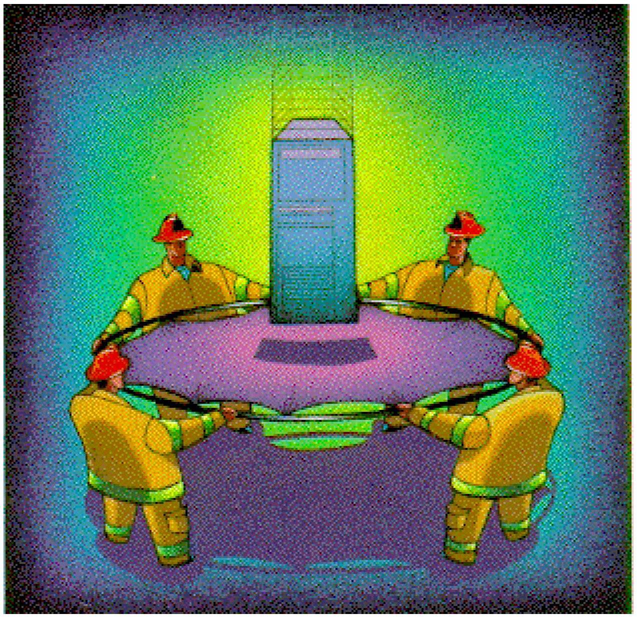
Stac

REVIEWER'S GUIDE



REPLICA™

FOR NETWARE

ADVANCED STORAGE MANAGEMENT

Table of Contents

INTRODUCTION 5

I. BACKGROUND 6

Technical Environment 6

Market Environment 7

What's Different about Replica for NetWare 7

II. PRODUCT COMPARISON 10

Overview 10

How to Test/Deploy 10

Comparison Summary Chart 11

III. DETAILED REVIEW 12

Paradigm 12

System Protection 12
Live Operation 13
Protection Speed 13
Automatic Protection of Logical Objects 14
Protection of Unmounted Volumes/Deleted Files 14
Multi-Threaded Concurrent Device Support 15

Disaster Recovery 15
Hardware-Independent Complete Server Recovery 15
Disaster Recovery Speed 15
Disaster Recovery Time 16
Simplified Disaster Recovery and Server Restart 17
Disaster Recovery "Fire Drills" Possible 18
Mount Tape as Network Volume to Verify Data 18
NetWare Command Console Recovery 19
Create New Servers without Installing Network OS 19

File Recovery 19
Application-Independent Restore Operations 20
Tape Mount Speed 20
Hardware-Independent Volume Upgrade/Migration 21
Seamless Near-on-line Storage 21
Client Access to Protected Data 21
Determining Access 22

APPENDIX 23

Test Bench 23

Stac Replica for NetWare—System Requirements 23

Introduction

This guide is designed to help you review Stac Replica for NetWare software, Stac's new network server backup replacement and disaster recovery product, in light of the IS manager's three most important requirements in a storage management product:

System Protection

Disaster Recovery

File Recovery

Our intended audience is anyone with an interest in understanding how to compare these products, including IS and network managers, corporate evaluators and reviewers.

In order to help speed your evaluation, this reviewer's guide has been divided into three sections:

- The first section offers a brief history of the techniques and market considerations that have shaped server backup products over the last ten years. It also summarizes what's different about Replica for NetWare compared to traditional backup products.
- The second section consists of a product comparison among Stac Replica for NetWare and three specific competing products: Cheyenne ARCServe, Arcada Backup Exec and Palindrome Storage Manager. You may wish to scan the chart for those items which are of most interest to you, then look them up in the Table of Contents.
- The third section covers each feature in detail.

Should you have technical questions during your evaluation of this product, please contact our Reviewers' Product Support Hotline: (619) 794-3701 between the hours of 8:00 a.m. and 5:00 p.m. Pacific Standard Time.

I. Background

Technical Environment

In the first half of the 1980's, when PC-compatible tape backup products came onto the market, the predominant technology was that of image backup, in which the physical image of the disk was saved, sector by sector, to tape.

Image backups did not, however, allow for restoration of individual directories or files, so file-by-file backup products came into prominence. These backups provide the flexibility to restore individual directories and files, but they are slow because they access the files one at a time via the file system of the network operating system. Additionally, tracking the saved files requires that file databases be written by the backup software, and these databases are essential for file restoration. As the demands on networked drives have grown, this has led to an increase in the size of the "backup window", during which users' access to data on the server is severly restricted or impossible.

