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Contents

Compaq TaskSmart N-Series Appliance Network Attached Storage Backup Guide

Abstract: This document is a backup guide for the Compaq Network Attached Storage (NAS) appliance. This document guides the user in understanding the backup and restore solution that is best suited to the Compaq TaskSmart N-Series appliance and the business environment the system is used in.

Introduction

Note: This paper includes the terms fibre and fiber. Fibre is the international spelling that refers to the Fibre Channel Standards that include optical and copper media. Fiber refers to the optical media used to implement Fibre Channel.

Many computer environments have information infrastructures that are out of control. Data management and information deployment are more complex today due to the pressure of handling more online information, while retaining an easy-to-access format. Even more pressing is the need for a complete data protection strategy, which can provide the security the business environment demands, protecting the most valuable asset of any company—information.

Compaq provides leading-edge solutions for both direct connect and storage area network (SAN) customers. With the introduction of the Compaq *TaskSmart*™ N-Series appliance, Compaq also provides increased storage flexibility for network attached storage.

Network attached storage (NAS) refers to storage elements that connect to a network and provide file access services to computer systems. The TaskSmart N-Series appliance consists of a data storage and server component, which implement the file services.

The TaskSmart N-Series appliance is designed as a complete engineered storage solution for a network. The appliance uses an advanced technology architecture, an optimized and reliable operating system, and integrated software components in a fully certified and tested solution. The TaskSmart N-Series appliance enables companies to realize the benefits of storage consolidation and heterogeneous file serving in an easy-to-deploy, easy-to-manage file serving device.

Figure 1: Compaq TaskSmart N-Series appliance

Protecting company information with efficient backup systems employing reliable restore capabilities is crucial to the modern business environment. With many factors to choose in the backup and restore marketplace, Compaq has provided this information-based document to help ease the task of choosing a data-protection strategy.

Defining a Solution

Key decisions must be addressed when designing the appropriate backup and restore solution. Issues are backup and restore performance, media reliability, tape rotation schemes, and offsite storage of data. These issues are addressed in this document. Defining a solution requires focusing on three core issues when deploying a backup solution:

- Hardware issues
- Software issues
- Sizing issues

In many departmental and workgroup situations, stand-alone tape drives and tape libraries are connected directly to the server appliance, providing the server with fast backup speeds and exclusive use of the devices. In enterprise environments, multiple servers commonly share a large tape library device through the communications network. A tape library device provides the benefit of an automated solution for reduced human error, without impacting network performance during the backup and restore process.

Note: When operating in a direct-connect environment, either stand-alone systems or libraries can be used, depending on the capacity and automation requirements of the system.

Depending on the need or ability to share a tape library, a company can choose to deploy a storage area network (SAN) for backup and restore or extend an existing SAN to include the TaskSmart N-Series appliance. SAN used for backup and restore allows multiple servers to share an automated tape library over a dedicated communication network using fiber channel as the interconnect. This backup solution takes advantage of the Fibre Channel infrastructure, and provides greater flexibility in distance between devices (up to 10 km using Single Mode Fibre Channel) as well as greater speed (100 MB/s). The use of a SAN also provides better asset utilization because a larger automated tape library can be shared by multiple servers, and because the automated library reduces human error.

If there is no need for sharing the library, the easiest and most direct way to back up the TaskSmart N-Series appliance is to connect a tape library, tape array, or stand-alone tape drive to the TaskSmart N-Series appliance using a direct SCSI connection.

Hardware Issues

Selecting the correct tape device and connection type matched to the company computing environment ensures a reliable backup of data.

Tape Device Type

Because of their common usage in the industry and excellent performance and capacity, Compaq recommends the following tape solutions for use with the TaskSmart N-Series appliance.

- Compaq Standalone DLT 35/70 Mini Library tape system
- Compaq Standalone DLT 40/80 Mini Library tape system
- Compaq DLT Tape Array
- Compaq TL891 DLT Mini Library
- Compaq TL895 DLT Library
- Compaq ESL9326 DLT Library
- Compaq SSL2020TL AIT Library
- Compaq TL891DLX DLT Library

For a full list of qualified tape solutions, refer to:

www.compaq.com/TaskSmart

Software/Hardware Issues

SCSI Direct Connect Environments

The next step is to select backup software compatible with the selected tape devices. The TaskSmart N-Series appliance has been tested with popular Compaq certified backup solutions software, and with the Compaq tape solutions listed in the previous section, under “Tape Device Type.”

