VERITAS

VERITAS SANPoint Control™ QuickStart 4.0

SANPoint Control QuickStart Overview Guide

Solaris

N09884F

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Preface

Welcome to the SANPoint Control QuickStart 4.0 documentation set. The manuals and online help included with SANPoint Control QuickStart will show you how you can use the product to view, monitor, and manage your SAN.

The information in this Preface helps you find what you need in the product documentation and tells you how to get help when you need it.

This section includes the following topics:

Overview of SANPoint Control QuickStart 4.0

SANPoint Control QuickStart provides automatic, accurate discovery and visualization of SAN devices. For discovered devices, SANPoint Control QuickStart provides detailed attributes and connectivity information, thus eliminating the need for manually tracking SAN assets.

SANPoint Control QuickStart is a VERITAS Enterprise Administrator (VEA) extension. Its graphical user interface displays within VEA and includes a graphical Topology Map that exposes the interrelationships between your SAN devices. SANPoint Control QuickStart provides the broad view of the entire storage network that you require while at the same time giving you the ability to drill down to specific information like data paths and resource relationships.

For a full description of the product and its major components, see "The SANPoint Control QuickStart Solution" on page 5.

Features in the SANPoint Control Product Family

The following table provides a high-level summary of the features available in SANPoint Control QuickStart and its parent product, SANPoint Control.

Comparison of SANPoint Control Product Family Features

Task	QuickStart	Full Product
Discover and visualize SAN devices and meta-objects, such as fabrics and virtual fabrics	✓	✓
View graphical representation of SAN topology	✓	✓
Create groups to meet quality-of-service requirements	✓	✓
View and export inventory reports	✓	✓
Create device enclosures and hosts for partially-discovered objects	✓	✓
Launch VERITAS Volume Manager in-context from within Console	✓	✓
Launch other VERITAS and supported third-party applications in-context from within Console		✓
Issue commands using the command-line interface		✓
Control access to SAN resources through zone management		✓
Create policies to monitor and report on SAN performance and utilization		✓
Use LUN security to manage hosts' access to LUNs within arrays		✓
Manage arrays, including binding and masking LUNs		✓
Manage fabrics and virtual fabrics		✓
Perform trace routes to identify potential bottlenecks that prevent optimal SAN performance		✓
Create customized attributes and wire connection information		✓
Analyze storage consumption to discern storage trends and needs		✓

Upgrading from SANPoint Control QuickStart

If you would like to upgrade from SANPoint Control QuickStart to its parent product, which contains additional features for managing and monitoring your SAN, contact your VERITAS sales representative.

What's In This Manual?

The *SANPoint Control QuickStart Overview Guide* introduces new users to the product and contains step-by-step instructions for using functions in the VERITAS Enterprise Administrator (VEA) Console.

This manual is organized as follows:

Chapter 1, "Introducing SANPoint Control QuickStart," introduces the reader to SAN technology and the functions of SANPoint Control QuickStart.

Chapter 2, "Visualizing Objects on the SAN," describes how to use the VERITAS Enterprise Administrator (VEA) Console to view objects on the SAN.

Chapter 3, "Creating and Modifying SAN Objects," describes how to create and update enclosure, host, and device objects to help you monitor the SAN, and also describes using the VEA Console to manage Volume Manager disk volumes.

Chapter 4, "Controlling Access to Resources," describes how to use groups and zones to maintain a quality of storage service for SAN-attached servers.

Chapter 5, "Displaying Reports about SAN Objects," describes how to display up-to-date inventory data about objects on the SAN, using reports that are included with the SANPoint Control QuickStart product.

Appendix A, "Troubleshooting," describes some common problems and contains information for diagnosing and solving them.

"Glossary" contains definitions for specialized terms used in SANPoint Control QuickStart.

Catalog of Product Manuals

Portable Document Format (PDF) versions of SANPoint Control QuickStart manuals are installed by default in `/opt/VRTSspqdc`.

The following manuals ship with SANPoint Control QuickStart.

Manuals in the SANPoint Control QuickStart Documentation Set

Manual	Abbreviated Title	Filename
SANPoint Control QuickStart Installation and Configuration Guide	*Install*	`spcqs_install_icg.pdf`
SANPoint Control QuickStart Overview Guide	*Overview*	`spcqs_overview.pdf`
SANPoint Control QuickStart Release Notes	*RelNotes*	`spcqs_notes.pdf`
VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List	*HCL*	`spcqs_suptmx.pdf`

Related Resources

In addition to the documentation included with SANPoint Control QuickStart, the following documentation provides information about Storage Foundation and the VERITAS Enterprise Administrator (VEA) Console:

◆ *Storage Solutions Installation Guide*—provides important information about how to license, install, and get support for Storage Foundation products . You should read this guide before you install SANPoint Control QuickStart. The document is available in print and in PDF format (`storage_solutions_ig.pdf`) at the top level of the VERITAS Storage Solutions software disc 2.

◆ VERITAS Enterprise Administrator (VEA) Console online help—provides basic information about how to use the VEA Console.

◆ VERITAS Volume Manager online help—provides information about how to use VERITAS Volume Manager to manage volumes, disks, and disk groups.

◆ VERITAS File System online help—provides information about how to use VERITAS File System to perform basic file system operations, such as adding a file system to a volume or mounting a file system.

◆ Storage Solutions documentation disc—a disc that enables you to search across all Storage Foundation product documentation. For more information on how to use the searchable documentation disc, see the *Storage Solutions Installation Guide*.

Conventions

The following conventions apply throughout the documentation set.

Screen Shots

The majority of screen shots in the manuals and help were taken on Windows systems. Unless otherwise noted, the application and its GUI are the same across platforms. For cases where the application or GUI is different on UNIX, a UNIX screen shot has been included as well.

Typographical Conventions

Here are the typographical conventions used throughout the manuals:

Conventions

Convention	Description
GUI Font	Used to depict graphical user interface (GUI) objects, such as fields, listboxes, menu commands, and so on. For example: Enter your password in the **Password** field.
Italics	Used for placeholder text, book titles, new terms, or emphasis. Replace placeholder text with your specific text. For example: Replace *filename* with the name of your file. Do *not* use file names that contain spaces.
Code	Used to show what commands you need to type, to identify pathnames where files are located, and to distinguish system or application text that is displayed to you or that is part of a code example.
Key+Key	Used to show that you must hold down the first key while pressing the second key. For example: Ctrl+S means hold down the Ctrl key while you press S.

You should use the appropriate conventions for your platform. For example, when specifying a path, use backslashes on Microsoft Windows and slashes on UNIX. Significant differences between the platforms are noted in the text.

Tips, notes, and cautions are used to emphasize information. The following samples describe when each is used.

Tip Used for nice-to-know information, like a shortcut.

Note Used for important information that you should know, but that shouldn't cause any damage to your data or your system if you choose to ignore it.

Caution Used for information that will prevent a problem. Ignore a caution at your own risk.

Getting Help

You can access SANPoint Control QuickStart online help from within the VERITAS Enterprise Administrator (VEA) Console. Within the VEA Console, select **Help > Contents**. In the help viewer's table of contents, expand the SANPoint Control QuickStart help set.

Manual pages for SANPoint Control QuickStart are installed by default in `/opt/VRTSspqmn`.

Understanding How to Troubleshoot SANPoint Control QuickStart

If an issue arises while you are using SANPoint Control QuickStart, we recommend that you follow these steps:

1. Use the manuals' troubleshooting appendixes to see if you can find the solution to your problem.

2. If your problem is not listed in the troubleshooting appendixes, check the TechNotes on the VERITAS Support Web site at http://support.veritas.com.

