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Enterprise Backup Solution for Legato NetWorker

Abstract: The Compaq StorageWorks Enterprise Backup Solution (EBS) is the integration of application software and industry-standard hardware providing a complete enterprise-class solution. Using Legato NetWorker and SmartMedia, Compaq provides an enterprise backup solution for the heterogeneous connection of servers to tape back-up devices through Fibre Channel connections.

This document provides an overview of the Enterprise Backup Solution for Legato NetWorker and SmartMedia.

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Enterprise Backup Solution for Legato NetWorker
White Paper prepared by Multi-Vendor Solutions — Storage Products Division

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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.

The Compaq StorageWorks Enterprise Backup Solution (EBS) is the integration of application software and industry-standard hardware that provides a complete enterprise-class solution. Using Legato NetWorker and SmartMedia, Compaq provides a backup solution for a heterogeneous connection of servers to tape backup devices through Fibre Channel connections.

This solution can include Compaq Alpha servers running Tru64 and Compaq ProLiant servers running Microsoft Windows NT sharing a single TL895 Digital Linear Tape (DLT) library interconnected through a Fibre Channel Switch 8 or a Fibre Channel Switch 16. Online storage, such as the RAID Array 8000 (RA8000) and the Enterprise Storage Array 12000 (ESA12000), may also be attached.

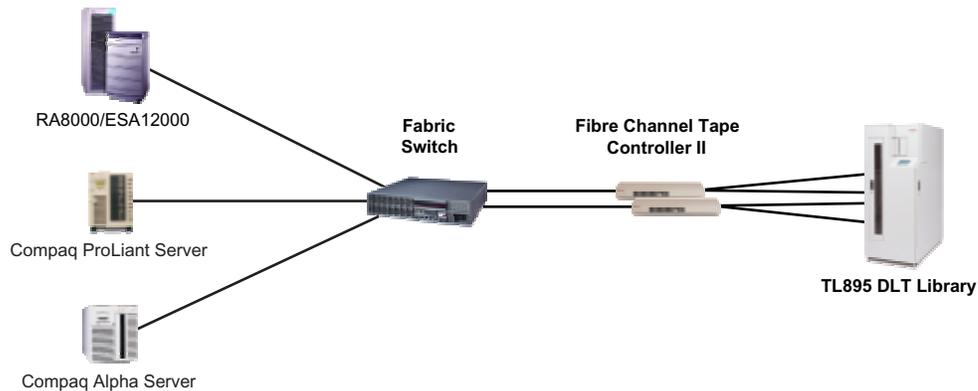


Figure 1: Enterprise Backup Solution for Legato NetWorker

The Legato NetWorker application combined with SmartMedia will manage backup operations. These applications provide the following features:

- A single point of control of all backup operations across a heterogeneous connection of servers.
- The use of Drive Control Programs (DCP) and Library Control Programs (LCP) allow for backend changes without affecting the front end execution. These programs provide protection for advancements in tape technology.
- The management features are accessible through the Web with StorageWorks Command Console.

Platforms and Operating Systems

Note: A maximum combination of six servers is supported on the EBS due to the required static assignment of tape drives, with a minimum of two drives assigned to the NetWorker Server.

Table 1 identifies the server platforms supported. AlphaServers must be running Compaq Tru64 4.0F and ProLiant servers must be running Microsoft Windows NT with SP 4 (or later).

Table 1. Supported Servers

AlphaServers	ProLiant Servers
800	ProLiant 4500
1000A	ProLiant 5000
1200	ProLiant 5500
4x00	ProLiant 6000
8x00	ProLiant 6500
DS10	ProLiant 7000
DS20	ProLiant 8000
ES40	ProLiant 8500
GS60	
GS140	

Storage Area Network Components

The nearline (tape) and online (disk) components for the EBS for Legato NetWorker are:

- TL895 DLT Library
- RAID Array 8000 Fibre Channel
- Enterprise Storage Array 12000 Fibre Channel
- Compaq Alpha server running Tru64 4.0F
- Compaq ProLiant server running Windows NT with SP 4 (or later)
- Fibre Channel Tape Controller-II
- Fibre Channel Switches
- PCI Fibre Channel Host Bus Adapters KGPSA-BC

Nearline

One of the most important components of the EBS is the tape library. The DLT libraries automate the tape handling process which frees valuable administrative resources. The TL895 automated tape library provides dedicated service 24 hours a day, seven days a week.