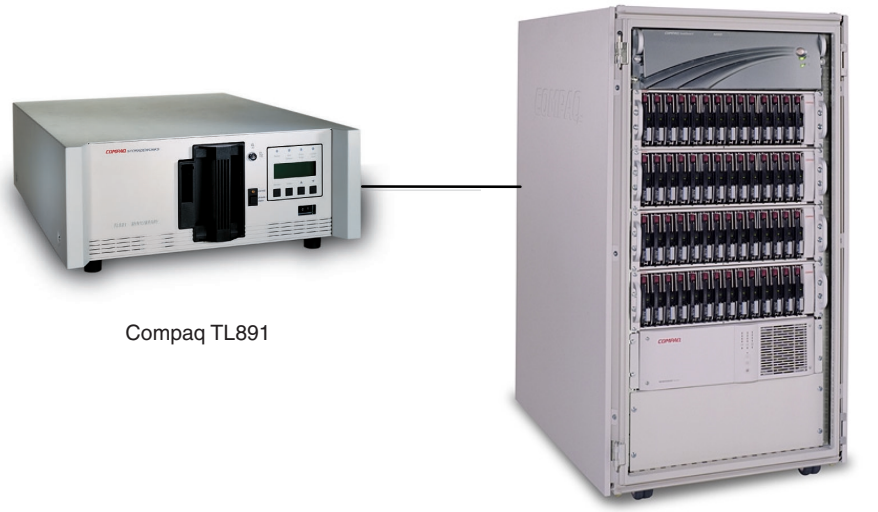

Figure 2: SCSI Direct Connect configuration with the TL891 DLT Mini Library

To implement a SCSI-connected solution, determine which type of tape device will be connected. Single ended (SE) SCSI devices can be connected directly to the integrated SCSI connector on the TaskSmart N-Series appliance. Single ended (SE) devices include stand-alone tape drives, Compaq DLT tape arrays, and some small tape autochangers. Check the tape device product documentation to verify that there is an SE connection. The integrated SE SCSI connector on the appliance supports up to two DLT 7000 (35/70-GB) tape drives on its single SCSI bus.

Some tape devices use High-Voltage Differential (HVD) or Low-Voltage Differential (LVD) connections. Typical HVD or LVD tape devices include the Compaq TL891 DLT Mini Library, Compaq TL895 DLT Library, standalone Super DLT, MSL5026 and other autochangers. To use these devices, purchase the optional SCSI tape controller and install the controller in PCI slot #4 in the appliance. The optional HVD or LVD cards have two SCSI buses, each capable of supporting up to two DLT 7000 (35/70-GB) devices, up to a total of four tape drive devices. The use of these types of automated libraries is highly recommended to improve the efficiency and reliability of backup and restore operations.

Before purchasing a tape device, check to ensure that the backup software supports the preferred backup device. Most backup software supports a wide range of backup devices, and Compaq has done extensive testing and certification on select independent software vendors (ISV) such as VERITAS, Legato and CA. The administrator must confirm the specific choice by consulting the software vendor's website. The vendors usually post a hardware compatibility guide for each version of the backup software application. TaskSmart supported configurations are listed in Table 1, under the "Supported Configurations" section of this document.

Fibre Channel Environments

In the event that the company already makes use of shared tape libraries, or intends to add a shared tape library, the type of Fibre Channel environment being used should be determined. The administrator must determine which Fibre Channel environment is being used or provides the greatest flexibility for the specific environment:

- Fibre Channel Arbitrated Loop (FC-AL)
- Switched Fabric Fibre Channel (FC-SW) or (FC-switched)

Fibre Channel Arbitrated Loop

Fibre Channel (FC) loop environments connect servers to backup devices using a Fibre Channel hub or switch and a Fibre Channel-to-SCSI bridge, called a Modular Data Router. The Fibre Channel loop host bus adapter (HBA) board is installed into a PCI slot in the TaskSmart N-Series appliance, and a fiber link connects the board to the fiber hub or switch. Other servers can also be connected to the hub/switch in the same way. A separate fiber link connects the hub\switch to the modular data router. Finally, a differential SCSI cable connects the tape controller to the actual SCSI tape devices, such as a Compaq TL891 or TL895 DLT library. FC-AL provides a shared bandwidth of up to 100 MB/sec.

A typical FC-AL backup solution consists of the following:

- One or more servers, each with a Fibre Channel host bus adapter
- FC-Hub-7, FC-Hub-12 or FC-AL Switch 8
- Fibre Channel-to-SCSI bridges (MDR) for library connectivity
- Compaq TL891 DLT Mini Library or TL895 DLT Library (shown)
- Backup solution software that allows multiple servers to share the tape drives in the library

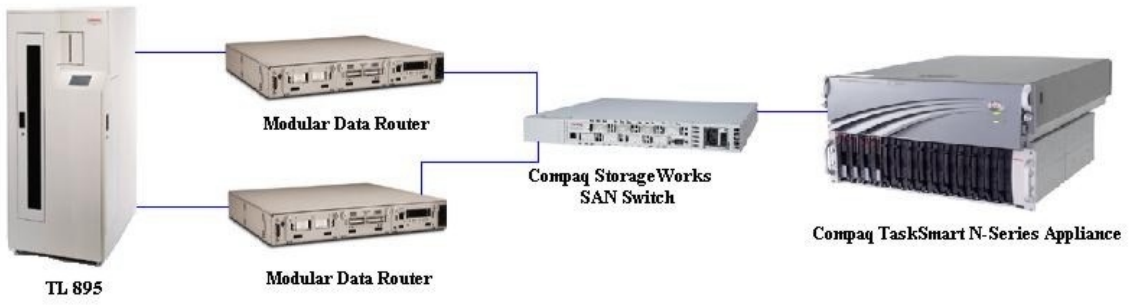

Figure 3: Enterprise Backup Solution for Fibre Channel Arbitrated Loop with the Compaq TL895 DLT Library

Switched Fabric Fibre Channel

Switched Fabric Fibre Channel environments use a different host bus adapter (HBA), and a fiber switch replaces the fiber hub used in the loop environments. Switched fabric environments are more scalable in performance and capacity than loop environments, because the architecture provides a dedicated data path between two devices in a switch. Other devices may be connected to the switch device, but they do not see or interfere with the two nodes that are communicating. This provides much greater performance, because loop-based environments must share a 100-MB data path. Switched environments contain many dedicated 100-MB data paths, without sharing the bandwidth.