3. If you still can't solve your problem, you can use the VRTSexplorer Diagnostic Program. Do the following:

   a. Run VRTSexplorer as root. VRTSexplorer, also known as vxexplorer and vxexplore, is a tool provided by VERITAS Software Corporation that, when executed on a UNIX system, gathers some of the information that may be needed by VERITAS Technical Support to troubleshoot a problem.

   > **Note** If VRTSexplorer is not already installed, install it from the CD-ROM. Under the support directory are directories for each supported platform. In each directory is a README.VRTSspt file with installation instructions.

   b. Transfer the resulting file to the VERITAS Support FTP server when asked.

   c. Call VERITAS Technical Support (see "Contacting VERITAS" on page xxiv).

Contacting VERITAS

For assistance with any of the VERITAS products, contact VERITAS Technical Support:

- ◆ U.S. and Canadian Customers: 1-800-342-0652
- ◆ International: +1-650-527-8555
- ◆ Email: support@veritas.com

For license information:

- ◆ Phone: 1-650-527-0300
- ◆ Email: license@veritas.com
- ◆ Fax: 1-650-527-0952

For software updates:

- ◆ Email: swupdate@veritas.com

For information on purchasing VERITAS products:

- ◆ Phone: 1-800-258-UNIX (1-800-258-8649) or 1-650-527-8000
- ◆ Email: vx-sales@veritas.com

For additional information about VERITAS and VERITAS products, visit the Web site at http://www.veritas.com.

For software updates and additional technical support information, such as TechNotes, product alerts, and hardware and software compatibility lists, visit the VERITAS Technical Support Web site at: http://support.veritas.com.

Introducing SANPoint Control QuickStart   1

VERITAS SANPoint Control QuickStart—part of the VERITAS Storage Foundation—provides automatic, accurate discovery and visualization of storage area network (SAN) devices and gives your SAN administrators a single, centralized, consistent interface for monitoring a multi-vendor storage network.

SANPoint Control QuickStart seamlessly integrates monitoring, storage allocation, and grouping capabilities with the VERITAS Enterprise Administrator (VEA) Console and also allows you to manage VERITAS Volume Manager disk volumes from within the same graphical user interface.

This section contains the following topics:

How a SAN Can Meet Your Storage Needs

For most organizations, the volume of data is exploding—growing from 50 percent to 400 percent every year as they adopt e-commerce, supply chain management, messaging, and other data-intensive applications. Even more storage is required to digitize manuals, corporate records, and other paper-based information, and to hold the files that include increasing amounts of multimedia content.

If all that volume and complexity weren't enough of a management challenge, today's business environments demand that all this data be available immediately, continuously, and from anywhere—to multiple applications and to hundreds, thousands, or even millions of users.

In the past, large organizations relied heavily on parallel SCSI technology to provide the performance required for their enterprise data storage needs. More recently, organizations are recognizing that the restrictions imposed by SCSI architecture are too costly for SCSI to continue as a viable solution.

To overcome these restrictions, some organizations have turned to a network-attached storage (NAS) model that enables storage arrays to reside directly on the network, where disk accesses may be made directly rather than through the server's SCSI connection. However, this model adds a significant load to the network, which frequently is already starved for bandwidth. A more elegant solution is needed.

The SAN Model

The storage area network (SAN) model places storage on its own dedicated network, removing data storage from both the server-to-disk SCSI bus and the main user network. This dedicated network most commonly uses Fibre Channel technology, a versatile, high-speed transport. The SAN includes one or more hosts that provide a point of interface with LAN users, as well as (in the case of large SANs) one or more fabric switches and SAN hubs to accommodate a large number of storage devices.

There are several advantages to the implementation of a high-performance network exclusively for storage devices:

◆ The LAN is relieved of the overhead of disk access and tape backup

◆ Data availability becomes less server-dependent

◆ Downtime incurred by service and maintenance tasks affects more granular portions of the available storage system

The versatility of the SAN model enables organizations to perform tasks that were previously difficult to implement, such as LAN-free and server-free tape backup, storage leasing, and full-motion video services.

Storage Virtualization

SANPoint Control QuickStart is an integral part of a *storage virtualization* solution. Storage virtualization is the process of taking multiple physical storage devices and combining them into logical (virtual) storage devices that are allocated to applications and users at will. Storage virtualization builds a layer of abstraction above the physical storage to ease management of complex storage environments.

Virtualization is not a new concept. In fact, for more than a decade products such as VERITAS Volume Manager have provided virtualization in open systems from the standpoint of a single host or a single array.

Today, SANPoint Control QuickStart enables you to take advantage of storage virtualization services over the entire storage network, across all SAN storage and server platforms. You also get centralized storage resource management capabilities such as hardware discovery, visualization, and reporting.

Fabrics and Virtual Fabrics

One of the most common ways of grouping and managing SAN objects is by *fabrics*. A fabric is a group of SAN objects connected by a single switch. Organizing objects in this way makes it easy for a SAN administrator to see the interconnections between objects and perform operations on all of the objects in a fabric.

For some switches that have Fibre Channel (FC) capability, you can create *virtual fabrics* (also known as virtual SANs or VSANs) to achieve even greater security and scalability. When you create virtual fabrics, you are in effect creating multiple logical fabrics, each of which can be managed as a single logical entity.

Virtual Fabrics can save you money by consolidating physically separate switch topologies into one physical topology that can be managed as a single logical entity. Each logical topology is easier to manage and keep secure.

Tasks Performed by the SAN Administrator

Because SANs are a relatively new technology, the job of SAN administrator is often filled by people with various skill sets and work backgrounds: mainframe operators, traditional network administrators, system administrators, and others in the IT industry.

Keeping the SAN secure is vital. To protect against security breaches from outside the SAN, the SAN administrator usually works in conjunction with network administrators and others in the IT department. Security within the SAN, however, is often solely the SAN administrator's responsibility. The SAN administrator, therefore, is typically expected to secure the SAN and develop a data protection strategy.

Here are some of the other tasks a SAN administrator typically performs:

◆ Administering SAN resources—for example allocating storage to hosts and the applications that run on them, and defining logical groups for easier management

◆ Testing new vendors' hardware and integrating it into the SAN

◆ Troubleshooting SAN elements

◆ Managing day-to-day performance and SAN resource availability

The next section describes how SANPoint Control QuickStart helps the SAN administrator perform these tasks.

The SANPoint Control QuickStart Solution

SANPoint Control QuickStart maximizes the return on your SAN technology investment by helping the SAN administrator make your SAN operate as effectively as possible.

SANPoint Control QuickStart provides the following tools:

◆ In-band and out-of-band discovery methods for discovering a wide range of SAN objects including fabrics, hosts, groups, and applications.

◆ A rich set of graphical and textual displays for visualizing SAN resources—such as fabrics, storage devices, and groups—as well as inventory reports about objects on the SAN.

◆ Integration with other VERITAS products, including the ability to manage VERITAS Volume Manager volumes from within the VERITAS Enterprise Administrator (VEA) Console.

◆ Support for features of Cisco MDS 9000 series switches, such as virtual fabrics and port bundles, that are designed to increase the efficiency and flexibility of your SAN.

(For a complete listing of the storage devices supported by SANPoint Control QuickStart, see the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List*.)