To save time and shorten the backup window, complex schemes such as incremental or differential backups have been added to file-by-file products so that only modified files are backed up. The disadvantage of these products is that the restoration process is slower and more complex because multiple backup sets may need to be accessed to get the latest versions of all files in a directory. The problem is magnified greatly when restoring an entire server.

Until Replica for NetWare was introduced, IS managers didn't really have any choice; most had to use these backup products based on file-by-file technology. Several factors, however, have contributed to the decreasing adequacy of these traditional backup products:

Size of media

Network volumes have increased in size to an average of 2.5 to 10GB and can span multiple physical disks. With this volume of data come greater demands for speed and reliability of backup/restore operations.

Network technology

Network servers consist of much more than simply the program and data files in their volumes. Other important information such as partition data and the boot volume are held outside the data volumes and are also subject to damage and corruption.

Size of networks

The size of the typical network installation has grown vastly. The relatively low speed of file-by-file backup burdens server performance and the complex disaster-recovery procedure (recreate partitions, reinstall the network OS, re-install backup software, restore data from backup) can lead to long down-times and loss of business.

Market Environment

Novell estimates that over 4 million NetWare servers will be in use by the end of this year. Of these, 700,000 new server licenses shipped during the calendar year.

Market researcher IDC estimated gross revenues for backup software running on NetWare servers at $240 million last year. They expect this to grow to $293 million next year.

Also according to IDC, the average NetWare server this year contains 2.5GB of disk capacity, with the upper 20% of the market holding 10GB or more. These capacities were unheard of ten or even six years ago, when a large server was 100MB in size and contained 10,000 files. As storage hardware capacities have grown to 2.5GB and 100,000 or more files, the demands on storage management software have increased commensurately.

What's Different about Replica for NetWare

Replica's patent pending Object Replication Technology™ brings a new approach to the way network servers are protected.

Instead of working at the sector level (as in image backup) or at the file level (as in file-by-file backup), Replica works at the object level and therefore gains high-speed access to *all* of the server, not just to the files and directories stored in the network volumes. It offers the speed of an image backup without the file system overhead of file-by-file solutions.

Replica treats each area of your server as a separate storage management object. The disk partition tables, boot volume, security information, system volume and data volumes are all treated as logical server objects; this allows you to create a complete copy (or replica) of your *entire* server by saving it, logical block by block, from one end to the other.

Because each block is accessed without any file system overhead, the replication process can pass information at high speed to a digital tape drive, such as a DAT or DLT drive, without the starting and stopping that characterizes file-by-file backups. In fact, regardless of the size and number of files held on the servers, it is possible to stream to such tape drives at their maximum transfer rates. This means that the replication of one million 1,000-byte files would take the same time as replication of a 1GB database file.

Object Replication Technology brings with it 3 major benefits:

System Protection

Replica for NetWare can replicate data when the server is in full use; i.e., "live". There is no need to down the server.

Even open files on the server can be replicated safely.

Disaster Recovery

Because Replica for NetWare protects the entire server, and not merely the data files in the volumes, disaster recovery becomes a far simpler process.

Replica creates disaster recovery disks for automatically starting the network OS and Replica itself. To recover the server, Replica simply reads all the replicated server objects from the storage medium to the server drive, then prompts to restart the server.

A 2GB server can, therefore, be recovered with just three keystrokes, two diskettes, and a tape, in about one-tenth the time required by traditional file-by-file-based backup products.

File Recovery

Because Replica maintains all of the orginal server-based structures on the replica copy, this copy can be mounted and accessed directly as a read-only NetWare volume; thus no special file recovery software is required.

Replicated versions of files and directories can be recovered using any program that can normally read files from the original NetWare volume. The Windows File Manager, the Windows 95 or Windows NT Explorer, or any DOS or Windows application can be used to recover files.

IS managers can also choose to allow access to the read-only replica copy to other people such as help desk staff or departmental users. Because all of NetWare's security rights are maintained, these users will have access to *only* those directories and files to which they have access on the original NetWare volume.