A typical Switched Fabric Fibre Channel environment consists of the following:

- One or more servers, using a Compaq 64 bit PCI Fibre Channel HBA (KGPSA-CB)
- A Fibre Channel 8-port SAN Switch or a 16-port SAN Switch
- Multiple Fibre Channel-to-SCSI bridges for library connectivity
- Compaq TL891 DLT Mini Library, TL895 DLT Library or ESL 9326D Library (shown)

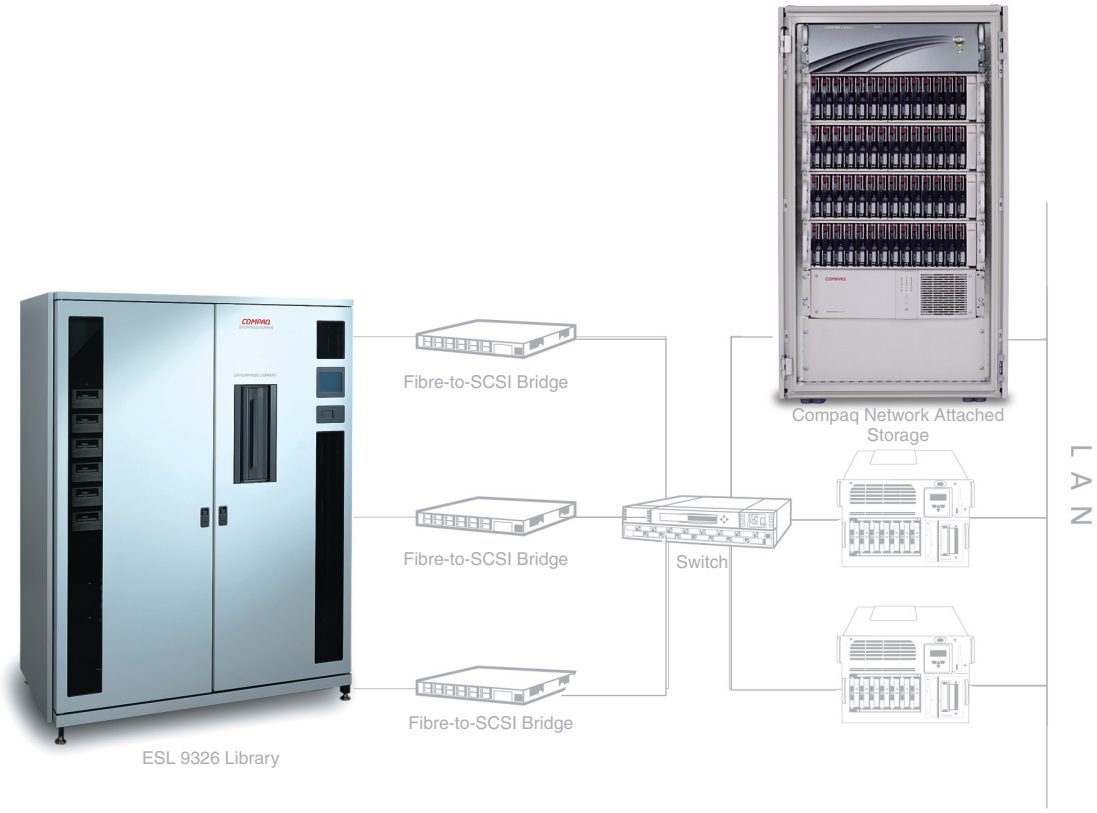

Figure 4: Enterprise Backup Solution for Switched Fabric Fibre Channel environments shown with the ESL9326D Library

Compaq recommends that the administrator verify that the chosen backup software supports the specific hardware environment that will be deployed. Refer to Table 1 under the "Supported Configurations" section of this document.

Backup Software Vendors

With the TaskSmart N-Series appliance, Compaq has taken the lead in enterprise management, developing a comprehensive portfolio of enterprise management solutions, all designed to consolidate system information for end-to-end enterprise management and a lower total cost of ownership.

VERITAS

Backup Exec

VERITAS Backup Exec is a storage management software package that focuses on data backup and restore. The goal of backup and restore can be accomplished with many different tape devices in various configurations and by using a transport method such as the corporate communication network, a server SCSI bus, or a Fibre Channel infrastructure.

Compaq has partnered with VERITAS to provide the Enterprise Backup Solution using the speed and scalability of Fibre Channel technology. Compaq supports the backup and restore of homogeneous/heterogeneous operating systems using VERITAS Backup Exec software. The Enterprise Backup Solution (EBS) with VERITAS Backup Exec uses a storage area network (SAN) that provides dedicated bandwidth independent of the local area network. This independence allows single or multiple backup or restore jobs to run without the network traffic caused by traditional data-protection environments.

The shared storage option (SSO) allows all servers configured in the SAN to share a common set of tape devices. The Advanced Device and Media Management (ADAMM) database for VERITAS Backup Exec resides on one VERITAS Backup Exec server and provides management capabilities for the shared devices. VERITAS Backup Exec uses this shared database to arbitrate all device and media requests and to prevent accidental media overwrites. The ADAMM database also provides for central device and media tracking and reporting.

Additionally, because of the manner in which the application addresses the devices, tape libraries are always presented to the application in a consistent order. This device persistency eliminates the need to reconfigure the application in case of a tape drive or library failure.

For more information about the installation, operation reference, troubleshooting, and future upgrades of VERITAS, refer to the online document *Enterprise Backup Solution with VERITAS Backup Exec User Guide*, located at

www.compaq.com/products/storageworks/ebs/ebslibrary.html

NetBackup

VERITAS NetBackup provides complete data protection for the TaskSmart N-Series appliance. With NetBackup, organizations can manage all aspects of backup and recovery from intuitive graphical user interfaces (GUIs). Consistent backup policies can be set across the enterprise.