Based on a distributed client-server architecture, SANPoint Control QuickStart is divided into three separate components:

◆ A VEA Console extension displays information compiled from the SAN Access Layer (SAL) and other sources within the SANPoint Control QuickStart Server. The VEA Console provides a central point to display the SAN topology and visualize fabrics (including virtual fabrics), access detailed information about components, and view inventory reports.

◆ The SANPoint Control QuickStart Server provides discovery of SAN objects and their attributes.

◆ The SANPoint Control QuickStart Agent discovers additional information about objects on the SAN that may be configured out of view of the Server (such as those devices on a separate zone or fabric). The Agent performs discovery in-band as well as through common HBA API and IOCTLs.

The following sections describe each of these components and their roles in discovering and managing objects on the SAN.

The VEA Console

The VERITAS Enterprise Administrator (VEA) Console displays data about SAN objects in graphical form and provides a user interface for the many tools and functions in SANPoint Control QuickStart.

The VEA Console includes the following features for all users:

◆ A user-customizable topographical display of every discovered object on the SAN

◆ Detailed information on object attributes and connectivity

◆ Filter views that draw a subset of the SAN topology based on the object currently selected

◆ Visualization of fabrics and virtual fabrics

◆ The ability to manage VERITAS Volume Manager disk volumes from within the SANPoint Control QuickStart portion of the VEA Console

◆ Pre-defined inventory reports about objects on the SAN

◆ An Enclosure Wizard for creating and managing SAN object enclosures

◆ A Host Wizard for creating and managing hosts on the SAN

◆ A Group Wizard for creating and managing groups of SAN objects

◆ A Device Wizard for creating and managing other devices on the SAN

The SANPoint Control QuickStart client application is automatically downloaded to your Solaris or Windows client when you install the VEA Console and then connect to a server on which SANPoint Control QuickStart is installed.

For more information about using SANPoint Control QuickStart functions in the VEA Console, see "Visualizing Objects on the SAN" on page 11.

The SANPoint Control QuickStart Server

The SANPoint Control QuickStart Server constantly explores your SAN to make data available to client applications. The functions of the QuickStart Server are to:

◆ Automatically discover SAN-attached objects including hosts, HBAs, switches, bridges, and storage devices such as JBODs and tape drives. (Configuration is required for discovery of some devices.)

◆ Monitor the SAN topology

◆ Provide data for inventory reports that are generated within the VEA Console.

◆ Support user-defined grouping of objects based on quality of service (QoS) criteria

SANPoint Control QuickStart ships with several *explorers*. Each explorer is a software tool that uses a unique methodology to discover information about a particular kind of object on the SAN.

The explorers provided in SANPoint Control QuickStart can discover the following SAN elements:

◆ Physical entities such as switches, host bus adapters (HBAs), bridges, routers, and other devices.

◆ Logical groupings of entities such as enclosures, zones, and virtual hubs.

◆ Information about VERITAS Volume Manager hosts, NetBackup applications, and Cluster Server clusters, along with application-specific objects such as Oracle and DB2 database instances.

◆ Attributes—such as name, host, and capacity—for address units (LUNs) that are controlled by VERITAS Volume Manager.

The SAN Access Layer (SAL), running on the SANPoint Control QuickStart Server, coordinates the activity of the explorers and collects the data they gather into a SAN discovery data store. The data store is constantly updated with real-time information about objects on the SAN.

SAL also performs the following functions:

◆ Interprets information in the SAN discovery data store, which it provides to the VEA Console as well as to other client applications such as the full SANPoint Control product.

◆ Enforces user authentication for commands sent to the Server.

◆ Handles communication between the Server and Agent hosts.

For more information about setting up and using the QuickStart Server for discovery, and for information about using the data in the SAN discovery data store, see *SANPoint Control QuickStart Installation and Configuration Guide*.

The SANPoint Control QuickStart Agent

Because not all objects on the SAN may be visible to the machine on which the SANPoint Control QuickStart Server is installed, the SANPoint Control QuickStart Agent assists the QuickStart Server in discovering the entire SAN. For example, the QuickStart Agent can discover objects like HBAs, clusters, OS handles, and applications on the host where it is installed.

The QuickStart Agent consists of several SAN explorers that are also used by the QuickStart Server, including explorers that discover Fibre Channel-capable switches and devices managed over IP networks.

For the most complete and accurate discovery, it is best to install the QuickStart Agent on every host in your SAN. However, if an QuickStart Agent is not installed (either by choice or because the host is running a non-supported operating system), the QuickStart Server can still discover HBAs on the host and display them as unidentified adapters. You can then use the Host Wizard to enclose the HBAs into host enclosures.

Licensing Levels

SANPoint Control QuickStart enables you to perform tasks such as basic discovery and visualization of SAN objects, manually creating enclosures for grouping storage devices, and configuring the SAN.

With the full SANPoint Control product, you can perform all tasks associated with managing and administering your SAN, including policy-based monitoring of SAN activity. For details about the functions available with the full product, see "Features in the SANPoint Control Product Family" on page xv.

If you would like to upgrade from SANPoint Control QuickStart to its parent product, which contains additional features for managing your SAN, contact your VERITAS sales representative.

Operating System Platforms

The SANPoint Control QuickStart Server and the SANPoint Control QuickStart Agent are supported on the Solaris operating system platform.

The VEA Console can be installed on Solaris, Windows 2000, or Windows XP Professional.

Visualizing Objects on the SAN   **2**

The VERITAS Enterprise Administrator (VEA) Console is a graphical user interface that displays information about SAN objects in an intuitive, easily navigable form. The VEA Console provides a central point with which to monitor the SAN and display information about SAN objects.

This section contains the following topics:

The VERITAS Enterprise Administrator (VEA) Console Window

In the VERITAS Enterprise Administrator (VEA) Console window, there are two areas where SANPoint Control QuickStart displays SAN information in complementary formats:

◆ Tree View or Navigational View—contains a directory tree of all the objects on the SAN. The Tree View displays SAN objects in a number of different ways. See "Viewing SAN Objects in the Tree View" on page 14 for details about the Tree View.

◆ Details View—includes several panes (tabs), each of which provides a different form of information about your SAN. Depending on the type of object or group you select in the Tree View, a different set of panes is available to select. See "Displaying Details about SAN Objects" on page 25 for more information about the Details View.

One of the Details View panes contains the Topology Map, a graphical representation of the objects on your SAN. Other panes display the object's attributes and other information about the object.