This table summarizes how traditional backup methods compare with object replication:

Object Replication vs. File-by-File/Image Backup			
	Image Backup	File-by-File Backup	Object Replication
Protection	- No live protection (Server must be down) + Fast (No wasted head-seek time) - Complex (Why?)	- Partially live - Slow (file system overhead) - Complex (incremental/ differential methods)	+ Live + Fast + Simple
Disaster Recovery	- Hardware-dependent (must restore to same configuration/geometry) + Fast + Automated, simple (Why?)	+ Hardware-independent - Slow (file system overhead) - Complex (Must re-install NOS)	+ Hardware-independent + Fast + Simple (fully automated recovery)
File Recovery Process	- No access to individual directories/files	- Application-dependent access (Access requires special restore software) - Slow (files must be looked up in databases) - Complex (Access requires administrative involvement)	+ Full, application-independent access + Fast (Secure access via any application) + Simple (low/no administrative involvement)

II. Product Comparison

Overview

This section presents a comparison of Stac Replica for NetWare and the three leading data protection products for Novell NetWare servers: Cheyenne ARCServe, Arcada Backup Exec and Palindrome Storage Manager.

How to Test/Deploy

The ideal configuration under which to compare network storage management products is the one in which the fewest constraints are placed on the software by the hardware itself. Following are three common scenarios for testing network servers and secondary storage:

- Direct connection in the same server with dual SCSI adaptors. With the server's disk drive on one SCSI adaptor and a DLT, 8mm or DAT tape drive on another SCSI adaptor, data moves smoothly and quickly through RAM from one adaptor to the other. With Replica, throughput of up to 150MB/minute or 9GB/hour is possible on a DLT drive in this configuration.

- Direct connection in the same server with single SCSI adaptor. Although the direct connection between devices is preserved, there is overhead due to negotiation and confirmation through the single channel. Maximum DLT throughput can drop to 120MB/minute or 7.2GB/hour.

- Remote connection across 100Mbps high-speed backbone. When server disk and tape drive are no longer in the same machine, the size of the network pipeline becomes a factor. Even with a high-speed link, maximum throughput is still far below that of the single-SCSI scenario: 40MB/minute or 2.4GB/hour.

Note: Storage management products can also be tested across a 10Mbps Ethernet link, but at this rate, the 10 Mbps link becomes the bottleneck, and maximum throughput drops to the prohibitively low 10-20MB/minute range. In this case, it may appear as though all products perform roughly the same, since all can run at least this fast. The differences in performance are not visible under this scenario.

Comparison Summary Chart

The following chart summarizes each comparison point. Detailed analysis follows in Section III.

Replica for NetWare Competitive Matrix (Server NLM-based products)

Category / Feature	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Mgr.
Paradigm				
Technology	Object Replication	File-by-file	File-by-file	File-by-file
System Protection				
Live Operation				
Built-in protection of open files	Yes	No	No	No
Flushing of pending writes	Yes	No	No	No
Protection Speed	9GB / Hr	3GB / Hr	3.4GB/Hr	1.7GB / Hr
Automatic protection of logical objects				
Security (Bindery/NDS) object	Yes	Yes	Yes	Yes
Partition table object	Yes	No	No	No
DOS partition object	Yes	No	No	No
Netware volume object protected as:	Object	Files	Files	Files
Protection of unmounted volumes/ deleted files	Yes	No	No	No
Multi-threaded concurrent device support	Yes	No	No	No
Disaster Recovery				
Hardware-independent complete server recovery	Yes	Yes	Yes	Yes
Disaster recovery speed	4.5GB/hr	1.5GB/hr	1.7GB/hr	.85GB/Hr
Disaster recovery time (2GB server)	< 1 Hr	≥ 1 day	≥ 1 day	≥ 1 day
Simplified disaster recovery and server restart				
All server objects protected	Yes	No	No	No
Creates bootable floppy of network OS	Yes	No	No	No
Network OS and patches automatically restored	Yes	No	No	No
Eliminates need to reinstall recovery software, file databases	Yes	No	No	No
Eliminates need to separately restore security objects	Yes	No	No	No
Disaster recovery "fire drills" possible	Yes	No	No	No
Mount tape as network volume to verify data	Yes	No	No	No
NetWare command console recovery	Yes	No	No	No
Create new servers without installing network OS	Yes	No	No	No
File Recovery				
Application-independent restore operations	Yes	No	No	No
Drag-and-drop restore to any location	Yes	No	No	No
File Open/Save As restore under any application	Yes	No	No	No
Tape mount speed	approx 5 min	N/A	N/A	N/A
Hardware-independent volume upgrade/migration	Yes	No	No	No
Seamless near-on-line storage	Yes	No	No	No
Client access to protected data	Any Client	Admin only	Admin only	Select clients
Determining access	Std NOS	N/A	N/A	Proprietary

