.

However, NRM is configured somewhat differently on OES than on NetWare. When NRM is installed, it sets up a small Web server on the OES server. The interface and module is called HTTPSTKD. Basic configuration parameters are pre-set; however, these can be changed by editing the `httpstkd config` or `httpstkd PAM config` files. See "Changing the HTTPSTKD Configuration" in the *OES 2015 SP1: Novell Remote Manager Administration Guide*."

You can log in as user Root, a local Linux user, or as an eDirectory user who is Linux User Management (LUM) enabled.

- If Linux User Management is enabled in your tree and is installed and configured on the local server, you can log in to Novell Remote Manager using your eDirectory credentials. See the *OES 2015 SP1: Linux User Management Administration Guide* for details.
- If you log in as a local Linux user or as a non-Admin eDirectory user, you can see only the information that the user you log in as has rights to view.

B.3 OES User Rights Management (NURM)

The OES User Rights Map (NURM) utility is used by administrators to map the Access Control List (ACL) of NSS resource that is owned by an identity in eDirectory to an identity in Active Directory. It maps the users and groups from eDirectory to Active Directory using a common name or any other field that is selectable by the tool. For more information, see NURM (OES User Rights Management) in the OES 2015 SP1: NSS AD Deployment and Administration Guide.

B.4 About Other Management Tools

For other OES utilities and tools, see OES 2015 SP1 Utility Changes in the OES 2015 SP1: Planning and Implementation Guide.

C Workstation Considerations

There are some impacts on network workstations resulting from a migration to OES.

Domain Services for Windows

Domain Services for Windows (DSfW) provides Windows users with seamless integration between eDirectory and Active Directory. For an overview of this new functionality, see Section 3.5, "About Domain Services for Windows," on page 40.

Novell Client

As OES is implemented, existing clients can be used, such as Windows XP and Windows 7. Make sure your workstations are running the latest Novell Client for the platform.

iFolder

The iFolder client must be installed on all Macintosh, Linux, and Windows workstations that use this functionality in OES.

iPrint

The iPrint agent must also be installed on all Macintosh, Linux, and Windows workstations that use this functionality in the OES environment.

D Server Consolidation

The OES Migration Tool includes a Migrate migration type that is specifically designed to support server consolidation. For more information, see Section A.1.1, "Migrating Selected Data or Services," on page 95.

E Examples

This section contains a few real-world examples of upgrades to OES or later that Novell customers have done. If you have an example you want to share, please submit a User Comment for this page with your e-mail address, and we'll contact you.

E.1 Replica and CA Server Migration

The following is an example of transferring a NetWare 6.5 SP7 CA and eDirectory replica server to an OES server using the Transfer ID option in the OES Migration Tool.

E.1.1 Overview

Table E-1 *Service Migration Summary*

Pre-Migration	Post-Migration
A NetWare 6.5 SP8 server running as the master replica server and certificate authority for the eDirectory tree.	A single OES server running as the master replica server and certificate authority for the eDirectory tree. The server has the same name and IP address as the NetWare server.
This server currently provides these services: • SLPDA • iManager • VLDB (DFS) • NetStorage • LDAP	This server provides these services: • SLPDA • iManager • VLDB (DFS) • NetStorage • LDAP • NTP

E.1.2 FAQs

- **Q:** Do we need to remove the Certificate Authority and create a new one on the new server?

A: No. The Identity Transfer option migrates the existing eDirectory Certificate Authority to the new server.

 ◆ **Q:** To migrate the master, do we need to remove all eDirectory replicas, remove the server from eDirectory, build a new server with the same name, add replicas back, etc.?

   A: No. The Identity Transfer option migrates the existing eDirectory database to the new server.

E.1.3 Preparing and Transferring Your Replica Server

1 Prepare your servers by following the instructions in "Preparing for Transfer ID" in the *OES 2015 SP1: Migration Tool Administration Guide*.

   Make sure you do the following:

    ◆ Install the OES target server in the same context as the NetWare source server, using the **Novell Pre-Migration Server** pattern and the patterns for all services that correspond to the services running on the NetWare server.