The TL895 is a high-performance, free-standing, 96-slot, automated DLT library. The TL895 is available with two to seven DLT7000 drives. This tape library offers up to 1.6 TB of DLT backup and restore capacity.

The TL895 DLT Library is the only tape library that is fully able to run on both AlphaServer and ProLiant series servers.

Online

The RA8000 and the ESA12000 are fully integrated RAID storage systems that provide multivendor platform support with Fibre Channel storage area networks (SANs). These storage systems ensure economical capacity growth, increased levels of availability, and lower cost of storage management, and provide the base for layered business continuance features.

StorageWorks RAID Array 8000

The RA8000 is an easy-to-deploy, flexible solution for open systems. The RA8000 provides an entry priced storage library with built-in and optional features for:

- Multivendor operating environments
- High availability requirements
- High performance requirements

The RA8000 capability list includes:

- Single and dual redundant controllers
- Operation of up to four active/active host communication paths
- Shared storage access for multiple heterogeneous platforms
- Hot-swappable components
- Optional software to support no single point of failure
- Dual pathing
- Remote data replication at sites up to 10 KM away

StorageWorks Enterprise Storage Array 12000

The ESA12000 is designed for the data center where there is a need to configure high-capacity systems with application-specific performance demands.

The ESA12000 building blocks can be configured to provide:

- Unlimited capacity
- A small footprint using preconfigured building blocks in industry standard-size cabinets
- Built-in and optional features for multivendor operating environments

The ESA12000 meets the stringent data center availability requirements, offers very high levels of storage, and scales in performance and capacity as requirements increase.

The RA8000 and ESA12000 storage systems incorporate the latest in RAID technology providing RAID levels 0, 1, 0+1, adaptive 3/5, and non-RAID disks. These RAID-capable storage systems ensure data availability will be maintained even in the event of hardware failure.

Features such as read ahead cache and mirrored write back cache improve or minimize the effect on performance while preserving data availability and supporting high availability.

Fibre Channel Tape Controller-II

The FCTC-II provides the capability to attach SCSI DLT Tape Libraries to the Fibre Channel SAN. Each FCTC-II has a single Fibre Channel connection and dual 20 MB/s SCSI buses that can be connected to a maximum of two tape drives per bus.

The FCTC-II is rack-mountable and has a 1U form factor.

StorageWorks Fibre Channel Storage Area Network Switches

The StorageWorks Fibre Channel SAN Switch 8 and Fibre Channel SAN Switch 16 create the core infrastructure for constructing the EBS SAN.

The Fibre Channel SAN switches:

- Provide full fabric support
- Provide true line-speed switching
- Contain modular components
- Have 8 or 16 universal ports
- Deliver 100 MB/s line speed
- Automatically determine port type
- Non-blocking architecture guarantees full speed data delivery no matter what the traffic conditions
- Have optional hardware-enforced zoning that secures data among switch ports

StorageWorks Fibre Channel Switch 8/16

The StorageWorks Fibre Channel Storage Switch 8 and the Fibre Channel Storage Switch 16 are high performance, scalable switch fabrics designed for creating SANs with RA8000s and ESA12000s.

The benefits of these switch fabrics include:

- Fibre Channel Switch 8 or Fibre Channel Switch 16 with 1 Gb/s, non-blocking Fibre Channel connections for high data throughput
- Switch-to-switch connectivity over distances of up to 10 kilometers
- Dynamic path rerouting
- Full duplex transmissions
- Multiple methods for switch management

PCI Fibre Channel Host Bus Adapters KGPSA-BC

The PCI Fibre Channel Host Bus Adapters KGPSA-BC provide a high speed connection from the server to the SAN. The KGPSA-BC is both ANSI Fibre Channel and PCI Local Bus compliant and supports:

- Full bus speed data transfers of 133 Mb/s.
- Switch fabric connections.
- Direct interface to fiber optic cables through a standard 80-pin gigabaud link module (GLM).