III. Detailed Review

Our review of the products is task-oriented. Considering the IS manager's expectations of a total storage management solution, we examine the features of each product in the areas of :

System Protection

Disaster Recovery

File Recovery

Paradigm

The approach to storage management is the determining factor in how well suited each product is to *all three* tasks of system protection, disaster recovery and file recovery. In it lies the difference between a product being able to perform the task effectively and its being able to perform it with compromises in performance or efficiency.

Which paradigm does each product use?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Paradigm	**Object Replication**	File-by-file	File-by-file	File-by-file

System Protection

IS managers purchase a storage management product to ensure that their server data is protected. A storage management solution should offer protection for *live*, running servers; it should be *fast* to reduce demands on the server; and its operation should be *simple*, requiring as little of the IS manager's effort as possible.

Live Operation

Most file-by-file backup products do not back up open files on the server. Their usual method of handling open files is to skip them on the first pass, then to attempt to back them up at the end of the job. Some add-on products for handling open files seek to remedy this by copying the open file to another location for backup, but few automatically cause any pending writes to be flushed from the server cache.

Does the product freeze the volume to protect open files?

Does the product ensure that all writes to an open file are first flushed from the server cache?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Built-in protection of open files through volume freeze	**Yes**	No	No	No
Flushing of pending writes	**Yes**	No	No	No

Protection Speed

The most commonly cited index of performance is the rate at which the storage management product can move data from disk to tape. (Moving from disk to disk, of course, is faster, but tape is a more common medium of secondary storage.)

Under the optimal test scenario given above (“How to Test/Deploy”), the products should exploit with maximum efficiency all elements in the secondary storage chain: SCSI controller, tape controller, and the tape drive.

The paradigm also plays a role. Because file-by-file products are subject to the file system overhead of the network OS and must also devote seek time to locating the starting, ending and fragmented blocks of a file’s data, the tape controller’s buffer can become empty, causing a slow overall transfer rate as the tape stops and restarts. When saved as a contiguous, logical object, however, the server’s data will stream to the tape, with no file system overhead, no head-seek interruptions and no tape buffer under-runs.

What is typical protection speed for each product using dual SCSI adaptors and a DLT drive?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Protection Speed	**9 GB/hr**	3 GB/hr	3.4 GB/hr	1.7 GB/hr

Automatic Protection of Logical Objects

The ability to completly recover a damaged server depends on far more than simply recovering the data in the volumes. The storage management product must protect the network OS itself and information and structures on which the network OS relies; e.g., the security objects such as the Bindery or NDS information, the partition table, and the boot partition. It must also make them readily available for recovery.

Protection	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Security (Bindery/NDS) object	**Yes**	Yes	Yes	Yes
Partition table object	**Yes**	No	No	No
Boot partition object	**Yes**	No	No	No
NetWare volume protected as:	**Object**	Files	Files	Files

Protection of Unmounted Volumes/Deleted Files

By their very nature, file-by-file backup programs cannot protect data in unmounted volumes because they cannot read them. Under the logical object approach, however, an unmounted volume is still a valid object and can be protected.

Protection of deleted files adds even more value to the product by permitting salvage operations on secondary storage.

Can the product protect unmounted volumes?

Can the product also protect deleted files?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Protection of unmounted volumes	**Yes**	No	No	No
Protection of deleted files	**Yes**	No	No	No

Multi-Threaded Concurrent Device Support

Storage management needs often require protecting a server by copying data to several different tape drives simultaneously. This poses problems from the standpoint of both configuration and resource utilization.

To run multiple concurrent storage operations, some products require a separate controller for each tape drive. Not only must each controller be properly configured to run, but it may also require an additional copy of the driver in RAM to control the storage operation, unless a single copy of driver can process multiple tape drives; i.e., is a re-entrant driver.

How does the product support multiple concurrent sessions and devices?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Single copy of driver can run multiple tape drives simultaneously	**Yes**	No	No	No

Disaster Recovery

No IS manager likes to think about disaster recovery--let alone perform it--but every IS manager plans for it. A storage management solution should allow *hardware independent* restore operations, and *fast*, *simple* recoveries by protecting *everything* needed for the server.