Main Elements of the VERITAS Enterprise Administrator (VEA) Console
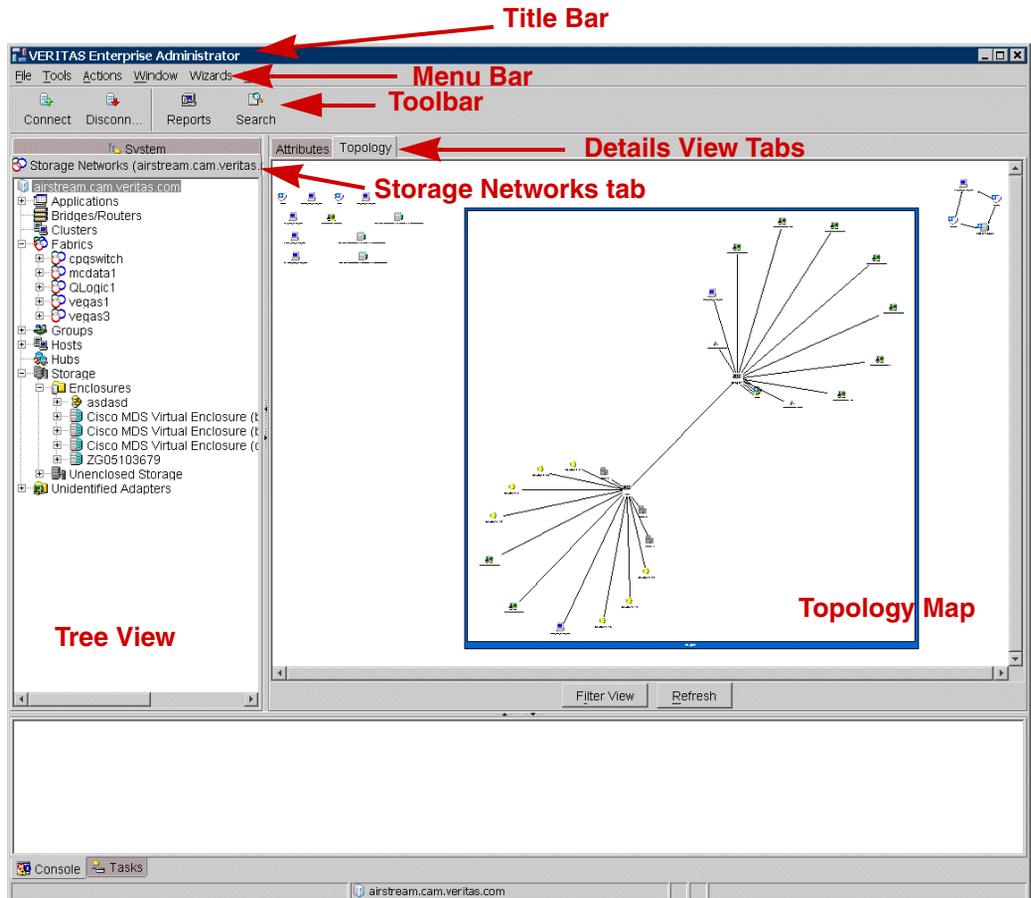
Viewing SAN Objects in the Tree View

The Tree View, on the left side of the VERITAS Enterprise Administrator (VEA) Console, contains a directory tree of SAN objects. Using the Tree View, you can view SAN objects organized according to any of the following object types:

♦ Applications, such as VERITAS Cluster Server and Volume Manager

♦ Bridges and routers

♦ Clusters

♦ Fabrics

♦ Groups

♦ Hosts

♦ Hubs

♦ Storage, including enclosures and unenclosed storage

♦ Unidentified Adapters

For each object type, a separate branch corresponds to each object of that type. You can open a number of sub-branches to display details about the object you have selected. For example, when you select a fabric you can display sub-branches for the fabric's switches, zones, and zone aliases.

▼ **To display a SAN object in the Tree View**

1. Select the **Storage Networks** tab at the top of the Tree View.

2. In the Tree View, select the expand icon (plus sign) to expand the branch that corresponds to the object type you want to display.

3. Select the object.

Viewing SAN Objects in the Topology Map

The Topology Map, displayed in the Details View when the **Topology** tab is selected, provides a visual representation of your SAN. The Topology Map displays not only the objects on the SAN, but the connections between objects as well.

▼   **To display SAN objects in the Topology Map**

1.   Select the **Storage Networks** tab at the top of the Tree View.

2.   Select the **Topology** tab at the top of the Details View.

A graphical representation of all the objects on your SAN, including connections between objects, is displayed.

Moving Objects in the Topology Map

You can move objects in the Topology Map to help you focus on the ones you are most interested in, or to group objects together.

▼ **To move an object in the Topology Map**

1. Select (single-click) the object.

A dotted rectangle around the object indicates that the object is ready to be moved.

2. Drag the object to its new location.

Note that when you drag an object and move it to a new location, the lines that represent its connections with other objects are repositioned as well.

▼ **To restore all objects in the Topology Map to their original positions**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Reset Node Positions**.

Expanding an Object to Display Subordinate Objects

Some object types—enclosures, fabrics, and bridges—are displayed in the Topology Map as a single icon even though they have subordinate objects such as storage devices or switches. You can expand the icon to show all of the subordinate objects. An expandable object is identified by a plus sign next to its icon.

An Expanded Object Displayed in the Topology Map
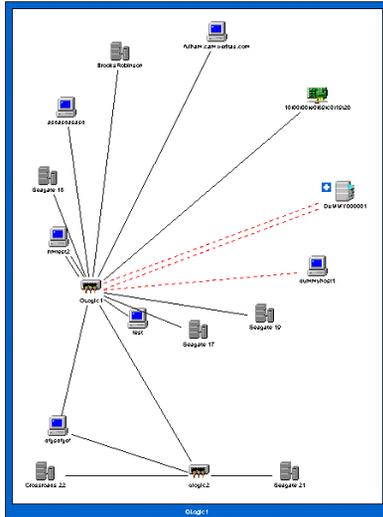
▼ **To expand a fabric or enclosure in the Topology Map**

1. Display a context menu by right-clicking the object's icon.

2. Select **Expand**.

The object and its subordinate objects are displayed inside a blue rectangle.

▼ **To hide the children of an object**

1. Display a context menu by right-clicking an object within an expanded fabric or enclosure.

2. Select **Hide Children**.

To undo this operation, right-click the object and select **Show Children**.

▼ **To restore an object to its original appearance**

1. Display a context menu by right-clicking the frame that surrounds the object and its subordinate objects.

2. Select **Collapse**.

Selecting the Topology Map Layout

You can choose from four different Topology Map layouts. The layout you use is usually a matter of visual preference, however there are some underlying design assumptions in each layout which may influence when and why you use one layout instead of another. The four layout options are:

The **circular layout**—the default layout—arranges the SAN objects in circular patterns that represent groups of objects connected to various ports on the switch.

The **fan layout** positions the switches at the top of the Topology Map and fans all devices and hosts out at a level below the switches in a symmetrical fashion.

The **hierarchical layout** positions the switches at the top of the Topology Map and shows other SAN objects arranged in hierarchical fashion below them.

The **network layout** emphasizes the switches on your SAN by displaying them centrally among the various other objects to which they connect.

▼ **To select the Topology Map layout**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Change Layout**.

3. In the Change Layout dialog box, do the following:

    a. Select the layout you want.

    b. Select **Set as default layout** if you want to have this layout display every time you invoke the Topology Map.

    c. Select **OK**.

    The layout in the Topology Map changes to the layout you selected.

Zooming on the Topology Map

You can zoom in or out on the Topology Map, controlling what objects display in the Topology Map and their magnification level.

▼ **To zoom in on the Topology Map**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Zoom > Zoom In**.

The view in the Topology Map is refreshed. A smaller portion of the map is visible, and objects appear larger.

▼ **To zoom in on the Topology Map using the keyboard**

❖ Hold down the Alt and Shift keys while you press + (the plus sign).

The view in the Topology Map is refreshed. A smaller portion of the map is visible, and objects appear larger.

▼ **To zoom out on the Topology Map**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Zoom > Zoom Out**.

The view in the Topology Map is refreshed. A larger portion of the map is visible, and objects appear smaller.

▼ **To zoom out on the Topology Map using the keyboard**

❖ Hold down the Alt key while you press - (the minus sign).

The view in the Topology Map is refreshed. A larger portion of the map is visible, and objects appear smaller.

▼ **To customize the Topology Map's zoom level**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Zoom > Custom Zoom**.

