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Contents

Enterprise Backup Solution for VERITAS NetBackup

Abstract: The Enterprise Backup Solution (EBS) for VERITAS NetBackup is aimed at serving organizations with data center sized backup requirements. The solution integrates data protection and archival strategies with disk storage subsystems across multiple platforms and operating systems located on the same storage area network (SAN). It provides for the interconnection of multiple heterogeneous servers to multiple tape backup devices using dynamic device sharing technology.

The Enterprise Backup Solution for VERITAS NetBackup successfully combines the functionality and management of EBS, SAN, high availability software and scaling tools to nicely marry tape and disk storage subsystems in the same Fibre Channel environment.

This document provides an overview of the Enterprise Backup Solution for VERITAS NetBackup and Shared Storage Option (SSO).

Notice

Enterprise Backup Solution for VERITAS NetBackup
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 VERITAS NetBackup, Compaq provides a backup solution for a heterogeneous connection of multiple servers to multiple tape backup devices through Fibre Channel connections.

This solution can include Compaq Alpha Servers running Compaq Tru64 Unix, Compaq ProLiant Servers running Microsoft Windows NT, and Sun UltraSPARC Servers running Sun Solaris all sharing one or more TL895 Digital Linear Tape (DLT) libraries 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.

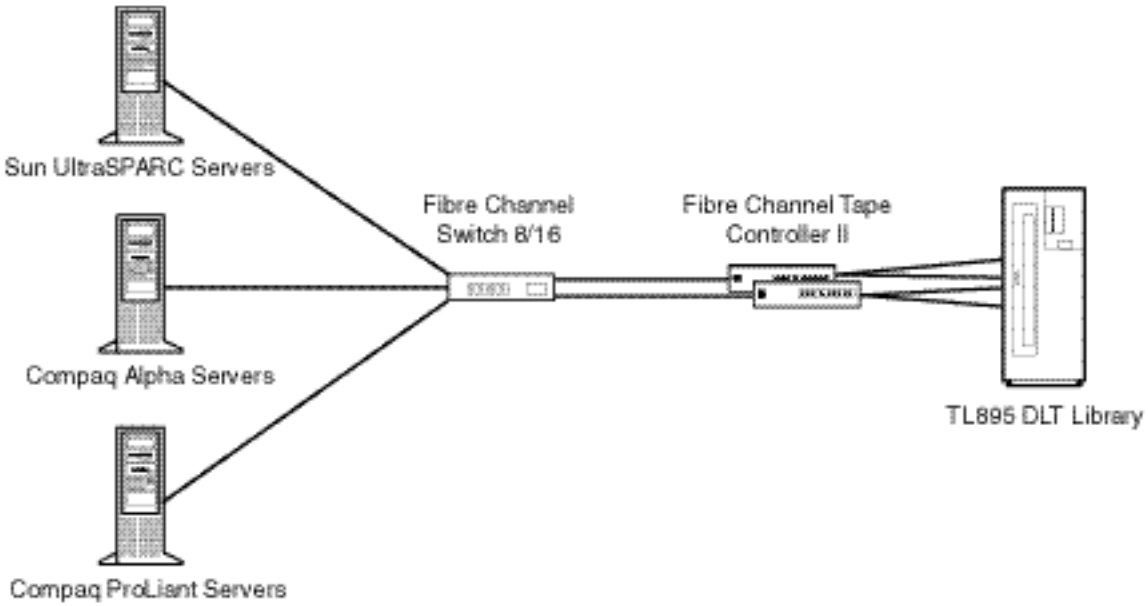

Figure 1: Enterprise Backup Solution for VERITAS NetBackup

The VERITAS NetBackup and Shared Storage Option manages backup operations of all servers within a NetBackup cluster. These applications provide the following features:

- A single point of control of all backup operations across a connection of heterogeneous clients and servers.
- The Shared Storage Option (SSO) allows several NetBackup slaves (media hosts) to share access to one or more tape storage devices. SSO virtually eliminates the media host count limitation otherwise imposed by a lack of tape drive resources.
- The implementation and management features allow for centralized configuration and administration of storage units, volumes, and media host databases.