Storage Area Network Architecture Configurations

Basic Configuration

The basic EBS configuration consists of multiple Alpha servers and ProLiant servers sharing a single TL895 library and a RAID Array storage system.

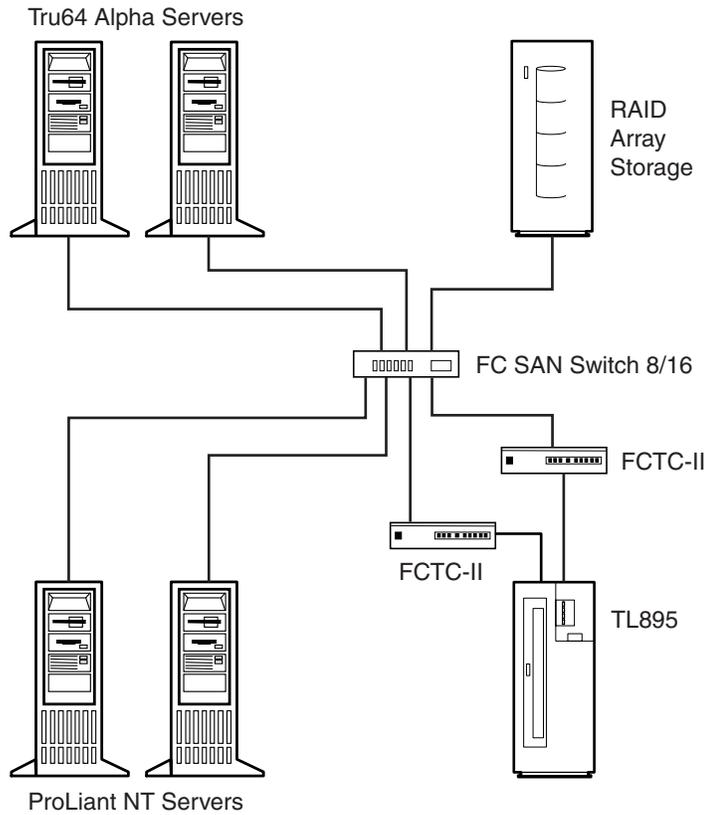


Figure 2: Basic configuration

Secure Path Configuration

The Secure Path high availability software product provides continuous data access to the EBS configuration between the ProLiant servers and the RAID Array storage.