3. In the Custom Zoom dialog box, type a zoom level in the text box. The zoom level should be a whole number between 1 and 200.

The larger the number, the more the display will be zoomed in—a smaller portion of the map is visible, and objects appear larger.

4. Select **OK** to set the Topology Map zoom level.

The view in the Topology Map is refreshed with the specified zoom level.

▼ **To return to the default Topology Map zoom setting**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Zoom > Fit in Window**.

The view in the Topology Map is refreshed so that all of the SAN objects fit in the window.

Filtering in the Topology Map

Because it might be difficult to navigate the Topology Map for a large, complex SAN, you can use the Filter View to focus on particular objects of interest and view only those objects in the Topology Map.

▼ **To filter the view in the Topology Map**

1. Select an object in the Tree View.

2. Display the Topology Map by selecting the Topology tab in the Details View.

3. Select the **Filter View** button at the bottom of the Topology Map.

   The Topology Map shows only the object that is selected in the Tree View. If the object is expandable—a fabric, for example—then an expanded view of the object is shown.

▼ **To restore the unfiltered display in the Topology Map**

❖ Select the **Filter View** button again.

Using the Overview Window to Display a Part of the SAN

At times, a large SAN with many devices may be difficult to represent legibly within the space allotted to the Topology Map. You can use the Overview Window to pan across the Topology Map and zoom in on a particular part of the SAN.

▼ **To launch and use the Overview Window**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Overview**.

3. In the Overview Window, resize the frame by dragging its corners.

4. Click and drag the frame to the area you want to display.

    As you drag the frame, objects inside the frame are magnified within the Topology Map itself.

▼ **To undo the Overview Window magnification**

1. Display a context menu by right-clicking anywhere in the Topology Map.

2. Select **Zoom > Fit in Window**.

Refreshing the View in the Topology Map

Select the **Refresh** button at the bottom of the Topology Map to update the display of SAN objects and restore the default settings for viewing the map.

When you select **Refresh**, the following things take place:

◆ The display of SAN objects updates to reflect the current condition of your SAN.

◆ Expanded objects return to their collapsed state.

◆ Objects display using the default circular layout.

◆ Objects display using the default zoom setting.

◆ Filtering turns OFF.

◆ The Overview Window closes.

If you have moved objects in the Topology Map, they remain in their new positions. (To return the objects to their original positions, right-click in the Topology Map and select **Reset Node Positions**.)

Displaying Details about SAN Objects

The Details View displays by default in the right side of the VERITAS Enterprise Administrator (VEA) Console. It includes several panes (tabs), each of which provides a different form of information about the objects on your SAN.

▼ **To display details about a SAN object**

1. Select an object in the Tree View.

2. At the top of the Details View, select the tab corresponding to the kind of information you want to display.

   Information about the object is displayed in the Details View.

   The Details View (Showing the Connectivity Pane)
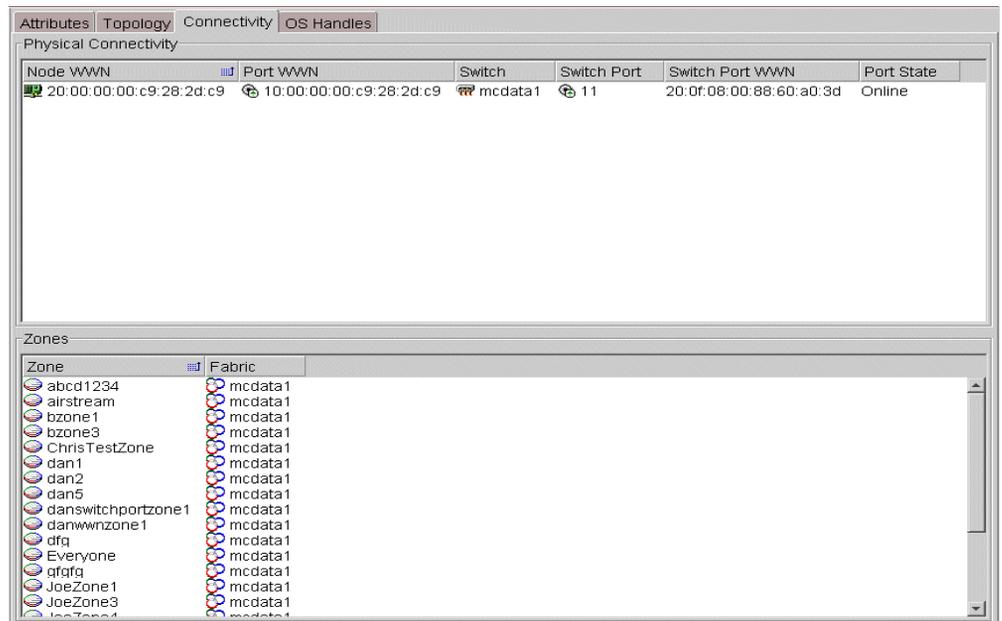
Depending on the type of object or group you select in the Tree View, a different set of panes is available in the Details View. The following panes are always available:

◆ The Attributes pane displays detailed information about the object or directory you select in the Tree View.

◆ The Topology Map provides a visual representation of your SAN. See "Viewing SAN Objects in the Topology Map" on page 15 for details.

Other panes are available in the Details View depending on the type of object you select in the Tree View:

♦ The Connectivity pane displays, for the selected object, information about the switch ports to which it is connected.

♦ The OS Handles pane displays—for hosts, HBAs, storage devices containing at least one LUN, and individual LUNs—the relationships between HBA ports and the LUNs that are accessible to them (the LUNs that are masked to those HBA ports).

♦ The Zone Members pane displays, for a zone that is selected in the Tree View, the zone definition and the objects in the zone, including parent objects that are members of the zone by virtue of the zone definition.

♦ The Group Members pane displays, for a group that is selected in the Tree View, the group definition and the objects in the group, including parent objects that are members of the group by virtue of the group definition.

Enabling the Display of Additional SAN Information

The SANPoint Control QuickStart Server can discover information about HBAs on hosts that are attached to fabrics discovered by the QuickStart Server host. If you want QS to perform additional discovery, so that information about more SAN objects is displayed in the VERITAS Enterprise Administrator (VEA) Console, you must install the SANPoint Control QuickStart Agent software on each host and register each Agent with the QuickStart Server.

Additionally, if you want to be able to display information from fabrics that are not attached to the QuickStart Server, you must install the QuickStart Agent software on at least one host in the remote fabric and specify it on the QuickStart Server to discover the fabric.

To configure QuickStart Agent hosts for discovery, so that information about more SAN objects is displayed in the VEA Console, select **Tools > SANPoint Control QuickStart > Configure Agent Hosts** in the menu bar. See "Configuring the Server for Agent Discovery" in *SANPoint Control QuickStart Installation and Configuration Guide* for details.

Creating and Modifying SAN Objects   3

This section introduces SAN objects and attributes that you can define. It explains how to create objects and manage them.

This section contains the following topics:

SAN Objects You Can Create

In some cases, SANPoint Control QuickStart neither discovers nor displays certain SAN elements. In other cases, although a SAN element is not discoverable, SANPoint Control QuickStart permits you to manually create an object in the SAN discovery data store to represent that element.

Generic Devices

Occasionally, an unidentified node may belong to a SAN-attached device that is undiscoverable by SANPoint Control QuickStart. You can create a device object to represent the physical device that contains the node.

For more information, see "Creating, Modifying, and Deleting Device Objects" on page 31.