Operating Systems and Platforms

The operating systems required are:

- Compaq Tru64 4.0F for the Alpha Servers
- Microsoft Windows NT 4.0 with Service Pack 5 for the ProLiant Servers
- Sun Solaris 2.6 and 7 for the Sun UltraSPARC Servers

Storage Area Network Components

The nearline (tape) and online (disk) components for the EBS for VERITAS NetBackup are:

- TL895 DLT Library
- RAID Array 8000 Fibre Channel
- Enterprise Storage Array 12000 Fibre Channel
- Compaq Alpha Servers running Tru64 4.0F
- Compaq ProLiant server running Windows NT with Service Pack 5
- Sun UltraSPARC Servers running Sun Solaris 2.6 and 7
- Fibre Channel Tape Controller II
- Fibre Channel Switches
- PCI Fibre Channel Host Bus Adapters KGPSA-BC for Alpha and ProLiant and SWSA4-PC for UltraSPARC
- SBUS Fibre Channel Host Bus Adapters SWSA4-SB and SWSA4-SC for UltraSPARC

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 capacity.

The TL895 DLT Library is the only tape library that supports both Alpha Servers and ProLiant Servers.

Online

The RA8000 and the ESA12000 are fully integrated RAID storage subsystems that provide multivendor platform support with Fibre Channel storage area networks (SANs). These storage systems assure economical capacity growth, increased levels of availability, lower cost of storage management, as well as 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 affordable entry priced storage library with built-in and optional features for:

- Multi-vendor 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 pre-configured building blocks in industry standard-size cabinets
- Built-in and optional features for multi-vendor 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 assure 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 Fibre Channel Tape Controller II (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 Switch 8/16

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
- Have blocking architecture that guarantees full speed data delivery no matter what the traffic conditions
- Feature gigabit interface converter–based modular design
- 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

Fibre Channel Host Bus Adapters

Fibre Channel Host Bus Adapters provide for a high speed connection from the server (host) to the SAN.

- Direct interface to Fibre optical cables through standard 80-pin Gigabit Link Modules (GLMs) or Gigabit Interface Connectors (GBICs)
- Supports either switch fabric or arbitrated loop connections
- Please see the hardware compatibility list for more information regarding supported HBAs.

Storage Area Network Architecture Configurations

Basic Configuration

The basic EBS configuration consists of multiple Compaq Alpha Servers, Compaq ProLiant Servers and Sun UltraSPARC Servers sharing at least one TL895 library and a RAID Array storage system.