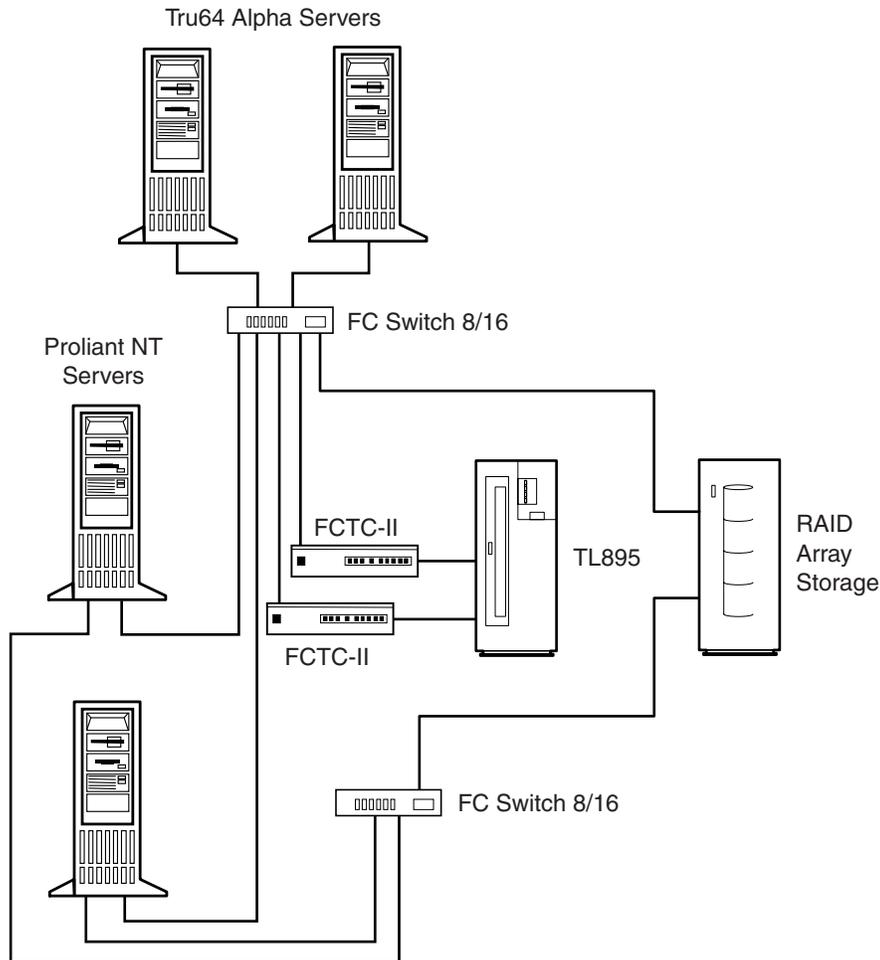


Figure 3: Secure Path configuration

Storage Area Network Management Software

The software for this solution includes:

- Legato NetWorker
- Legato SmartMedia
- StorageWorks Command Console

Legato NetWorker

Legato NetWorker has a client/server architecture comprised of three distinct functions (Client, Storage Node, and Server) that enable 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 the collection of clients, Storage Nodes and data protected by a single Legato NetWorker backup server. A Legato NetWorker data zone can be collectively administered with a single set of storage management policies and procedures.

Legato NetWorker excels as a data zone manager, delivering both centralized and distributed storage management. It is the only product offering that completely addresses the storage management needs of large and small heterogeneous enterprise environments by meeting the requirements of manageability, availability, performance, and scalability.

Legato NetWorker helps organizations easily protect vast amounts of critical distributed data by offering heterogeneous platform support, 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. Legato NetWorker takes these capabilities to a new level for state-of-the-art data protection, making it the most flexible and scalable solution available.

Features and Benefits

Protection—Legato NetWorker protects all local and remote data, including security information, user profiles, access control lists, Windows registries, and event logs. It protects data running on Windows NT, UNIX, and NetWare servers, and on all major desktops.

Add-on modules protect open files and popular databases and applications. Additional protection is provided during full, incremental, and differential backups. Automatic cloning provides additional data integrity and availability. Applications enable manual and policy-driven archive, retrieval, migration, and recall of data.

Failover capability based on a Storage Node priority list increases backup reliability and availability.

Superior Performance—Legato NetWorker provides faster performance for both backup and restore operations. NetWorker has multitier storage management with optional staging of storage management to intermediate high-speed disks.

Other performance factors include:

- Local device support using storage nodes optimizes backup/recovery performance and reduces network traffic.
- Client-side parallelism and data compression accelerate throughput while minimizing server load and network traffic.
- Built-in support for parallelism and data interleaving of 32 data streams-per-device ensures devices are driven at maximum speeds.

Legato NetWorker Power Edition provides built-in support for 64 parallel data streams for backup of data warehousing environments.

Easy to Manage and Use—Windows graphical user interfaces (GUIs) provide speed icons, online help, and single point of administration to configure, schedule, or monitor networkwide backups. Desktop users can perform ad-hoc backups and browse and recover files from a graphical online index.

Automatic event notification is available by way of a pager, email, or SNMP.

Advanced Media Management—Legato NetWorker provides broad support for 4 mm, 8 mm, DLT, and other devices. The Power Edition provides built-in support for high-speed devices and concurrent operation of 32 devices per storage node.