Storage Enclosures

A storage enclosure is a method of grouping SAN objects together so that you can visualize them, and perform operations on them, as if they were a single object—for example a JBOD. SANPoint Control QuickStart discovers some enclosures automatically, but in many cases it discovers only the individual storage devices inside the enclosure. Using the Enclosure Wizard, you can create an enclosure object and specify which devices it contains.

For more information, see "Creating, Modifying, and Deleting Enclosure Objects" on page 34.

Hosts

If a host on the SAN is not running either the SANPoint Control QuickStart Server or the Agent, SANPoint Control QuickStart discovers only its HBA nodes, which appear as unidentified adapters in the VERITAS Enterprise Administrator (VEA) Console. Using the Host Wizard, you can create a host object to represent the physical host that contains that HBA node. You can also specify certain attributes of the host, which SANPoint Control QuickStart adds to the data store.

For more information, see "Creating, Modifying, and Deleting Host Objects" on page 37.

Creating, Modifying, and Deleting Device Objects

In some circumstances, SANPoint Control QuickStart may not be able to completely discover a storage device on the SAN. This occurs when three conditions are met:

◆ The switch name server does not provide enough information (a SCSI INQUIRY string) to determine whether a discovered adapter belongs to an HBA or a device. In some cases this is because of a limitation in the switch. In other cases the device simply does not register a SCSI INQUIRY string when logging onto the fabric.

◆ No SANPoint Control QuickStart Server or QuickStart Agent can see the object—for example, when it is zoned out of view of the host.

◆ The object's vendor (a discoverable attribute) is not known to be a storage vendor.

In such a case, the device appears in the VERITAS Enterprise Administrator (VEA) Console as an unidentified adapter.

The Device Wizard allows you to identify an unidentified adapter node as a storage device so that it appears correctly in the VEA Console.

▼ **To create a generic storage device object from an unidentified node**

1. In the VEA Console menu bar, select **Wizards > Device**.

2. In the Welcome panel of the Device Wizard, select **Next**.

3. In the Specify Device Details panel, do the following:

   a. Select **Create**.

   b. Type a name for the new device.

      The device name may consist of alphanumeric characters and underscores.

   c. Type the appropriate information—such as its type, its vendor name, or its physical location—in the **Device Information** field. (This field is optional.)

   d. Select **Next**.

4. In the Specify Device Nodes panel, do the following:

   a. Select the checkbox next to each node that represents a node within the device.

   b. Select **Next**.

5. In the Confirm Device Selections panel, do the following:

    a. Examine the attributes shown in the **Device Attributes** fields for accuracy.

    b. Examine the nodes shown in the **Nodes** list for accuracy.

    c. Select **Finish** to confirm your selections and create the device object, or select **Back** to go back and make changes.

A progress window opens to track the execution of the command by the SANPoint Control QuickStart Server. You can close the window at any time.

▼ **To modify a storage device object**

1. In the VEA Console menu bar, select **Wizards > Device**.

2. In the Welcome panel of the Device Wizard, select **Next**.

3. In the Specify Device Details panel, do the following:

    a. Select **Modify**.

    b. Select the device from the drop-down list.

    c. Update the information in the **Device Information** field. (This field is optional.)

    d. Select **Next**.

4. In the Specify Device Nodes panel, do the following:

    a. Select the checkbox next to each node you want to add to the device object.

    b. Deselect the checkbox next to each node you want to remove from the device object.

    c. Select **Next**.

5. In the Confirm Device Selections panel, do the following:

    a. Examine the attributes shown in the **Device Attributes** fields for accuracy.

    b. Examine the nodes shown in the **Nodes** list for accuracy.

    c. Select **Finish** to confirm your selections and create the device object, or select **Back** to go back and make changes.

The definition for the device object has been updated.

▼ **To delete a storage device object**

1. Display a context menu by right-clicking a storage device object in the Tree View.

2. Select **Delete**.

    The object is deleted. Because user-defined storage device objects serve as symbolic rather than functional groupings of nodes, the nodes themselves are not affected when you delete a storage device object.

Creating, Modifying, and Deleting Enclosure Objects

Some storage enclosures (groups of storage devices) are discovered automatically by SANPoint Control QuickStart. For enclosures that are not discoverable, you can manually create a representation of the enclosure object in the SAN discovery data store. Use the Enclosure Wizard to specify the type of enclosure and which devices are contained within it.

▼ **To create a new enclosure**

1. In the VEA Console menu bar, select **Wizards > Enclosure**.

2. In the Welcome panel of the Enclosure Wizard, select **Next**.

3. In the Create or Modify an Enclosure panel, do the following:

   a. Select **Create**.

   b. Type a name for the new enclosure.

   The enclosure name may consist of alphanumeric characters and underscores.

   c. Type the appropriate information in the **Vendor Name** and **Model Number** fields. (These fields are optional.)

   d. In the **Type** drop-down list, select the enclosure type—disk array, robotic array, or JBOD.

   e. Select **Next**.

4. In the Add or Remove Enclosure Members panel, do the following:

   a. Highlight an object in the **Available Objects** list. To display lower-level objects, use the expand icons (plus signs).

   b. Select **Add** to add the selected object to the enclosure.

   c. Repeat steps a and b to add more objects.

   d. When you have placed all the objects you want into the **Enclosure Objects** list, select **Next**.

5. In the Confirm Selections panel, do the following:

    a. Check your selections for accuracy.

    b. Select **Finish** to confirm your selections and create the new enclosure, or select **Back** to go back and make changes.

▼ **To add objects to, or remove objects from, an existing enclosure**

1. In the VEA Console menu bar, select **Wizards > Enclosure**.

2. In the Welcome panel of the Enclosure Wizard, select **Next**.

3. In the Create or Modify an Enclosure panel, do the following:

    a. Select **Modify**.

    b. Select the enclosure from the drop-down list.

    c. Update the information in the **Vendor Name** and **Model Number** fields, if desired.

    d. Select **Next**.

4. In the Add or Remove Enclosure Members panel, do the following:

    a. To add an object to the enclosure, highlight the object in the **Available Objects** list and select **Add**.

    b. To remove an object, highlight the object in the **Enclosure Objects** list and select **Remove**.

    c. Repeat steps a and b until the **Enclosure Objects** list contains all the objects you want the enclosure to have.

    d. Select **Next**.

5. In the Confirm Selections panel, do the following:

    a. Check your selections for accuracy.

    b. Select **Finish** to confirm your selections, or select **Back** to go back and make changes.

The definition for the enclosure has been updated.

▼ **To delete an enclosure**

1. Display a context menu by right-clicking an enclosure in the Tree View.

2. Select **Delete**.

   The enclosure is deleted. Because user-defined enclosures serve as symbolic rather than functional groupings of storage devices, the devices themselves are not affected when you delete an enclosure.

Creating, Modifying, and Deleting Host Objects

If a host system on the SAN is not running either the SANPoint Control QuickStart Server or the Agent, then SANPoint Control QuickStart discovers only the adapter (HBA) that connects that host to the SAN.

You can manually create a host object to contain an unidentified adapter that was discovered on the SAN. Use the Host Wizard to specify the host name, IP address, and any discovered HBA nodes that represent HBAs in the host.

▼ **To create a new host object**

1. In the VEA Console menu bar, select **Wizards > Host**.

2. In the Welcome panel of the Host Wizard, select **Next**.

3. In the Specify Host Details panel, do the following:

    a. Select **Create**.

    b. Type a name for the new host.