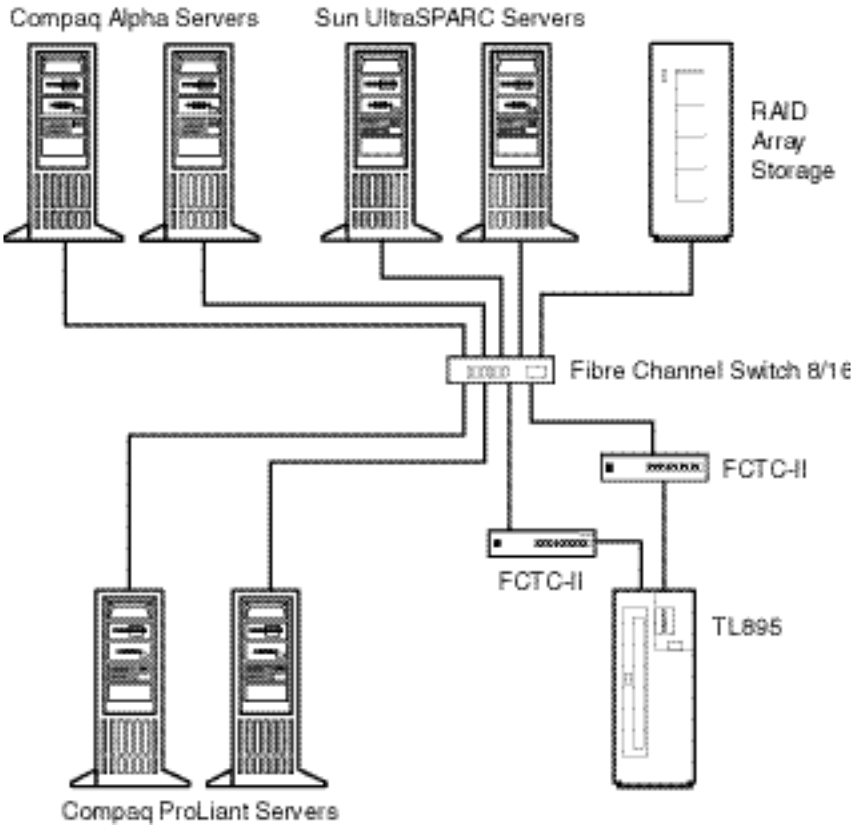

Figure 2: Basic configuration

Secure Path Configuration

The Secure Path, high availability software product provides continuous data access to the EBS configuration between the Compaq ProLiant Servers running Microsoft Windows NT and the RAID Array storage.