The NetBackup media management capability enables organizations to perform all aspects of media management, including library sharing. The NetBackup Java interface provides complete real-time and historical analysis of all backup and recovery operations.

VERITAS NetBackup SSO is the industry's first heterogeneous SAN solution that allows individual tape drives (stand-alone or in a robotic tape library) to be shared dynamically between multiple VERITAS NetBackup Servers. The drives are connected to each host by enabling Fibre Channel hardware, such as switches and Fibre Channel tape controllers. SSO allows enterprises to leverage their peripheral investments more thoroughly through drive sharing, because individual drives do not have to be tied to a specific server. SSO utilizes hardware resources more efficiently.

NetBackup is easy to install and implement. The Microsoft Windows NT server version provides a wizard-driven installation and configuration program. Administrators define backup schedules by using the graphical scheduling interface. Full and incremental backups can be on an hourly, daily, weekly, or monthly basis. A backup window can be defined to ensure that backups are run at times that support the needs of the organization. Administrators can also assign backup classes descriptive, multiple-word names for tracking and reporting.

NetBackup can perform full or partial recovery from a primary backup, and it can recover applications or complete servers in offsite locations. NetBackup can automatically create copies of the primary backups. These secondary tapes can then be sent offsite for storage. NetBackup does more than just copy tapes. NetBackup de-multiplexes tapes so that data is located on more than one tape. This feature allows business-critical applications to come up first, followed by secondary and tertiary applications.

The process of performing a selective restore is much faster if the data is located on duplicate tapes. Organizations rarely restore a complete server at a hot-site location. The backup copies that NetBackup creates are TAR compatible (UNIX Tape Archive). Although NetBackup uses its own method for moving data and writing data to tape to ensure reliability, it provides the capability for these tapes to be read by basic UNIX utilities.

For complete disaster recovery automation, NetBackup provides an option for complete vault management. This option provides ejection of the backup, and copies to the I/O bin are in a tape library providing access and retrieval of reports written in a variety of formats including Iron Mountain (Arcus) and DataSafe. Library tapes must be rotated to and from the offsite vault.

Legato NetWorker

Dramatically increased performance and scalability in backup and recovery operations are achieved in Legato NetWorker software with an advanced indexing architecture. NetWorker software features Open File Connection and support for the TaskSmart N-Series appliance.

NetWorker software can provide Comprehensive Data Protection for the TaskSmart N-Series appliance because it protects all data, including security information, user profiles, access control lists, and Windows registries and event logs. NetWorker software also provides the ability to share a tape library between NetWorker server and cluster nodes.

NetWorker software helps organizations to easily protect vast amounts of critical distributed data by offering automated media handling, interoperable tape format, data stream parallelism, remote tape management, and automatic integration with the popular storage management frameworks in the network environment.

NetWorker software is based on the client/server architecture and consists of three distinct components: Client, Storage Node, and Server. This three-tier architecture provides the flexibility and performance required to protect and manage data on the most complex networks. The data protection process is encompassed in a data zone, which is a collection of clients, storage nodes, and data protected by a single NetWorker server. A NetWorker data zone can be collectively administered with a single set of data protection policies and procedures. NetWorker serves as a data zone manager, delivering both centralized and distributed storage management.

Computer Associates

ARCserve*IT* Advanced Edition from Computer Associates (CA) is a Microsoft Windows NT, Microsoft Windows 2000, and Novell NetWare data protection solution for growing networks. ARCserve*IT* incorporates complete storage management and database protection for storage area network (SAN) environments. Compaq has partnered with CA to provide an Enterprise Backup Solution (EBS) that uses the speed and scalability of Fibre Channel technology. Compaq EBS supports the backup and restore of homogeneous operating systems using ARCserve*IT* software; however, ARCserve*IT* is still in the qualification process for the TaskSmart N-Series appliance. EBS with ARCserve*IT* uses a dedicated SAN that provides bandwidth that is independent of the local area network. This independence allows single or multiple backup or restore jobs to run without generating the local area network (LAN) traffic that is caused by traditional data protection environments.

The Enterprise Library option allows all servers configured in the SAN to dynamically share a common set of tape devices. Additionally, due to the manner in which the application addresses the devices, tape libraries are always presented to the application in a consistent order. This consistent presentation of tape libraries eliminates the need to reconfigure the application if a tape drive or a library fails.

Look for an announcement from Compaq in the future for support of ARCserve*IT* on the TaskSmart N-Series appliance. For more information regarding installation, operation reference, troubleshooting, and future upgrades of Computer Associates ARCserve*IT*, refer to the online document *Enterprise Backup Solution with Computer Associates ARCserveIT User Guide* located at

www.compaq.com/products/storageworks/ebs/ebslibrary.html

Software Trial Versions

All Compaq tape devices ship with trial versions of popular third-party backup solution software. Choose one of these third-party backup software solutions for the TaskSmart N-Series appliance when that name software is already in use on other company servers. Using familiar software reduces the complexity and setup time of the backup solution. Recognize that the software may require an upgrade when moving to a new data-protection architecture such as Fibre Channel. Check with the independent software vendors for assistance in determining required upgrades.

The TaskSmart N-Series appliance also contains an integrated backup solution that can be used for basic backup functionality. This solution lacks all the functionality and features offered by third-party solutions. Compaq recommends the selection and purchase of a third-party backup solution that meets organization needs.