Advanced media management automates media handling, cleaning cartridge support, and media verification. Support for electronic labeling, bar codes, and cartridge access ports reduces media inventory requirements.

Enterprise Scalability—Legato NetWorker can dynamically expand capacity by adding client connections, storage devices, and storage nodes by way of software enablers. Legato NetWorker is fully interoperable across Windows NT, UNIX, NetWare, Windows 9x, Windows 3.1, DOS, and the MacOS.

The storage media is interchangeable between Legato NetWorker servers for Windows NT, UNIX, and NetWare. Legato NetWorker Workgroup Edition protects smaller networks across the enterprise, and Legato NetWorker Power Edition provides unsurpassed performance for large file systems and databases.

Legato SmartMedia

SmartMedia addresses enterprise requirements for library and drive sharing and central tape and device management. SmartMedia is an open media management application that provides standard interfaces for:

- Applications
- Robotic library control
- Drive control
- Administration

SmartMedia enables enterprises to better manage their growing base of removable media and devices distributed across a heterogeneous storage environment. Whether deployed within or across data zones, SmartMedia:

- Acts as a gateway for drive and library sharing
- Controls application requests for media from a central location
- Allows all SmartMedia aware applications to access and share all SmartMedia attached devices.

With the growth of removable media, media management has evolved from being an afterthought to being one of the most significant considerations when selecting an overall solution.

NetWorker dramatically increases return on investment for hardware and reduces overall storage costs through centralized, automated operations. SmartMedia increases the manageability, availability, and performance of NetWorker in an enterprise storage environment. NetWorker customers achieve the following benefits:

- Simultaneous operations for tape labeling and library inventorying
- Central media management within or across data zones

Note: LCP support is only available with Microsoft Windows NT. One server on the SAN must be running Windows NT to host the LCP component for this solution.

SmartMedia acts as a broker for device use. SmartMedia places requests from multiple NetWorker servers or Storage Nodes in a queue, and robotic arm operations are completed in the order they are received. The robotic library control is provided by an LCP running on the SmartMedia server. Drive control is provided by a DCP running on the NetWorker server and each Storage Node for the statically assigned tape devices.

SmartMedia offers a single gateway for robotics control, managing and serializing requests from multiple applications. Device management is also dramatically reduced, and fewer devices are required.

Library and drive monitoring is achieved through the central gateway. Device administration is now required for fewer devices. Legato SmartMedia's central database simplifies the management of media and devices used throughout a storage environment.

SmartMedia offers significant management benefits. Operational costs are reduced through its global management capabilities. Media and device control and monitoring now occur in one location. Additionally, the central media database offers a single source for tracking important media events, such as location, use, and status, for multiple applications.

SmartMedia is only available for Microsoft Windows NT. The SmartMedia server does not require connectivity to the SAN, however, it must be able to communicate with all of the NetWorker servers by way of the local area network (LAN).

StorageWorks Command Console

StorageWorks Command Console (SWCC) is a feature-rich, year 2000 compliant GUI that provides local and remote management of StorageWorks controllers and hardware interconnect components. SWCC is a user-friendly tool used to monitor, configure, and troubleshoot storage subsystems.

SWCC can be connected to your StorageWorks controller in several ways. Once connected, the SWCC issues commands and interprets the responses sent by the controller. The GUIs display the logical and physical layout, as well as the status of a selected subsystem.

SWCC consists of two major components, the Client and the Agent.

- The Client:
 - Includes the user interface
 - Includes additional services
 - Provides a window into your storage subsystems
- The Agent:
 - Is a host-resident program
 - Is an interface that interprets and transfers data between the Client and the host storage controller

Storage Software and High Availability Support

High availability in the EBS is provided by way of the StorageWorks Secure Path software product on NT platforms. TruCluster Available Server software for Tru64 also provides high availability for the EBS but is supported in a LAN attached cluster configuration only.

Secure Path

StorageWorks Secure Path is a high availability software product providing continuous data access for the RA8000 and the ESA12000 storage products configured on Windows NT platforms. Redundant hardware, advanced RAID technology and automated failover capability enhance fault tolerance and availability.