      This ensures that eDirectory is installed on the target server without a replica and that the target server is prepared for all of the services being migrated.

      IMPORTANT: You must select the **Pre-Migration Server** install pattern during the initial OES installation. Otherwise, an eDirectory replica is installed and/or configured on the server, and the server is not a valid migration target server.

      Selecting the pattern later will not remove the replica configuration.

      If you install a server without selecting the pre-migration pattern initially, you must start fresh by performing a **New Server** installation and being sure to select **Pre-Migration Server** as one of the initial OES patterns.

      For instructions, see "Installing OES 2015 SP1 as a New Installation" in the *OES 2015 SP1: Installation Guide*.

    ◆ If you are moving data from NSS volumes on the NetWare source server, create corresponding NSS volumes on the OES target server. Be sure to use the same names as on the source server.

      Do not create any new volumes that will not have data migrated to them until after the Identity Transfer migration is completed.

    ◆ Verify that the host name and DNS entries in your local `/etc/hosts` files and on the DNS server are correct.

    ◆ Apply the latest SLES 11 and OES patches from the Novell Customer Center to the target server. For more information, see "Updating (Patching) an OES 2015 SP1 Server" in the *OES 2015 SP1: Installation Guide*.

    ◆ If the source server is running NetWare 6.5 SP7, install the SMS patch (http://support.novell.com/docs/Readmes/InfoDocument/patchbuilder/readme_5042400.html) first. If the source server is running SP8, this is not necessary.

2 Migrate your server by following the instructions in "Using the Migration GUI Tool for Transfer ID" in the *OES 2015 SP1: Migration Tool Administration Guide*.

   Make sure you do the following:

    ◆ If you are moving data from NSS volumes on the NetWare source server, follow the instructions in "Migrating File Systems to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

- ◆ Do not select iManager, VLDB, NetStorage or LDAP for migration. These services work automatically after the ID Transfer is complete.
- ◆ SLPDA must be manually reconfigured after the migration completes.

E.1.4 Post-Migration Configuration

1 Set up the SLP DA on your OES server by following the instructions in "Setting Up an OpenSLP DA Server" in the *OES 2015 SP1: Planning and Implementation Guide*.

2 Clean up the old eDirectory target server objects by following the instructions in "Cleanup Objects" in the *OES 2015 SP1: Migration Tool Administration Guide*.

3 If you have DFS junctions, check one of them in this VLDB management context to make sure it is still working. If it is not working, rebuild the VLDB using the instructions in "Repairing the VLDB" in the *OES 2015 SP1: Novell Distributed File Services Administration Guide for Linux*.

4 For information about time synchronization services on a Novell network, see "Time Services" in the *OES 2015 SP1: Planning and Implementation Guide*.

5 Verify that all of the other services are working as expected.

E.2 Cluster Migration

The following is an example of doing a rolling cluster upgrade from an NetWare 6.5 SP7 cluster to an OES cluster.

- ◆ Section E.2.1, "Overview," on page 109
- ◆ Section E.2.2, "General Notes and Tips," on page 110
- ◆ Section E.2.3, "Preparing to Migrate the Cluster," on page 110
- ◆ Section E.2.4, "Transferring DHCP in the Cluster," on page 111
- ◆ Section E.2.5, "Transferring DNS in a Cluster," on page 112
- ◆ Section E.2.6, "iPrint Migration in a Cluster," on page 113
- ◆ Section E.2.7, "Transferring AFP in a Cluster," on page 115
- ◆ Section E.2.8, "Transferring CIFS in a Cluster," on page 116

E.2.1 Overview

Table E-2 summarizes the pre-migration and post-migration status of the cluster being migrated.