Hardware-Independent Complete Server Recovery

Object replications and file-by-file backups can be restored to different hardware from that of their origin; data on an IDE-based server could be saved to tape, then be recovered and mounted on a SCSI drive.

An image backup, however, is dependent on the same hardware and geometry for restore operations.

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Hardware-independent complete server recovery	**Yes**	Yes	Yes	Yes

Disaster Recovery Speed

The block-by-block restoration of a network object from tape to disk eliminates the overhead of updating the file allocation tables as each file is stored.

What is typical recovery speed for each product using dual SCSI adaptors and a DLT drive?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Recovery Speed	**4.5 GB/hr**	1.5 GB/hr	1.7 GB/hr	.85 GB/hr

Disaster Recovery Time

How much time can the average IS manager spare to recover a server?

Consider the sequence of events when it is discovered that a server has sustained damage and traditional file by file backup products are in use:

- reformat and partition server hard disk (.5 hr.)
- install bootable network OS (3.5 hrs.)
- locate and install necessary device drivers, patches (1 hr.)
- install backup software’s restore utility and recover file databases (1 hr.)
- restore files to server volumes (4-6 hrs.)

...all of which can take most of a day for even an experienced network administrator.

When, however, the server has been replicated on tape as a series of logical objects, and diskettes with a bootable copy of the network OS and the restore utility have been created, the process of recovering a damaged server becomes:

- boot from diskette (5 mins.)
- restore from tape (45-120 mins.)

How long does it take on average to recover a 2 GB server with 1 GB of data from DLT?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Disaster Recovery Time	**< 1 hour**	≥ 1 day	≥ 1 day	≥ 1 day

Simplified Disaster Recovery and Server Restart

The disaster recovery process should involve as few steps and demand as little technical knowledge as possible.

With protected data held as logical objects, there is no need to re-install the network OS when recovering a server. The storage management product should provide all needed tools to start and bring back the damaged server. Consider that the procedure could be as simple as the following:

1) load the tape into the tape drive;

2) boot the server from floppy disk;

3) recover all the server objects from tape (or disk);

4) restart the server.

The logical-object approach eliminates the need for the file databases indexing the data in secondary storage, as well as the need for reinstalling the bootable partition and applying network OS patches.

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
All server objects protected	**Yes**	No	No	No
Creates bootable floppy of network OS	**Yes**	No	No	No
Network OS and patches automatically restored	**Yes**	No	No	No
Eliminates need to reinstall recovery software	**Yes**	No	No	No
Restoration without file databases	**Yes**	No	No	No
Eliminates need to separately restore security objects	**Yes**	No	No	No

Disaster Recovery “Fire Drills” Possible

To measure the amount of time required to recover a crashed server or demonstrate the integrity of a backup created with a file-by-file product, the IS manager needs to dedicate a machine with a large enough disk, take the time to install an identical copy of the network OS and recovery software on it, and then perform a file restore operation.

A good storage management solution should allow for the IS manager to perform “fire drills” to test the readiness of the protection system with as much ease as possible.

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Disaster recovery fire drills possible	**Yes**	No	No	No

Mount Tape as Network Volume to Verify Data

The real measure of any data protection system is in the accuracy and reliability of restoring the saved data. Rather than fully restoring and reloading the server, however, IS managers would prefer less extreme and time-consuming ways of ensuring that the data on the tape is identical to the data on the server drive.

Mounting the protected data as a live, logical volume, then accessing the directories and files on it would reassure the network administrator that the data were protected. This eliminates the need for explicitly restoring files to prove that data on tape are recoverable.

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Mount tape as network volume to verify data	**Yes**	No	No	No

NetWare Command Console Recovery

Most products in the category feature a Windows GUI allowing control of the server from the administrator's workstation. However, in the case of a disaster when the server is down, a workstation-based GUI is worthless, since the network connection to the damaged server may not be available. The alternative is to run the software from the server console.

Does the product support disaster recovery from the NetWare command line?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
NetWare command console recovery	**Yes**	No	No	No

Create New Servers without Installing Network OS

Object Replication Technology results in a series of logical objects which can be replicated as an intact server--pre-configured with the bootable network OS, and volume and partition data--to another disk drive. This gives IS managers the opportunity to "cookie-cut" servers by replicating one baseline configuration to other machines as often as licensing permits. "Generic" NetWare servers for use in branch offices or departments can also be created in this way.

