Migration to NetWare 5.1

Accelerates Dell Manufacturing

By Nicolas Pujol and Terry Main

Dell is upgrading its servers running Novell NetWare 4.x to NetWare 5.1 in order to gain a more efficient operating system kernel, acquire more addressable memory, and support increased storage. This article provides an overview of NetWare use at Dell and highlights the value of upgrading both hardware and software during any operating system migration.

D ell® manufacturing facilities run three strategically chosen operating systems on PowerEdge® servers and PowerVault® storage solutions: Microsoft® Windows®, Red Hat® Linux®, and Novell® NetWare®. Dell is migrating its servers running NetWare 4.x to NetWare 5.1 to increase performance, maintain reliability, and support storage capacities greater than those accommodated by NetWare 4.x. Figure 1 illustrates the uses of NetWare within Dell's manufacturing IT infrastructure.

NetWare use in Dell manufacturing

Worldwide, Dell has 500 servers running NetWare, with more than 200 of these in the U.S. NetWare is typically used for network management, file and print, and as a general-purpose operating system. Dell uses NetWare to perform mission-critical operations in a manufacturing environment where downtime is unacceptable.

Dell chose to use NetWare in its manufacturing environment based on the extreme stability of the system. Companies running NetWare on PowerEdge servers in demanding environments can benefit from significantly reduced maintenance, downtime, and total cost of ownership.

To meet rigid business requirements, Dell uses two enterprise-capable servers for manufacturing in its factories: the PowerEdge 6300 and PowerEdge 6400. These servers provide enhanced availability features and higher bus speeds to meet Dell's storage-intensive needs; 500 servers support nearly 43,000 client connections in this manufacturing environment.

A storage-intensive manufacturing environment

Dell also chose NetWare 5.1 because of its storage capabilities. The NetWare 5.1 infrastructure supports Dell's requirement for 8 TB storage area network (SAN) configurations. Some of the individual servers provide up to 4 TB of data storage each. While NetWare 4.x limits total storage capacity to 2 TB, NetWare 5.1 can handle storage volumes up to 8 TB with the new Novell Storage Services™ (NSS) file system. The storage hardware includes internal hard drives of 36 GB or 72 GB. To guarantee
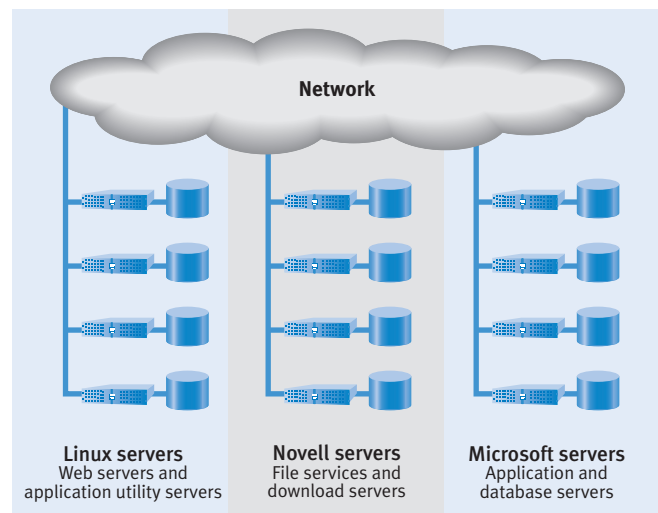

Figure 1. NetWare use in Dell manufacturing IT infrastructure

Linux servers
Web servers and application utility servers

Novell servers
File services and download servers

Microsoft servers
Application and database servers

Server	Support for NetWare
PowerEdge 300SC	✔
PowerEdge 350	
PowerEdge 500SC	✔
PowerEdge 1400SC	✔
PowerEdge 1550	✔
PowerEdge 2500SC	✔
PowerEdge 2550	✔
PowerEdge 4400	✔
PowerEdge 6400	✔
PowerEdge 6450	✔
PowerEdge 8450	✔

Figure 2. PowerEdge server platforms that support NetWare—workgroup to data center

maximum availability and reliability, Dell implemented RAID-5 as a fast, reliable storage solution in a mission-critical environment. In addition to internal storage, PowerVault 650Fs and 630Fs expand the storage area network (SAN) environment. Figure 2 shows the PowerEdge servers with platforms that support NetWare.

Advantages of NetWare in a manufacturing environment

NetWare users praise 5.1 for its high system availability and ease of administration and management. With tens of thousands of units produced every day and just-in-time inventory management, the smallest amount of downtime can quickly disrupt Dell's manufacturing process and increase operating costs.

Higher system performance and reliability increase productivity. Using NetWare 5.1, companies gain the benefits and reliability of Intel®-based systems. In addition to securing a stable platform, users can augment the speed gained from migrating to NetWare 5.1 by concurrently upgrading key hardware components and eliminating major bottlenecks. While every system has different bottlenecks, the following hardware components and system characteristics commonly limit performance by creating bottlenecks:

▸▸ Network interface cards (NICs) for network peripherals
▸▸ Front-side bus, processor speed, and RAM
▸▸ Ratio of clients to servers in the network configuration
▸▸ Disk configuration
▸▸ NetWare software and network configuration

By upgrading both hardware and software, Dell achieved considerable productivity gains in manufacturing. By migrating to NetWare 5.1 and re-architecting the network with best-of-breed hardware components, Dell reduced download times by a factor of three.