Table E-2   *Service Migration Summary*

Pre-Migration: Three-node NetWare 6.5 SP7 Cluster	Post-Migration: Three-node OES Cluster
Each node contains some eDirectory replicas	Each node contains some eDirectory replicas

Pre-Migration: Three-node NetWare 6.5 SP7 Cluster	Post-Migration: Three-node OES Cluster
Each node has access to fiber-attached shared storage that includes:	Each node has access to fiber-attached shared storage that includes:
◆ Several clustered NSS volumes for home directories and shared file systems	◆ Several clustered NSS volumes for home directories and shared file systems
◆ One clustered NSS volume for NDPS and iPrint	◆ One clustered NSS volume for iPrint
◆ Clustered DHCP	◆ Clustered DHCP
◆ Clustered DNS	◆ Clustered DNS
◆ Clustered AFP (NFAP)	◆ Clustered Novell AFP
◆ Clustered CIFS (NFAP)	◆ Clustered Novell CIFS

E.2.2   General Notes and Tips

- ◆ In the YaST install, clustering is disabled by default. To set up clustering, you must enable it for configuration. See "Novell Cluster Services Parameters and Values" in the *OES 2015 SP1: Installation Guide*.

- ◆ Clustering on OES is case-sensitive. Always make sure that you have specified the correct case for each name, etc. The SPD on the OES node is created exactly as you specify it. (NetWare was case-insensitive.)

- ◆ NetWare cluster names display in uppercase. Using lowercase for OES cluster names makes them easier to distinguish from the NetWare names.

- ◆ On NetWare nodes, the load and unload scripts are stored in eDirectory and accessible through iManager.

- ◆ On OES nodes, the load and unload scripts are dynamically created in `/var/run/ncs` from the scripts stored in eDirectory each time that you cluster-migrate a cluster resource to the OES node.

  Scripts are retained only while the OES server is running. If the server goes down for any reason, the scripts are removed. This is not a problem, however, because they are created again when you cluster-migrate the cluster resources.

- ◆ NetWare has a limitation of 1024 characters in scripts. Linux doesn't have this limitation.

  The best solution for this limitation is to create a small script to call the larger scripts. The script must be the same on each box. Section E.2.4, "Transferring DHCP in the Cluster," on page 111 illustrates this concept.

- ◆ There's a utility called `sbdutil` that lets you manage the sbd on OES. For documentation, access the sbdutil man page on a clustered server.

E.2.3   Preparing to Migrate the Cluster

1 Read through Table E-3 to understand what happens to the existing volumes during a cluster migration.

Table E-3 *What Happens to Existing Volumes During a Cluster Migration*

Pre-Migration Status	Migration Action	Post-Migration Status
Users volume active on NetWare	Cluster-migrates to an OES node	Users volume active on OES
Shared volume active on NetWare	Cluster-migrates to an OES node	Shared volume active on OES
NDPS volume active on NetWare	Migration Tool migrates configuration, etc. to the new iPrint volume.	Offline
DNS volume active on NetWare	Moved by iManager to the new DNS2 volume on OES.	Offline

2 Create all of the NSS volumes that are required for your service migrations as listed in Table E-3.

WARNING: This must be done while the cluster has only NetWare nodes. If you have already joined OES nodes to your cluster, make sure that you remove them from the cluster before you create the NSS volumes.

Table E-4 *New NSS Pools and Volumes Are Required*

Create These	Migration Action	Post-Migration Status
Destination iPrint pool and volume (newly created through the NetWare server)	Cluster-migrates to an OES node	iPrint volume active on OES
Destination DHCP pool and volume (newly created through the NetWare server)	Cluster-migrates to an OES node	DHCP volume active on OES
Destination DNS2 pool and volume (newly through the NetWare server).	Cluster-migrates to an OES node	DNS2 volume active on OES

E.2.4   Transferring DHCP in the Cluster

1 Before starting the migration, create the Destination DHCP volume specified in Table E-4.

2 Add one or more OES servers to the cluster. For more information, see "Adding New OES Nodes to Your NetWare Cluster" in the *OES 2015 SP1: Novell Cluster Services for Linux Administration Guide*.

3 Set up an OES DHCP cluster resource using the instructions in the first three section only of "Installation and Configuration" in the *OES 2015 SP1: DNS/DHCP Services for Linux Administration Guide*.

4 Edit the destination DHCP pool resource load script and insert the following line just before the last (`exit 0`) line:

`/`*`destination_dhcp_volume`*`/dhcp_cluster.sh`

where *destination_dhcp_volume* is the path to the destination DHCP volume listed in Table E-3.