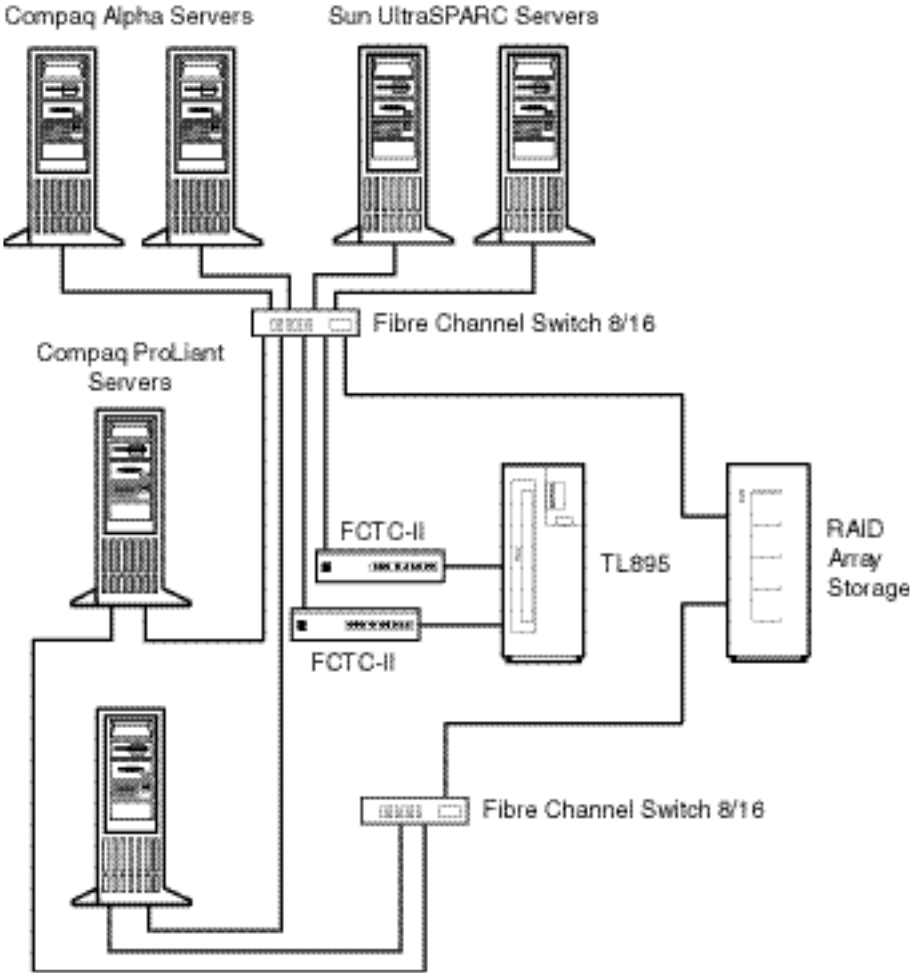

Figure 3: Secure Path configuration

Maximum Configuration

The maximum configuration would include all components shown in Figures 1 and 2. Additionally, with the implementation of NetBackup Shared Storage Option and its ability to share storage devices, server count is limited only by switch port availability. Read the section on VERITAS NetBackup Shared Storage Option (SSO) for information regarding this feature.

Storage Area Network EBS Management Software

The management software for this EBS solution includes:

- VERITAS NetBackup
- VERITAS Shared Storage Option (SSO)
- Compaq StorageWorks Command Console (SWCC)
- Compaq StorageWorks Secure Path for Windows

VERITAS NetBackup

The ability to protect all data in the enterprise, from workgroups to enterprise servers is of utmost importance. VERITAS NetBackup provides complete data protection for Windows NT, UNIX and NetWare environments. Organizations can manage all aspects of backup and recovery from intuitive, graphical user interfaces, thus allowing consistent backup policies to be set across the enterprise. NetBackup provides optional database and application specific backup and recovery solutions for Oracle, SAP R/3, Informix, Sybase, Microsoft SQL server, Microsoft Exchange server, DB2, and Lotus Notes.

The NetBackup "data center" strength media management provides organizations with the ability to perform all aspects of media management, including library sharing. In addition, the NetBackup Java interface provides complete real-time and historical analysis of all backup and recovery operations. These features, along with the proven track record of NetBackup in large-scale enterprises such as Oracle, Chrysler, and Boeing, make it the most popular choice for enterprise data protection in the global 1000.

Product Highlights

- Automates enterprise backup operations for thousands of users across multiple servers, and consolidates management of all your storage devices- standalone, departmental, and those in the data center.
- Central management console and scalable architecture enables the backup and recovery solution to continually meet the changing need of the modern IT environment.
- Equal performance and functionality for UNIX and Windows NT environments.

Scalable Architecture

There are literally hundreds of products on the market performing backup and recovery for open systems environments. However, very few were designed to handle the amount of data in the new data center. Once the sole domain of mainframes, the new data centers are built around large UNIX Servers and NT clusters where organizations run their business critical applications.

NetBackup provides a four-tier architecture that, combined with advanced media management and pure speed, can address the largest data center installations. The first tier consists of the NetBackup Master server. The role of the Master server is to act as the "brains" for actions such as scheduling and tracking client backups. It can have one or more tape devices/libraries attached for backing up data from multiple clients. If organizations have data in disperse locations or have data intensive applications such as data warehouses, they can implement Media Servers that provide local backup of large applications while backing up other clients (other servers and/or workstations) over the network. A Media server can share a tape library with the Master server or another Media server, or it can operate with its own tape devices/library. If a Media server fails, the attached client's backups can be routed to another Media server. The third tier in the architecture is that of the client agents which back up servers and workstations. Normally, this tier represents the largest number of individual machines but not necessarily the most data. Both the Media Servers and clients can be centrally managed from the Master server.

However, for organizations that require centralized management of multiple NetBackup Master Servers and/or widely distributed environments, VERITAS created a fourth tier with Global Data Manager for NetBackup. Global Data Manager offers centralized management and control of all NetBackup storage domains in the enterprise. This allows systems administrators and database administrators to manage all aspects of NetBackup. It also facilitates consistent policy management along with the ability to monitor NetBackup storage domains anywhere in the enterprise.

A NetBackup storage domain consists of one NetBackup Master server and one or more NetBackup Media Servers. In campus situations and where operations may be dispersed in multiple geographic locations, there may be more than one storage domain. One instance of Global Data Manager that controls multiple storage domains is called an enterprise domain.