Some important capabilities to look for in backup software include the following:

- Autochanger support for the chosen type of device
- Tape media management database

- File history database with extensive search capabilities
- Ability to define backup groups and schedules
- Ability to take advantage of multiple tape devices concurrently to reduce the backup window
- Capabilities to analyze, summarize, and report status automatically
- Options to enable backup of open and locked files
- Options to back up system state and system databases
- Options to interact with software from a remote console application
- Options for quick disaster recovery
- Options for sharing tape devices, where library configurations are being considered

Sizing Considerations

Sizing considerations guide an administrator in selecting or scaling the solution to fit specific business requirements. Factors to consider when sizing include the following:

- Speed of backup and restoration
  - How long will it take to complete a backup?
  - Is a full backup needed, or will a partial backup suffice?
- Cost
  - What equipment will be required to implement this backup?
  - What software vendor will best assist the backup requirements?
- Safety of data
  - How often is this information backed up?

For detailed information about hardware and software products that are certified by Compaq, access the *Compaq StorageWorks Enterprise Backup Solution Hardware/Software Compatibility Matrix,* which may be obtained at

www.compaq.com/products/storageworks/ebs/EBScompatmatrix.html

Sizing Tools

To help the administrator understand the factors that affect performance and purchasing decisions, Compaq has developed a performance sizing tool. This tool addresses the factors involved in selecting a backup solution that meets the requirements for specific system environments. Among these factors are performance, capacity, reliability, automation, and cost. Compaq provides tools that make the selection process more efficient.

The Compaq award-winning sizer is a Windows-based tool that helps to maximize business benefits by optimizing the sizing solution. This sizing tool does the following:

- Displays product information
- Displays a complete backup schedule for the environment
- Display solutions on the TL891 DLT Mimi Library, TL895 DLT Library, and ESL9326D Library that support system performance and business requirements

The sizing guide can be accessed from the Compaq website at

www.compaq.com/products/storageworks/ebs/ebstoolsbackupsizing.html

Information about backup products is available on the Compaq website at

www.compaq.com

Specific references on the Compaq website include the following:

- Direct connection sizing tool

www.compaq.com/products/storageworks/Tape-and-Optical-Storage/TapeBackupSolution.html

- Enterprise Backup Solutions backup sizing paper

www.compaq.com/products/storageworks/ebs/ebstoolsbackupsizing.html

- Compaq Fibre Channel Backup Diagnostics

www.compaq.com/products/storageworks/ebs/ebstoolsdiagnostics.html

Case Studies

The following case studies can help the administrator decide what type of solutions must be considered for the company, and reveal some of the issues that contribute to this decision.

Branch Office

Financial Institution Needs to Increase Storage for Branch Offices

A financial institution has 100 community branch offices and has multiple Microsoft Windows NT general-purpose servers with 50 GB stored on each. Because of a lack of resources, branch locations do not have a dedicated technical support resource onsite. The decision has been made to implement a TaskSmart NAS appliance to ease the burden of deployment and enable management of the storage appliances from a central location.

In this case, the NAS appliance installations will be in geographically distributed sites, with a small amount of storage. The backup application being used on the general-purpose servers has been tested and is supported and recommended for the TaskSmart N-Series appliance. The best arrangement is to directly connect one or more standalone Compaq DLT 35/70 tape drives to the TaskSmart appliance and back up locally. Nontechnical staff at the remote site can change tapes as required. Up to four standalone DLT 35/70 tape drives can be added to accommodate storage growth as it occurs. Alternatively, a small tape library can be configured to store enough cartridges to serve the needs of each office for a week or more, requiring much less interaction from the nontechnical staff at the branch office. Because the volume of data is low at the branch offices, the stand-alone tape drives or a small library can easily handle the backup task.

Departmental Server Consolidation

Health Care Provider Wants to Manage Heterogeneous File Serving

A health care provider manages and stores a large number of data-intensive files, from patient files to X-ray images, in multiple formats and protocols. Over 200 hospitals and clinics around the country depend on a central IT staff managing a mixed Microsoft Windows NT and UNIX network spread over a number of data centers around the country.

Plans call for using a Compaq TaskSmart N-Series appliance to consolidate the storage and administration of many UNIX and Microsoft Windows NT general-purpose servers. Removing the storage load from the general-purpose server allows them to carry out their functions more efficiently and reduces administration time and effort. In this case, storage consolidation resulted in needing only one file server for each data center. The customer did not currently have a SAN infrastructure, so direct-attached backup solutions were preferred.

An expandable tape library system was chosen and directly connected to the TaskSmart N-Series appliance. The board in PCI slot 4 is connected to the tape library by SCSI cables. The tape library consisted of one Compaq TL891 DLT Mini Library with two DLT 35/70 tape drives, an expansion module, and a TL891 DLT Mini Library data unit for additional tape cartridge capacity. As storage space grows, this scalable solution will allow each data center to increase its backup capacity and improve its performance by adding another Mini Library or data unit. The TL891 DLT Mini Library solution can be mounted on a rack and can expand to a native capacity of up to 3.15 terabytes. The solution also automates tape management with its integrated bar code readers.

In the long term, if the customer decides to implement a storage area network to take advantage of longer distance support and higher performance, the customer can utilize the same library investment and simply add the infrastructure components.

Enterprise Data Center

Large Enterprise Needs to Consolidate and Manage Storage Resources More Effectively

A company growing at a rapid rate in the eCommerce field is looking for new solutions for storage management. Instead of finding point solutions, they want solutions that give the company room to grow and are part of a planned enterprise storage architecture for business.

This enterprise currently has a SAN, based on the Compaq Enterprise Network Storage architecture. After consolidation of data onto several TaskSmart N-Series appliances, the decision was made to use a large shared tape library to back up all data on the file server appliances.