For example, insert the following line:

```
/media/nss/DHCP_VOLUME/dhcp_cluster.sh
```

> **IMPORTANT:** This step is required to circumvent the 1024 byte script-size limitation on NetWare mentioned in Section E.2.2, "General Notes and Tips," on page 110.

5 Download the `dhcp_cluster.sh` (http://www.novell.com/documentation/oes11/scripts/dhcp_cluster.sh) script file from the OES Documentation Web site.

6 Using a UNIX-compatible text editor, replace `<DHCP_VOLUME>` in the `dhcp_cluster.sh` script with the local mount point of your destination DHCP volume.

   For example, `MOUNT_POINT="/media/nss/DHCP_VOLUME"`.

7 Using the instructions in "Migrating DHCP to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*, migrate the NetWare DHCP configuration to one of the OES servers added to the cluster in Step 2.

8 Copy the `/etc/dhcpd.conf` file to the destination DHCP volume.

   For example `cp /etc/dhcpd.conf /media/nss/DHCP_VOLUME/dhcpd.conf`.

9 Edit the `dhcpd.conf` file you copied in Step 8, as follows:

   9a Change the `ldap-server` IP address to the IP address associated with your destination DHCP pool.

   9b Change the `ldap-dhcp-server-cn` to the OES DHCP Server Object created by the Migration Tool in Step 7.

10 Copy the *migrated_server*`.leases` file from the `/var/opt/novell/dhcp/leases` folder to the `/var/lib/dhcp/db` folder on your Destination DHCP Volume and rename it to `dhcpd.leases`.

   Continuing with the same example, you use the following command to copy and rename the file:

   ```
   cp /var/opt/novell/dhcp/leases/DHCP_SERVER.leases /media/nss/DHCP_VOLUME/var/
   lib/dhcp/db/dhcpd.leases.
   ```

11 Offline the DHCP cluster resource that has been running on NetWare.

12 Online the OES DHCP cluster resource.

13 (Optional) Use iManager to enable the DHCP server as the authoritative server.

E.2.5   Transferring DNS in a Cluster

   ◆ "Using Java Console to Migrate DNS Servers within the Same eDirectory Tree" on page 112
   ◆ "Installing and Configuring a Cluster-Enabled DNS" on page 112

Using Java Console to Migrate DNS Servers within the Same eDirectory Tree

See "Migrating DNS from NetWare to OES 2 SP3 Linux" in the *OES 2 SP3: Migration Tool Administration Guide*.

Installing and Configuring a Cluster-Enabled DNS

1 Verify that all OES cluster nodes have the DNS pattern installed with a common locator group context.

2 Mount the shared volume on one of the OES nodes in the cluster.

3 Execute the following script at the command prompt:

```
/opt/novell/named/bin/ncs_dir.sh mount_point username
```

where *mount_point* is the Destination DNS2 volume listed in Table E-4 and *username* is the fully distinguished name of the DNS user (`named` by default).

For example, you might enter the following command:

```
/opt/novell/named/bin/ncs_dir /media/nss/DNSVOL/ cn=named.o=novell.T=MyTree
```

The script creates the following directory:

```
/media/nss/DEST_DNS2_VOL/etc/opt/novell/named
```

The script also assigns access and ownership rights for the preceding directory to the DNS user.

4 Run the DNS Server by using the following command:

```
/opt/novell/named/bin/novell-named -u DNS_User -V DEST_DNS2_VOL
```

This step ensures that DNS server is running on the cluster node.

5 Click **Cluster > Cluster Options**, then select the Destination DNS2 cluster pool resource and click **Details**.

6 Click the **Scripts** tab.

   6a Click **Load Script**.

   6b Add following line before `exit 0` to load DNS.

```
exit_on_error /opt/novell/named/bin/novell-named -u DNS_User -V
DESTINATION_DNS2_VOLUME
```

   6c Click **Unload Script**.