        The host name may consist of alphanumeric characters and underscores.

    c. Type the host's IP address in the **IP address** field. (This field is optional.)

    d. Type notes or other information in the **Host information** field. (This field is optional.)

    e. Select **Next**.

4. In the Specify Host Host Bus Adapters panel, do the following:

    a. Select the checkbox next to each HBA node that represents an HBA within the host object.

    b. Select **Next**.

5. In the Confirm Host Selections panel, do the following:

    a. Examine the attributes shown in the **Host Attributes** fields for accuracy.

    b. Examine the HBA nodes shown in the **Host Bus Adapters** list for accuracy.

    c. Select **Finish** to confirm your selections and create the new host object, or select **Back** to go back and make changes.

▼ **To modify a host object**

1. In the VEA Console menu bar, select **Wizards > Host**.

2. In the Welcome panel of the Host Wizard, select **Next**.

3. In the Specify Host Details panel, do the following:

   a. Select **Modify**.

   b. Select the host from the drop-down list.

   c. Update the host's IP address in the **IP address** field. (This field is optional.)

   d. Update information in the **Host information** field. (This field is optional.)

   e. Select **Next**.

4. In the Specify Host Host Bus Adapters panel, do the following:

   a. Select the checkbox next to each HBA node you want to add to the host object.

   b. Deselect the checkbox next to each HBA node you want to remove from the host object.

   c. Select **Next**.

5. In the Confirm Host Selections panel, do the following:

   a. Examine the attributes shown in the **Host Attributes** fields for accuracy.

   b. Examine the HBA nodes shown in the **Host Bus Adapters** list for accuracy.

   c. Select **Finish** to confirm your selections, or select **Back** to go back and make changes.

   The definition for the host object has been updated.

▼ **To delete a host object**

1. Display a context menu by right-clicking a host in the Tree View.

2. Select **Delete**.

The host is deleted. Because user-defined hosts serve as symbolic rather than functional groupings of HBAs, the HBAs themselves are not affected when you delete a host.

Managing Volume Manager Disk Volumes

You can manage VERITAS Volume Manager disk volumes from within the VERITAS Enterprise Administrator (VEA) Console. By accessing Volume Manager functions directly from the VEA Console window, you can change a volume's size or layout, create a mirror disk, and perform other management functions.

For details about the Volume Manager functions that are available from within the VEA Console, see the Volume Manager documentation.

▼ **To perform management tasks on a volume controlled by Volume Manager**

1. Display a Volume Manager disk group in the Tree View.

2. Display a context menu by right-clicking the disk group.

3. Select **Manage**.

    VEA initiates a connection to the host on which the disk group resides.

4. Supply authorization credentials if you are prompted for them.

When you connect to the Volume Manager host, the controls in the VEA Console—such as the tabs in the Details View, the icons on the Toolbar, and the contents of the context (right-click) menu—change so that Volume Manager functions are displayed.

When you select other objects in the Tree View, such as fabrics and hosts, the controls in the VEA Console return to their SANPoint Control QuickStart settings. In this way you can easily move back and forth between the SANPoint Control QuickStart environment and the Volume Manager environment.

When you are done using the Volume Manager functions, you can disconnect from the Volume Manager host and continue working in the SANPoint Control QuickStart environment.

For more information about using Volume Manager, see the Volume Manager documentation.

▼ **To exit the Volume Manager environment**

1. Select the Disconnect icon on the VEA Console Toolbar.

2. In the Disconnect dialog box, select the name of the Volume Manager host.

3. Select **OK**.

Controlling Access to Resources 4

The topics in this section describe two services that are designed to help administrators maintain a quality of storage service for SAN-attached servers.

This section contains the following topics:

Using Groups to Simplify SAN Management

A group is an arbitrary set of SAN elements defined by an administrator to help organize and provision resources. For example, you might define a group that contains all of the storage devices associated with a particular application.

To view your groups in the VERITAS Enterprise Administrator (VEA) Console, expand the **Groups** object in the Tree View. When you select a group in the Tree View, its member objects are listed in the Group Members tab in the Details View.

Types of Groups

SANPoint Control QuickStart supports three different types of groups, which are described in the table below:

Types of Groups Supported by SANPoint Control QuickStart

Group Type	Object Members	Description
Generic group	◆ Switches ◆ Unidentified adapters ◆ Hosts ◆ Storage devices (storage appliances, enclosures, or unenclosed storage) ◆ Routers and bridges ◆ Nested groups (any type)	A generic group contains any type of object that can be grouped within SANPoint Control QuickStart.
Storage account	◆ Hosts ◆ Storage devices (storage appliances, enclosures or unenclosed storage) ◆ Routers and bridges ◆ Nested groups (storage accounts or storage groups only)	A storage account contains one or more SANPoint Control QuickStart Server hosts and all the storage that the administrator assigns to the host(s). You can use storage accounts to keep track of the storage resources provisioned for hosts on the SAN.
Storage group	◆ Storage devices (storage appliances, enclosures, or unenclosed storage) ◆ Routers and bridges ◆ Nested groups (storage groups only)	A storage group contains only storage devices. You can use storage groups to categorize storage resources by quality of service criteria including cost, performance, capacity, and location.

Nested Groups

You can nest groups within other groups, but only under the following conditions:

◆ Nested groups cannot introduce cyclic dependency. That is, if Group B is nested within Group A, Group A cannot then be nested within Group B, creating a loop. SANPoint Control QuickStart checks for cyclic dependency and prevents users from creating such a configuration.

◆ A generic group may contain any other type of group.

◆ A storage account may contain other storage accounts or storage groups, but it cannot contain generic groups.

◆ A storage group may contain other storage groups, but it cannot contain storage accounts or generic groups.

Group Member Exclusivity

In certain cases, a member of a group may not become a member of another group. The rules governing group member exclusivity are as follows:

◆ An object may have membership in multiple generic groups. There is no member exclusivity applied to generic groups.

◆ If an object is already a member of a storage account, it cannot be added to another storage account.

◆ If an object is already a member of a storage group, it cannot be added to another storage group.

◆ Member exclusivity does not apply when nesting groups. By nesting one group within another, objects within the nested group become members of both groups.

Viewing Members of Groups

Use the VERITAS Enterprise Administrator (VEA) Console to view group members.

▼ **To view group members in the Attributes pane**

1. In the Tree View, select a group whose members you want to identify.

2. In the Details View, select the Group Members tab.

   For each physical object with which a group member is associated, the Grouped Objects pane displays the object type and owning entity (such as a host or enclosure).

▼ **To view group members in the Topology Map**

1. In the Tree View, select a group whose members you want to identify.

2. In the Details View, select the Topology tab.

   All members of the currently selected group are highlighted in the Topology Map.

Creating, Modifying, and Deleting Groups

Use the Group Wizard to create groups on a SAN fabric, add or remove group members, and delete groups.

▼ **To create a new group**

1. In the VEA Console menu bar, select **Wizards > Group**.

2. In the Welcome panel of the Group Wizard, select **Next**.

3. In the Create or Modify a Group panel, do the following:

   a. Select **Create**.

   b. Type a name for the new group.

   c. In the **Description** field, type a description for the group, describing its purpose, the type of objects in the group, or any other information. (This field is optional.)

   d. In the **Type** drop-down list, select the type of group you want to create—generic group, storage account, or storage group.

   e. Select **Next**.