Implementation Flexibility

Both the installation and implementation of NetBackup are easy processes. In fact, the Windows NT server version provides a wizard-driven installation and configuration program. Administrators can define backup schedules with the graphical scheduling interface. The scheduler within NetBackup provides the flexibility to define full and incremental backups. Flexible scheduling options are part of the scheduler, including the ability to not only run backups on a daily/weekly/monthly basis, but also by hour. A backup window can be defined to ensure that backups are not run outside of a pre-defined window. Lastly, administrators can give backup classes descriptive, multi-word names for tracking and reporting.

Disaster Recovery

When a disaster occurs, it can be as simple as a disk array crash or as big as the computer room being flooded. NetBackup has not only the ability to perform full or partial recovery from a primary backup, but can be used to recover applications or complete servers in an off-site scenario. NetBackup provides the ability to automatically create copies of the primary backups. These secondary tapes can then be sent off-site for storage. However, NetBackup does more than just copy tapes. First of all, NetBackup "de-multiplexes" tapes so that data is "co-located" on tapes. The reason for this is that most installations have business critical applications that must come up first, followed by secondary and tertiary applications.

The process of performing a selective restore is much faster if the data is co-located. Very rarely does an organization choose to restore a complete server at a hot-site location. Secondly, the backup copies that NetBackup creates are TAR compatible (UNIX Tape ARchive). While 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 includes everything from ejection of the backup copies to the I/O bin in a tape library to pick/pull reports written in a variety of formats including Iron Mountain (Arcus) and DataSafe. Additionally, tapes are automatically rotated to and from the off-site vault.

Easy to Use

The definition of an easy-to-use backup and recovery solution has different meanings to different people. Some system administrators like the control of a command line interface whereas some want 100 percent graphical user interfaces. Database administrators, on the other hand, want to administer database backup and recovery from the same interface as the systems administrator. NetBackup addresses all of these issues. NetBackup provides multiple choices for administration: Command line, Motif, and Java-based along with a Windows NT Explorer-like interface.

The Complete UNIX and Windows NT Solution

NetBackup 3.2 is the only solution that provides equal functionality and performance combined with intuitive graphical user interfaces for both UNIX and Windows NT environments. Customers can choose UNIX Servers, Windows NT Servers or a combination as their backup server platform without sacrificing scalability or ease-of-use.

No other product can match the performance, disaster recovery support, and application coverage or data center reliability of NetBackup.

(Excerpt from: *NetBackup 3.2 Datasheet* -- http://www.veritas.com/products)

VERITAS NetBackup Shared Storage Option

VERITAS NetBackup Shared Storage Option (SSO) is the industry's first heterogeneous Storage Area Network (SAN) solution that allows individual tape drives (standalone or in a robotic tape library) to be shared dynamically between multiple VERITAS NetBackup Servers. The drives are connected to each host via enabling hardware, such as switches, hubs, or multiplexors. SSO allows enterprises to leverage their peripheral investments more thoroughly through drive sharing, since individual drives need not be tied to a specific server anymore. SSO also provides better utilization of hardware resources.

(Excerpt from: *NetBackup 3.2 Datasheet* -- http://www.veritas.com/products)

StorageWorks Command Console

StorageWorks Command Console (SWCC) is a feature-rich, year 2000 compliant, GUI that provides local and remote management of StorageWorks controllers. The 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

High Availability Support

High Availability Support in EBS is provided by the Compaq StorageWorks Secure Path software 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 that provides 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.

EBS Sizing Support

Sizer Utility

The Compaq StorageWorks Enterprise Backup Solution Sizing Tool version 1.3 is a Windows-based tool used to determine a backup solution based upon 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 version 1.3:

- 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 VERITAS NetBackup. 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:

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

For more information on product compatibility, refer to

www.compaq.com/storageworks

Table 1. 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 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

VERITAS

For comprehensive online support of VERITAS NetBackup, refer to:

http://support.veritas.com/

For more detailed information on VERITAS NetBackup, refer to

http://www.veritas.com/products/