   6d Add following line at the beginning to unload DNS.

```
killproc -p /var/opt/novell/run/named/named.pid -TERM /opt/novell/named/
bin/novell-named
```

7 Set the Destination DNS2 cluster resource offline and then online by using the **Clusters > Cluster Manager** task in iManager.

8 Verify that DNS services are functioning correctly.

E.2.6   iPrint Migration in a Cluster

- "How Clustered iPrint Migration Works" on page 113
- "Tips and Caveats" on page 114
- "Transferring iPrint in a Cluster" on page 114

How Clustered iPrint Migration Works

The OES Migration Tool (miggui) contains an NLM named `PSMINFO.NLM` that copies all of the iPrint data from the cluster to an XML text file named `psminfo.xml` on the iPrint NSS volume that you created in Step 2 on page 111. The `psminfo.xml` file is located in an `/ndps` directory at the root of the volume.

The migration tool uses the information in `psminfo.xml` to create new printer objects, set up the driver store, create printer agents, etc. The tool also changes the names of the old iPrint objects in eDirectory by appending `_nw` to each name. The old names can then be applied to the new printer objects. All changes are completely transparent to iPrint users.

Tips and Caveats

- Legacy queue-based printing cannot be serviced by an OES Printer Agent.

- You can manage both OES iPrint and NetWare iPrint from NetWare, but you can only manage OES iPrint from OES.

- You must create the iPrint NSS pool and volume as instructed in Step 2 on page 111 prior to adding OES nodes to the cluster or running the migration.

Transferring iPrint in a Cluster

1 Download the `iprint_load.sh` script (http://www.novell.com/documentation/oes11/scripts/ iprint_load.sh) and the `iprint_unload.sh` script (http://www.novell.com/documentation/oes11/ scripts/iprint_unload.sh) from the OES Documentation Web site.

2 Customize the iPrint load script for your iPrint pool resource by doing the following:

   2a In iManager, access the load script for the destination iPrint pool resource.

   2b Copy and paste the contents of the downloaded `iprint_load.sh` file below the last line of the current load script.

   2c Using the information in the current script, replace each variable (indicated by <angle brackets>) with the correct values for the cluster resource.

     For example, if the first line in the current script reads

```
nss /poolactivate=POOLNAME
```

     Modify the third line in the downloaded script to read

```
exit_on_error nss /poolact=POOLNAME
```

   2d Remove all of the lines down to the first line you inserted.

   2e Click **Apply**.

3 Customize the iPrint unload script for your iPrint pool resource by doing in the following:

   3a In iManager, access the unload script for the destination iPrint pool resource.

   3b Copy and paste the contents of the downloaded `iprint_unload.sh` file below the last line of the current unload script.

   3c Using the information in the current script, replace each variable (indicated by <angle brackets>) with the correct values for the cluster resource.

     For example, if the first line in the current script reads

```
ncpcon unbind
--ncpservername=CLUSTERNAME_POOLNAME_SERVER --ipaddress=192.168.10.10
```

     Modify the third line in the downloaded script to read

```
ignore_error ncpcon unbind
--ncpservername=CLUSTERNAME_POOLNAME_SERVER --ipaddress=192.168.10.10
```

   3d Remove all of the lines down to the first line you inserted.

   3e Click **Apply > OK**.

4 In **iManager > Cluster Options**, select the iPrint cluster resource object and click the **Details** link.

5 On the Cluster Pool Properties page, click the **Preferred Nodes** tab and move all of the NetWare nodes to the **Unassigned** column.

6 Offline and then online the cluster resource.

7 On the server where the iPrint cluster resource is running, open a terminal and enter the following commands:

```
cd /opt/novell/iprint/bin

./iprint_nss_relocate -a admin.fqdn -p password -n NSS/path -l cluster
```

For example, enter

```
./iprint_nss_relocate -a cn=admin,o=novell -p novell -n /media/nss/NSSVOLNAME -
l cluster
```

8 Migrate the iPrint resource to another OES node in the cluster, then repeat Step 7 until all of the OES nodes in the cluster have run the `iprint_nss_relocate` script.