The Compaq TL895 DLT Tape Library was chosen to meet the demands of multiple server backups. Using a switched environment, the TaskSmart N-Series appliances were configured with a switched Fibre Channel host bus adapter and connected to a SAN switch. The Compaq TL895 DLT Tape Library was connected via SCSI cabling to two Compaq MDRs that bridge from SCSI-to-Fibre Channel (similar Compaq products include the Fibre Channel Tape Controller and the Fibre Channel Tape Controller II). The MDR was then connected to the SAN switch, and the backup application was configured to add the TaskSmart N-Series appliances as clients in the enterprise backup solution.

The Compaq TL895 DLT Tape Library contains 96 tape cartridge slots and up to seven DLT 35/70 tape drives for a native capacity of at least 6.72 terabytes. Using compressible data will result in significantly more capacity. Bar code readers and extensive management functions make the Compaq TL895 DLT Tape Library an ideal choice for enterprise-level operations.

Backup Best Practices

After the backup solution is installed, you should establish procedures that enhance the reliability and effectiveness of system backups. The "Case for Backups" section that follows provides general recommendations for performing backups. Consider company-specific needs and the environment when implementing these suggestions.

Note: The suggested scenarios for backup times are based on a hypothetical company situation.

Case for Backups

The TaskSmart N-Series appliance has a range of high-availability features, including the following:

- Advanced Data Guarding (ADG) for data protection among RAID levels
- RAID 5 for the data drives
- RAID 1 (mirroring) for the operating system drives
- Snapshots
- Redundant power supplies and fans

In addition to these features, regularly scheduled backups to removable media are crucial in safeguarding company data against accidental loss, intentional tampering, or hardware failures.

Advanced Data Guarding protects against multiple disk drive failures while only requiring the capacity of 2 drives in a array of up to 56 disk drives to be set aside for dual sets of distributed parity data. It provides data protection greater than RAID 0+1 or 10 while having the capacity utilization efficiency similar to RAID 5. When data drives are configured in RAID 5 arrays, it is highly unlikely that data loss will occur due to drive failure. However, data loss is always possible. Backups prevent an inconvenience from becoming a disaster.

Snapshots are a convenient temporary online copy of operating data. They should never be used as a replacement for tape backup. The TaskSmart N-Series appliance can automatically delete the oldest snapshot to recover space when disk space is low. Compaq does not recommend total dependency on snapshots for data protection. The use of tape backup and restore solutions in conjunction with snapshot functionality is a tremendous and cost-effective method of protecting corporate information.

Backup Schedules

An automatic, periodic backup is more reliable than occasional unscheduled backups. Specific needs determine what type of backup schedule to implement.

A weekly or biweekly full backup is the basis of any good backup schedule. Add to that baseline daily incremental or differential backups to capture any daily changes that occur between full backups. Depending on the frequency of data changes, capacity and performance of the backup devices dictate the backup schedule. Incremental backups capture changes to the data that have occurred since the last backup. Differential backups capture all the changes that have occurred since the last full backup.

If system backup devices do not have sufficient capacity for a full backup, distribute the backups so they occur throughout the backup cycle. This strategy can meet backup needs until a larger tape backup device or backup library can be installed. For example, instead of doing a full backup of disks C:, X:, Y:, and Z: on Friday, back up C: on Monday, X: on Tuesday, Y: on Wednesday, and Z: on Thursday. Schedule incremental or differential backups on the same distributed schedule.

Archiving Server Setup

After a regular backup schedule is established, the setup attributes of the TaskSmart N-Series appliance must be documented. There is always the possibility of the complete loss of the server in cases of fire, flood, or weather disasters. To maximize the ability to recover from server disasters and to minimize the time required for recovery, keep current copies of the following information in a safe location:

- Server name
- IP addresses
- Gateways
- DNS servers
- Microsoft Windows platform servers
- NIS servers
- User mapping database
- Drive array configurations and settings
- Logical disk information
- Virtual Replicator configuration:
  - Pool names
  - Sizes
  - Member logical drives
  - Virtual disk names and sizes
  - Snapshot names
  - Snapshot schedules

This information helps the system quickly and accurately recover from catastrophic failures caused by events such as fires, weather disasters, theft, and complete hardware failure.

Multiple Backup Devices

To take advantage of multiple backup devices, the server must be configured correctly. Generally, multiple tape drives are required whtn multiple disks need to be backed up. If the TaskSmart N-Series appliance has 500 GB of disk space and is arranged as a single virtual disk, it is more difficult to take advantage of multiple tape drives. If possible, make multiple smaller virtual disks. This method allows the administrator to back up the multiple devices in parallel, sending the data from one or two disks to each tape in parallel. This type of configuration greatly reduces the time required for backup and makes the most efficient use of the tape backup device.

When using a single large virtual disk, several backup groups must be configured to contain the various directory trees at the root of the virtual disk. That way more than one tape device can work in parallel when performing the backup.

Also, note how virtual disks are constructed when setting up backup jobs. System backup performance can be increased by scheduling the backup of virtual disks that share common physical drives at different times. The underlying physical disks can then devote more time to each of the backup jobs, rather than having two backup jobs competing for disk I/O.

Media Rotation

Backup software solutions are equipped to accurately label and track media usage. Take advantage of these capabilities to maintain different media pools for full backups, incremental/differential backups, and archive media. The retention time for the data on each of these types of backups is different. For example, using differential backups on the same tape for full backups causes the tape space to be wasted after the retention time for the differential data has passed. Keep separate media pools to avoid this problem.