Secure Path effectively eliminates controllers, interconnect hardware, and host bus adapters as single points of failure in the storage system.

Secure Path enables the dual HSG80 controllers in the storage subsystems to operate in the active/active Multiple-Bus failover mode. This failover mode allows each controller to be configured on its own bus and to process I/O independently under normal operation.

The Secure Path software:

- Detects the failure of I/O operations to complete on a failed path
- Automatically reroutes all traffic to the second path

Controller and path failover is completed without disruption or data loss.

The Secure Path management utility provides continuous monitoring capability and identifies failed paths and failed-over storage units. To facilitate static load balancing, storage units can be moved between paths using simple drag-and-drop operations.

The integration of Secure Path, Windows NT Clustering, and StorageWorks RAID Array Fibre Channel technology provides the maximum level of fault tolerance, data availability, and performance required for mission-critical environments.

Legato NetWorker Power Edition

Legato NetWorker Power Edition optimizes EBS performance and is a solution for customers with large servers, or the requirement to drive high-speed devices. Power Edition features enhance local backup to dramatically increase local throughput while minimizing the use of system resources.

Power Edition takes advantage of the high throughput of the leading enterprise-class tape devices. Performance is scaled linearly as additional fast storage devices are added to the system, up to the limit of the server's I/O bandwidth.

Immediate Save and Recover

When backing up data from the Power Edition server or storage node, Immediate Save and Recover speeds up data transfer. The processor load is reduced because the data is transferred within memory. Power Edition enables local backup and recover to bypass the processor overhead of networking protocols.

Storage Nodes

Each Power Edition server can have several storage nodes attached and each node can have multiple devices. This configuration enables the transmission of a maximum of 512 parallel backup sessions with a maximum of 256 devices. Because Power Edition storage nodes store data locally and maintain all of the metadata associated with the controlling Power Edition server, backup speed and efficiency is enhanced. Immediate Save and Recover is used to back up and recover data hosted on a storage node.

High-Speed Device Support

Power Edition supports a broad range of autochangers and silo tape library models. Autochangers and silos can contain multiple storage devices (tape drives or optical drives) and can automate the tasks of loading, unloading, and labeling storage media. This automation allows backups to proceed without intervention. High-speed devices are configured for higher throughput, so they can write data to media faster and in larger blocks.

File Device Type and Save Set Staging

Support for the file device type enables backup to disk. Save set staging enables automated transfer of data from one medium to another according to user-defined policies.

Remote Procedure Call Enhancements

Power Edition includes improvements to remote procedure call (RPC), the communications between processes, to improve the efficiency of both local and remote backup and recover operations.

Sizer Utility

The StorageWorks Enterprise Backup Solution Sizing Tool v1.3 is a Windows-based tool used to determine a backup solution based on the information supplied by the user. Before beginning the sizing process, the user must have a thorough understanding of the network, the type of data to be backed up, and the back-up window parameters.

The StorageWorks Enterprise Backup Solution Sizing Tool v1.3:

- Accepts user input
- Allows the user to select the Options and Agents that are offered by the ISV
- Performs calculations for realistic performance
- Performs the calculations necessary for backup and tape retention
- Configures a solution for a single data zone or a larger solution or Domain
- Generates both a report and a proposal for a solution

Download, install, and run the StorageWorks Enterprise Backup Solution Sizing Tool version 1.3 to configure a solution for Legato NetWorker. The Sizer can be found on the Compaq website at: www.compaq.com

Appendix A: References

Compaq

For comprehensive online support, refer to:

www.compaq.com

For international information, refer to:

www.compaq.com/corporate/overview/world_offices.html

For more information on product compatibility, refer to:

www.compaq.com/storageworks

Table 2. Departments and Telephone Numbers for the United States and Canada

Department	Telephone Number(s)
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 Canadian Reseller Locator & 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

Legato

For comprehensive online support, refer to:

www.legato.com/Support/

For more detailed information on Legato NetWorker, refer to:

www.legato.com/Products/