NetWare 5.1 migration strategies

There are two ways to migrate to NetWare 5.1 on PowerEdge servers: "in place" and "over the wire". These two migration methods are outlined below. For best results, Dell recommends that companies work with Dell Technology Consulting for services that can facilitate migration.

"In place" migration lowers costs

This option involves migrating from NetWare 3.x or NetWare 4.x to NetWare 5.1 by keeping an existing server and upgrading only the operating system. New hardware is not required. Figure 3 shows an "in place" setup.

The risks associated with "in place" migration are quite high. Once migration begins, data is processed and updated to the new NetWare 5.1 system, and files are copied on top of NetWare 3.x or NetWare 4.x. At this point, the user is committed to migration or to back-out plans in the event of a problem. The risk comes from the possibility of incompatibility with existing applications, which can cause significant trouble—data may be lost and the migration may take much longer than expected, with at least one server down for a prolonged period. While back-out plans using tape recovery will work, these too can be risky and take considerable time to implement.

Advantage of "in place" migration:
▸▸ No new hardware costs

Drawbacks:
▸▸ Extreme risk; once migration starts, user commits to migrate unless a complete backup has been performed
▸▸ Time-intensive migration
▸▸ Sub-optimal performance gains, as hardware bottlenecks may remain
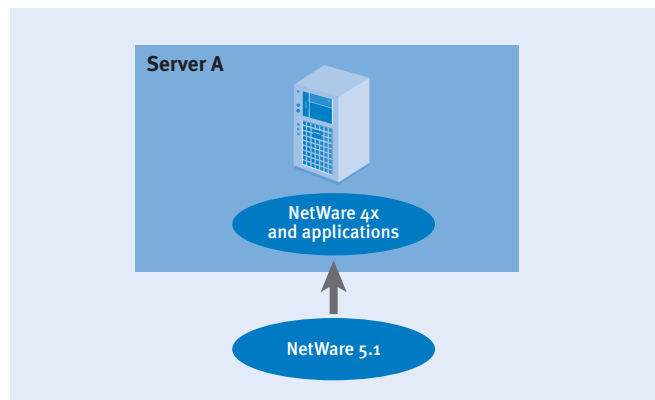▸▸ Data loss
▸▸ Server downtime

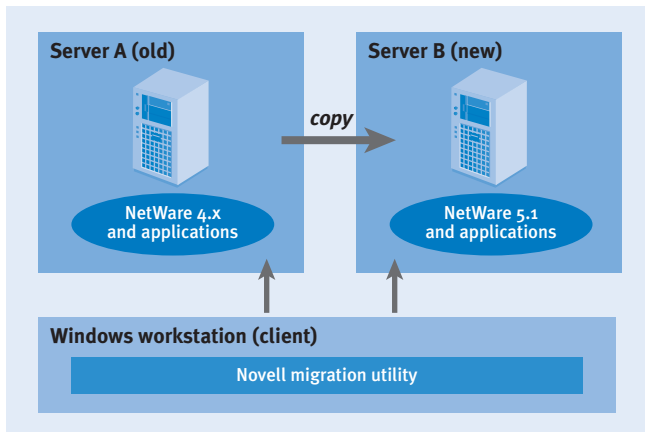*Figure 3. "In place" NetWare migration*

Figure 4. "Over the wire" NetWare migration

"Over the wire" migration reduces risk

"Over the wire" migration uses a new server. This approach offers both the safest way to migrate and the greatest performance gains. The process requires both the old and the new server to be up and running while an administrator on a workstation logs onto both machines and copies the data from the NetWare 4.x server to the NetWare 5.1 server. Figure 4 shows this setup.

If any problems arise, the user can return to the previous system, since data has simply been copied to the new system. If the migration is successful, the new server takes over with minimal risk.

To make the migration to NetWare 5.1 even easier, Novell developed a migration utility called the Migration Wizard, which runs on Windows and is available at no cost.[1]

Advantages of "over the wire" migration:
- Safest migration path because the original configuration is preserved
- Optimal gains in performance result from concurrent hardware and software upgrades
- Faster than "in place" migration
- Higher server availability than "in place" migration
- Data integrity maintained

Drawback:
- Slightly more costly than "in place" migration

Dell Server Assistant eases NetWare installation

When installing NetWare 5.1 on a PowerEdge server, using Dell Server Assistant (DSA) provides several advantages that make migration easier:

- Server deployment is faster and simpler. With Dell Server Assistant, a server setup takes about 30 minutes, whereas a manual installation may take hours.
- DSA detects hardware components and required drivers (the newest drivers can be found on www.support.dell.com).
- A user-friendly interface allows disk partitioning and RAID setup to be performed effectively and reliably.
- Associated software documentation includes instruction for PowerEdge servers deployed in NetWare environments.

Dell/Novell combination provides stability and performance

The Dell/Novell combination offers stability and performance, and Dell depends on this technology to provide a critical piece of its infrastructure. Dell's NetWare solution has successfully endured the most rigorous tests during more than a decade of internal use for mission-critical manufacturing processes. The scalability and reliability of Dell's infrastructure depends on enterprise-capable servers and operating systems. Dell continually seeks out and implements new technology to meet growing and changing business needs, motivating the migration to NetWare 5.1.

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FOR MORE INFORMATION

More information about Dell/Novell migration strategies and resources can be found at www.dell.com/novell

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[1] Migration utilities and further instructions are available on the Novell Web site at http://www.novell.com/products/netware/deployment/index.html. Migration utilities are also available on the NetWare 5.1 CD.