Offsite Storage

Set up a regular process for moving important long-term media, such as backups and archives, offsite for safekeeping. This process ensures that the administrator can recover the data in the event of complete facility destruction where the TaskSmart N-Series appliance resides. As an alternative to a commercial offsite storage facility, if the company has multiple buildings, the offsite media can be stored in another building. This provides some protection in the event of a building fire where the TaskSmart N-Series appliance is located.

When employing offsite storage, a balance must be struck between safety and convenience when deciding how long to keep the media onsite before sending it to the safe offsite location. After the media has been moved offsite, restores take much longer because the media is not readily available.

A periodic audit of the offsite facility ensures that the media is being stored in secure, environmentally acceptable conditions, and that it can be located and returned to the TaskSmart N-2400 facility in a timely manner.

Readiness Testing

Completing regular backups is important, but it is only the first step in the backup process. To verify the integrity of those backups, periodic testing to confirm the ability to recover files and directories must be conducted. Regularly testing the recoverability of random files or directories ensures that the backup solution is working as planned.

Snapshots

Snapshots enable the instant creation of virtual replicas of production data without the requirement of a physical copy. Snapshots function identically to ordinary physical disks that have read and write capability.

IMPORTANT: Snapshots should be considered an additional convenience for restores, not a replacement for tape backup. In the event of disk failures, snapshots can be lost with the original virtual disk data. Snapshots can be automatically deleted without warning by the operating system to regain space when disk space is low.

When a quick copy of production data is needed, snapshots can be used with minimal disruption to running applications. For example, the snapshot can be the source for backup using standard backup tools. Snapshots can remain online for restore operations, testing, and data mining.

For Quick Restores

SANworks™ Virtual Replicator (SWVR) is a utility used to combine logical disks into "pools of space" from which virtual disks are created. SWVR also enables the "snapshot" capability for the TaskSmart N-Series appliance. Snapshots are temporary, online point-in-time copies of the virtual disks. Snapshots can be completed in a few seconds because disk space is used only when the original files change.

Snapshots should never be considered a replacement for regular data backup to removable media, although snapshots are useful for immediate, tapeless recoveries. If a file is accidentally deleted or corrupted, it can be recovered quickly by accessing the snapshot, selecting the file or directory, and copying it back to its original location on the virtual disk.

To use the snapshot capability for a quick restore, take a snapshot on a regular basis or before the source disk is altered. This procedure ensures that a backup of all the original files, applications, and configurations will be available.

For Backups

Snapshots can also be used as the source of data for a backup. Some applications that must be stopped before backups are made. A backup requires that the file system is recorded in a consistent state, where no changes occur during the backup. Because snapshots are created in a matter of seconds and maintain a consistent view of the file system from that point on, snapshots can drastically reduce the amount of time applications must be paused or shut down during backup operations.

The TaskSmart N-Series appliance has facilities for automatically creating snapshots at any given time, and can even be set up to create a snapshot, execute a backup, and delete the snapshot upon successful completion of the backup job.

Optional Backup Features

Many backup vendors have optional modules for additional backup features that can be valuable in some computing environments. These modules are usually sold separately.

Open File Backup

Open file backup is the capability to back up a file that is open and possibly locked by a client system. Open file backup is usually not provided in the backup application itself and is an added option that can be purchased separately. This capability enhances the effectiveness of backup operations by capturing those files that are open while backup operations are occurring.

Disaster Recovery Options

Like the open file backup feature, automated disaster recovery is usually a separately purchased option. This option speeds the recovery from fire, theft, or other catastrophe by creating bootable media that is used to quickly get the server up so data recovery can begin. Without this option, the recovery process would consist of the following general steps:

1. Replace the hardware if necessary.
2. Use QuickRestore to return the system to the initial factory-default state. This procedure recovers operating system and all NAS systems software and applications, such as the Virtual Replicator and Array Configuration Utility.
3. Re-apply storage configuration customizations that are different from factory default settings.
4. Reinstall the backup software.
5. Recover the backup software media and file history databases.
6. Recover important system state and local security databases.
7. Start recovering data on virtual disks.

The use of an optional disaster recovery module would eliminate steps 2 through 6.

Tape Libraries for Automation

Tape libraries improve performance, capacity, and reliability of tape backup operations, and should be used whenever they are practical. Libraries must be enabled by additional licensing, installation of library control modules, and configuration steps. Some of the benefits of tape libraries include:

- Enhanced performance by the automated, instantaneous handling of tapes, requiring no lag time for an administrator to arrive and manually change the tape.
- Improved capacity because tape libraries include storage slots for additional tape cartridges. Enough media can be loaded so that operations can continue overnight, over the weekend, or even all week, without intervention or tape changes.
- Increased reliability because tapes are handled less and the human element of forgetfulness in changing tapes is eliminated.

Supported Configurations

Compaq is working to qualify each of the following backup solutions for the TaskSmart N-Series appliance in various backup solutions. Compaq offers and supports the official software versions listed in Table 1. To ensure that the correct version of each program is obtained, consult Table 1 for specific combinations.

Table 1. Applicable Connection Methods and Backup Solution Vendors

	Veritas Backup Exec version 8.0	Veritas NetBackup version 3.4	Legato Networker version 6.0	Legato NetWorker version 5.7	Tivoli Storage Manager	Computer Associates ARCServe*2000*
Direct SCSI Attached	Supported	Planned Future Support Q3 2000	Supported	Supported	Planned Support Q2 2001	Planned Future Support Q2 2001
FC-AL	Supported	N/A	N/A	N/A	Planned Support Q2 2001	Planned Future Support Q2 2001
FC-Switched	Supported	Supported	Supported	Not Supported	Planned Support Q2 2001	Planned Future Support Q2 2001

Table 2 provides information on the amount of time required for the system backup based on the amount of data being backed up and compared to different backup devices.