9 Create the Print Manager and Driver Store on the OES cluster.

When choosing the target server, use the IP address of the cluster resource. This specifies where the driver store and Print Manager database will reside. Begin by using the IP address of the new resource. This will need to be changed to a DNS name later by editing the `.conf` file.

When you receive a certificate management error, allow the error and proceed.

While you are creating the Print Manager, the lower dialog box indicates where the Print Manager will be located. Specify the IP address of the cluster resource. This changes later to a DNS name.

The iPrint service doesn't "know" that it's running on a cluster because the script creates a symbolic link. If the link exists, you know that the service is clustered.

10 After you create the Print Manager and Driver Store, modify the `/etc/opt/novell/iprint/conf/ipsmd.conf` and `idsd.conf` to have multiple DSServer values.

For example:

```
DSServer1 replicaServer
DSServer2 replicaServer
DSServer3 replicaServer
```

11 Remove the pound sign (#) from the following two lines in the load script:

```
exit_on_error rcnovell-idsd start
exit_on_error rcnovell-ipsmd start
```

12 Offline and online the cluster resource and verify that the Print Manager and Driver Store load.

13 Create a printer to test that the service is working.

14 Follow the instructions in "Migrating iPrint to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.

IMPORTANT: When you authenticate to the source and target servers, use the IP address of the source Novell Cluster Services iPrint resource (secondary IP) and the IP address of the target Novell Cluster Services iPrint resource (secondary IP).

The `ipsmd.conf` file is located in the `/etc/opt/novell/iprint/conf` directory.

E.2.7 Transferring AFP in a Cluster

1 Install AFP on each OES server that will be in the cluster. For details, see the *OES 2015 SP1: Novell AFP for Linux Administration Guide*.

2 Cluster-enable the AFP service. For details, see "Configuring AFP with Novell Cluster Services for an NSS File System" in the *OES 2015 SP1: Novell AFP for Linux Administration Guide*.

E.2.8   Transferring CIFS in a Cluster

1 Install CIFS on each OES server that will be in the cluster. For details, see the *OES 2015 SP1: Novell CIFS for Linux Administration Guide*.

2 Cluster-enable the CIFS service. For details, see "Configuring CIFS with Novell Cluster Services for an NSS File System" in the *OES 2015 SP1: Novell CIFS for Linux Administration Guide*.

E.3   Server Identity Migration

The following is an example of transferring a NetWare 6.5 SP7 server to an OES server, using the Transfer ID option in the OES Migration Tool.

- Section E.3.1, "Preparing and Transferring Your Replica Server," on page 116
- Section E.3.2, "Post-Migration Steps," on page 117

Table E-5   *Service Migration Summary*

Pre-Migration (Source Server)	Post-Migration (Target Server)
A NetWare 6.5 SP7 server with the following: • eDirectory replicas • NSS volumes for home directories and shared file systems • An NSS volume for NDPS and iPrint • DHCP services • ZENworks for Desktops 7 SP1 IR3a HP3 (or newer update)	An OES server on new hardware with the same name and eDirectory identity • eDirectory replicas • NSS volumes for home directories and shared file systems • An NSS volume for iPrint • DHCP services • ZENworks for Desktops 7 SP1 IR3a HP3 (or newer update)

E.3.1   Preparing and Transferring Your Replica Server

1 Prepare your servers by following the instructions in "Preparing for Transfer ID" in the *OES 2015 SP1: Migration Tool Administration Guide*.

Make sure you do the following:

- Install the OES target server in the same context as the NetWare source server, using the **Novell Pre-Migration Server** pattern and the patterns for all services that correspond to the services running on the NetWare server.

  This ensures that eDirectory is installed on the target server without a replica and that the target server is prepared for all of the services being migrated.

  For instructions, see "Installing OES 2015 SP1 as a New Installation" in the *OES 2015 SP1: Installation Guide*.

- If you are moving data from NSS volumes on the NetWare source server, create corresponding NSS volumes on the OES target server. Be sure to use the same names as on the source server.

  Do not create any new volumes that will not have data migrated to them until after the Identity Transfer migration is completed.