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Create new servers without installing network OS	**Yes**	No	No	No

File Recovery

IS managers rely on storage management products not only for the extreme purposes of disaster recovery, but also for those of file recovery. The process should be *application-independent,* such that no special software is needed to recover data; the means of accessing the data should be *simple*; and recovery of the data should be *fast.*

Furthermore, while file recovery functionality in storage management products has historically been evaluated from the perspective of the *network administrator*, the object-replication approach can also allow *clients* secured access to protected data.

All products in the category accommodate recovery of volumes, directories and files.

Application-Independent Restore Operations

Once the saved data have been made accessible, how is yesterday's version of a spreadsheet recovered?

Protected data held as logical objects and served up as a mapped network drive are accessible to drag-and-drop under the Windows File Manager, or the Windows 95 or NT Explorer, as well as to any COPY, NCOPY or XCOPY command.

For the same reason, any saved directory or file on the drive is visible to any DOS or Windows application with a simple File Open operation, and it can be stored locally with a Save As... operation. It should not, therefore, be necessary to use special restore software to recover protected directories or files

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Drag and drop restore to any location	**Yes**	No	No	No
File Open/Save As restore under any application	**Yes**	No	No	No

Tape Mount Speed

With the protected data held *as objects,* the tape can be mounted and accessed as a normal server disk drive. This permits the IS manager to examine and access any object on the tape as if it were on a network disk drive.

How long does it take to mount a tape for file access?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Tape Mount Speed	**~5 minutes**	N/A	N/A	N/A

Hardware-Independent Volume Upgrade/Migration

With the server protected as a series of logical objects, selective recovery of objects (e.g., only the SYS volume, only the security data, etc.) becomes an option to the IS manager. And, because the object replication model is hardware- and NOS version-indepedent, volume migration is possible.

Data volumes replicated from an IDE-based server drive running NetWare 3.12, for instance, can be replicated to a SCSI-based server drive running NetWare 4.10. This is far faster than under a file-by-file scheme, in which it would first be necessary to create the volumes, then restore the files to them one by one.

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Hardware-independent volume upgrade/migration	**Yes**	No	No	No

Seamless Near-on-line Storage

The benefit of mounting the protected data as a network drive is that of making it available with simple, common tools provided by the network OS. To create more room in the SYS volume for print jobs, for example, an IS manager could store less-used but still important network utilities on tape for quick availability anywhere on the network.

Does the product serve up the protected data as available, secondary storage?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Seamless near-on-line storage	**Yes**	No	No	No

Client Access to Protected Data

Naturally, the final arbiter of client access to saved data is the network administrator. However, the admininstrator can only grant as much access as the storage management product allows.

Who can be allowed to access the protected data with each product?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Accessibility to clients	**Any Client**	Admin only	Admin only	Select clients

Determining Access

Beyond the security imposed by the read-only status of the saved volume, how does the storage management product protect the access rights to files and directories? Can the IS manager simply rely on the existing schemes already in place for the network OS, or must yet another security scheme be created?

	Stac Replica for NetWare	Cheyenne ARCServe	Arcada Backup Exec	Palindrome Storage Manager
Access determined by:	**Standard Network OS Security**	N/A	N/A	Proprietary

Appendix

Test Bench

Direct:

DEC Venturis Pentium 90 server
Adaptec PCI 2940 SCSI Adaptors (2 x)
Maxstor 71260AT IDE disk drive, 1GB
Seagate ST15230N SCSI disk drive, 4GB
Quantum DLT 4000 tape drive
Exabyte 8505 8mm tape drive
Hewlett-Packard SureStore 6000 DAT tape drive

Remote:

Compaq ProLinea Pentium 90 server
100Mbps Fast Ethernet
SMC 9332 Ethernet cards
SMC Tiger hub

Stac Replica for NetWare—System Requirements

Server:

NetWare 3.12 or 4.x
Minimum 10 MB disk space
Minimum 16 MB RAM
ASPI-compliant SCSI controller
SCSI tape drive(s)

Administrator PC:

Windows 3.1, 3.11 (Enhanced Mode) or Windows 95
Minimum 4 MB disk space
Minimum 8 MB RAM

Tape Drives supported:

All drives supported by Novell NetWare 4.10