Table 2. Backup Window and Capacity

Backup Capacity	**Backup Window**					
Gigabytes per Hour	1 Hour	2 Hours	4 Hours	8 Hours	16 Hours	24 Hours
0 - 4	One 4/8 SLR drive	One 4/8 SLR drive	One 4/8 SLR drive	One 4/8 SLR drive	One 4/8 SLR drive	One 4/8 SLR drive
5 - 8	One 20/40 SLT drive	Two 4/8 DAT drives	One 4/8 SLR drive	One 4/8 SLR drive	One 4/8 SLR drive	One 4/8 SLR drive
9 - 16	One AIT 35 drive - or - Three 20/40 DAT drives	One 20/40 DLT drive	One 20/40 DLT drive	One 4/8 SLR drive	One 4/8 SLR drive	One 4/8 SLR drive
17 - 48	One or Two 35/70 DLT drives - or - One or Two AIT 50 drives - or - Three 20/40 DAT drives	One AIT 50 drive - or - Two 20/40 DLT drives - or - Two 20/40 DAT drives	One AIT 35 drive - or - One 20/40 DLT drive - or - One 20/40 DLT drive	One 20/40 DLT drive - or - One 20/40 DAT drive	One 20/40 DLT drive - or - One 12/24 DAT drive	One 20/40 DLT drive - or - One 12/24 DAT drive
49 - 90	Three 35/70 DLT drives - or - Three AIT 50 drives - or - Eight 20/40 DLT drives	Two 35/70 DLT drives - or - Two AIT 50 drives - or - Four 20/40 DLT drives	One 35/70 DLT drive - or - One AIT 50 drive - or - Two 20/40 DLT drives	One AIT 35 drive	One 20/40 DAT drive	One 20/40 DLT drive
91 - 180	One DLT Tape Array II backup solution	Three AIT 50 drives - or – Three 35/70 AIT drives - or – Eight 20/40 DLT drives	Two 35/70 DLT drives - or - Two AIT 50 drives - or - Four 20/40 DLT drives	One 35/70 DLT drive - or - One AIT 50 drive - or - Two 20/40 DLT drives	One AIT 35 drive - or - One 20/40 DLT drive	One 20/40 DLT drive
181 - 360	Two DLT Tape Array II backup solution	Two DLT Tape Array II backup solution	Three 35/70 DLT drives - or - Three AIT 50 drives - or - Eight 20/40 DLT drives	Two 35/70 DLT drives - or - Two AIT 50 drives - or - Four 20/40 DLT drives	One 35/70 DLT drive - or - One AIT 50 drive - or - One 20/40 DLT drive	One 35/70 AIT drive - or - One 20/40 DLT drive

continued

Table 2. Backup Window and Capacity *(continued)*

Backup Capacity	**Backup Window**					
Gigabytes per Hour	1 Hour	2 Hours	4 Hours	8 Hours	16 Hours	24 Hours
361 - 720	N/A	Two DLT Tape Array II backup solution	Two DLT Tape Array II backup solution	Three 35/70 DLT drives - or - Three AIT 50 drives - or - Eight 20/40 DLT drives	Two 35/70 DLT drives - or - Two AIT 50 drives - or - Four 20/40 DLT drives	One 35/70 DLT drive - or - Two AIT 35 drives - or - Four 20/40 DLT drives
721 - 1000	N/A	N/A	Two DLT Tape Array backup solution	One DLT Tape Array backup solution	Three 35/70 DLT drives - or - Three AIT 50 drives - or - Eight 20/40 DLT drives	Two 35/70 DLT drives - or - Two AIT 50 drives - or - Four 20/40 DLT drives
1001 - 2000	N/A	N/A	N/A	Two DLT Tape Array backup solution	One DLT Tape Array backup solution	Three 35/70 DLT drives - or - Three AIT 50 drives - or - Eight 20/40 DLT drives
2001 - 3000	N/A	N/A	N/A	N/A	Two DLT Tape Array backup solution	One DLT Tape Array backup solution
Note: Shared tape systems are configured with the Enterprise Backup Solution.						

Contact Us

- For comprehensive online support, refer to:
  www.compaq.com/
- For international information, refer to:
  www.compaq.com/corporate/overview/world_offices.html
- For a list of Compaq products, refer to:
  www.compaq.com/showroom/
- For a list of Compaq Storage Products and Solutions, refer to:
  www.compaq.com/storage/index.html
- For a list of Enterprise Backup Solutions, refer to:
  www.compaq.com/products/storageworks/ebs
- For more information about the TaskSmart N-Series appliance refer to:
  www.compaq.com/TaskSmart

Table 3. Departments and Telephone Numbers for the United States and Canada

Department	Telephone Number
Consumer Direct	1-800-888-0220
Compaq DirectPlus	1-800-888-5858 (U.S.)
Compaq Partner Direct	1-800-888-5874
Compaq Reseller Locator	1-800-345-1518 (Option 3)
Compaq Canada Reseller Locator and Product Literature	1-800-567-1616
Diskette Fulfillment (backup diskettes for preinstalled software)	1-800-952-7689 (U.S.) 1-800-349-8498 (Canada)
Compaq Product Information	1-800-345-1518 (U.S.) 1-800-567-1616 (Canada)
Compaq Technical Support	1-800-OK-COMPAQ (U.S. and Canada) 1-800-652-6672