- Verify that the host name and DNS entries in your local `/etc/hosts` files and on the DNS server are correct.
- Apply the latest SLES 11 and OES from the Novell Customer Center to the target server. For more information, see "Updating (Patching) an OES 2015 SP1 Server" in the *OES 2015 SP1: Installation Guide*.
- If the source server is running NetWare 6.5 SP7, install the SMS patch (http://support.novell.com/docs/Readmes/InfoDocument/patchbuilder/readme_5042400.html) first. If the source server is running SP8, this is not necessary.
- If you are migrating ZENworks 7 Server Management, delete the Distributor and Subscriber objects on the NetWare servers that will be migrated to OES.

2 Migrate your server by following the instructions in "Using the Migration GUI Tool for Transfer ID" in the *OES 2015 SP1: Migration Tool Administration Guide*.

Make sure you do the following:

- If you are moving data from NSS volumes on the NetWare source server, follow the instructions in "Migrating File Systems to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*.
  - If you are migrating Novell ZENworks 7 Desktop Management, migrate the directories where you store your MSI, AOT, etc. You do not need to migrate the ZENworks program directory itself.
  - If you are migrating Novell ZENworks 7 Server Management, migrate the directories where you store your user applications, etc.
- If you are transferring iPrint, follow the instructions in "Migrating iPrint to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*. Do not perform the post-migration procedures at this point.
- If you are transferring DHCP, follow the instructions in "Migrating DHCP to OES 2015 SP1" in the *OES 2015 SP1: Migration Tool Administration Guide*. Do not perform the post-migration procedures at this point.

3 After all the services above have been successfully migrated, click the button to transfer the server identity and complete the Transfer ID Wizard.

E.3.2 Post-Migration Steps

- "iPrint" on page 118
- "DHCP" on page 118
- "ZENworks 7" on page 118

iPrint

1 Complete the remaining iPrint instructions, starting with "Migrating ZENworks iPrint Policies" in the *OES 2015 SP1: Migration Tool Administration Guide*.

DHCP

1 Complete the remaining iPrint instructions, starting with "Post-Migration Procedures" in the *OES 2015 SP1: Migration Tool Administration Guide*.

ZENworks 7

- "Novell ZENworks 7 Desktop Management" on page 118
- "Novell ZENworks 7 Server Management" on page 118

IMPORTANT: You need the ZENworks for Desktops 7 SP1 IR3a HP4 patch for imaging on 64bit Linux.

Novell ZENworks 7 Desktop Management

1. Mount the ZENworks 7 Desktop Management Linux CD on the OES server.

2. Install ZENworks 7 Desktop Management, selecting the features that you will use.

   You can also do the silent install by modifying the `silent.properties` file and copying it to your machine.

3. Modify each NAL object to reflect the new path to the files on the OES Volume

4. Modify the Workstation objects so that they have the correct location for the images.

5. Open the ports in the firewall on the OES server.

   See "Ports used by ZEN" (http://www.novell.com/support/php/
   search.do?cmd=displayKC&docType=kc&externalId=3880659&sliceId=1&docTypeID=DT_TID_
   1_1&dialogID=22570644&stateId=1%200%2022568512)

Novell ZENworks 7 Server Management

1. Install ZENworks 7 Server Management on the OES server

2. Make sure that the Distributor and Subscriber objects are created.

   IMPORTANT: If you did not delete the objects before the migration (Step 1 on page 116), you get an error and they are not created. In this case, all of the paths still point to the NetWare volumes and ZENworks 7 Server Management does not function properly.

3. Resolve the certificates by using ConsoleOne.

4. Right-click any of the distributions that you created and assign them to the new distributor created when you installed ZENworks 7 Server Management on the server.

5. Access the Distributions that have paths, and modify them with the new paths.

6. If you were using variables, access the Subscriber and re-create the variables, making sure they point to the new location on the OES server.

7. Open the ports in the firewall on the OES server.

   See "Ports used by ZEN" (http://www.novell.com/support/php/
   search.do?cmd=displayKC&docType=kc&externalId=3880659&sliceId=1&docTypeID=DT_TID_
   1_1&dialogID=22570644&stateId=1%200%2022568512)