4. In the Add or Remove Group Members panel, do the following:

   a. Highlight an object or group in the **Available Objects** list. To display lower-level objects, use the expand icons (plus signs).

   b. Select **Add** to add the selected item to the new group.

   c. Repeat steps a and b to add more items to the group.

   d. When you have placed all the items you want into the **Group Objects** list, select **Next**.

5. In the Confirm Selections panel, do the following:

   a. Check your selections for accuracy.

   b. Select **Finish** to confirm your selections and create the new group, or select **Back** to go back and make changes.

▼ **To add members to, or remove members from, an existing group**

1. In the VEA Console menu bar, select **Wizards > Group**.

2. In the Welcome panel of the Group Wizard, select **Next**.

3. In the Create or Modify a Group panel, do the following:

   a. Select **Modify**.

   b. Select the group from the drop-down list.

   c. Update the description in the **Description** field. (This is optional.)

   d. Select **Next**.

4. In the Add or Remove Group Members panel, do the following:

   a. To add a new group member, highlight an object or group in the **Available Objects** list and select **Add**, or select (check) the box next to the name of the object in the **Group Objects** list.

   b. To remove a group member, highlight an object or group in the **Group Objects** list and select **Remove**, or deselect (uncheck) the box next to the name of the object in the **Group Objects** list.

   c. Repeat steps a and b until the **Group Objects** list contains all the members you want the group to have.

   d. Select **Next**.

5. In the Confirm Selections panel, do the following:

   a. Check your selections for accuracy.

   b. Select **Finish** to confirm your selections, or select **Back** to go back and make changes.

   The group's membership has been updated.

▼ **To delete a group**

1. Display a context menu by right-clicking a group object in the Tree View.

2. Select **Delete**.

The group is deleted. Because user-defined groups serve as symbolic rather than functional groupings of SAN objects, the objects themselves are not affected when you delete a group.

Using Zones to Allocate Storage Resources

The any-to-any connectivity of the SAN storage model offers great flexibility but at the same time poses security risks. Zoning helps alleviate that risk by providing a means of controlling access between objects on the SAN. By creating and managing zones, a SAN administrator can control host access to storage resources.

With SANPoint Control QuickStart you can view zones, zone aliases, and zone memberships that have been defined for your SAN.

Full zone management functionality—including the ability to create zones, delete zones, and change zone memberships—is available with the full SANPoint Control product. For information about ordering this product, contact your VERITAS sales representative.

Overview of Zoning

A zone is a set of objects within a SAN fabric that can access each other. Zones and their member objects are defined in zoning tables within the switches on the SAN fabric. When zoning is implemented on a SAN fabric, the switches consult the zoning table to determine whether one object is permitted to communicate with another object. Unless switches share a common zone membership in at least one zone, access between them is restricted.

Fabric zoning occurs at the level of individual nodes or ports attached to the SAN fabric. Zoning-enabled fabrics contain zoning tables that define each zone along with its member objects. These zones function in a way similar to virtual private networks (VPNs) on traditional networks.

There are two ways to enforce the access restrictions created by zones on the SAN:

Soft zoning, also called *advisory zoning or WWN zoning*, is enforced simply by filtering the visibility of objects on the SAN so that an object is aware of only the objects that share at least one zone membership with it. Soft zoning is flexible because, if an object's physical connection to the SAN fabric changes, its zone memberships remain intact. However, soft zoning also has a security vulnerability: it does not actively prevent access between objects that belong to different zones.

Hard zoning, or *switch port zoning*, occurs when the Fibre Channel switch actively blocks access to zone members from any objects outside the zone. Hard zoning offers strong security because it actively segregates zone members from the rest of the SAN fabric. However, it lacks the flexibility of soft zoning because objects lose their zone memberships whenever they are disconnected from a switch port and moved elsewhere on the SAN.

Zone Aliases

A *zone alias* is a name given to an object or set of objects for zoning purposes. Zone aliases simplify zone administration by eliminating the repetitive entry of World Wide Names (WWNs) or port numbers. After assigning a zone alias to one or more objects, you can perform zoning operations on the alias instead of having to specify the individual ports and WWNs of the object(s).

Although zone aliases bear some similarities to user-defined groups, a zone alias differs from a group in three primary ways:

◆ A group may contain objects from multiple fabrics, but objects in a zone alias must be from one fabric.

◆ A group cannot be added to a zone, because the objects it contains may not be zone-capable or may reside on different fabrics.

◆ A group definition is specific to SANPoint Control QuickStart and is stored in the SAN discovery data store. By contrast, a zone alias exists independently of SANPoint Control QuickStart and is stored on the principal switch of the fabric.

You can use the VERITAS Enterprise Administrator (VEA) Console to view zone aliases and their members.

Viewing Members of Zones

Use the VERITAS Enterprise Administrator (VEA) Console to view members of zones.

▼ **To view zone members in the Details View**

1. In the Tree View, select a zone whose members you want to identify.

2. In the Details View, select the **Zone Members** tab.

   The Zone Members pane displays two lists:

   ◆ Zone Definition—a list of the port objects that are actually defined as members of the zone

   ◆ Zoned Objects—objects that are zoned by virtue of a port object being included in the zone definition

▼ **To view zone members in the Topology Map**

1. In the Tree View, select a zone whose members you want to identify.

2. In the Details View, select the **Topology** tab.

   All members of the currently selected zone are highlighted in the Topology Map.

Viewing the Zones to which an Object Belongs

Use the VERITAS Enterprise Administrator (VEA) Console to view the zone memberships for an object on the SAN.

▼ **To view an object's zone memberships in the Connectivity pane**

1. In the Tree View, select an object whose zone memberships you want to view.

2. In the Details View, select the **Connectivity** tab.

The Zones table, in the lower part of the Connectivity pane, displays a list of the zones to which the object belongs.

Viewing Zone Aliases and their Members

Use the VEA Console to view members of zone aliases.

▼ **To view members of zone aliases in the Details View**

1. In the Tree View, select a zone alias whose members you want to identify.

2. In the Details View, select the **Zone Members** tab.

The Zone Members pane displays two lists:

- ◆ Zone Definition—a list of the port objects that are actually defined as members of the zone alias

- ◆ Zoned Objects—objects that are zoned by virtue of a port object being included in the zone alias definition

▼ **To view zone aliases in the Topology Map**

1. In the Tree View, select a zone alias whose members you want to identify.

2. In the Details View, select the **Topology** tab.

All members of the currently selected zone alias are highlighted in the Topology Map.

Using Virtual Fabrics for Enhanced Security

For some switches that have Fibre Channel (FC) capability, you can create *virtual fabrics* (also known as virtual SANs or VSANs) to achieve even greater security and scalability. For a description of virtual fabrics and how they work, see "Fabrics and Virtual Fabrics" on page 3.

Use the VERITAS Enterprise Administrator (VEA) Console to view virtual fabrics and the objects they contain.

▼ **To view virtual fabrics and the objects they contain**

1. In the Tree View, select a physical fabric in which virtual fabrics have been defined.

2. Select the expand icon (plus sign) next to the name of the fabric.

3. In the expanded list for the fabric, select the expand icon next to **Virtual Fabrics**.

   A list of virtual fabrics displays.

4. Use expand icons to view the switch ports, zones, and other objects contained in any virtual fabric.

Displaying Reports about SAN Objects **5**

SANPoint Control QuickStart ships with several out-of-the-box reports with which you can inventory and analyze your SAN. The reports display up-to-date inventory data about objects on the SAN.

This section contains the following topics:

Displaying Reports

Use the Toolbar or the Tools menu in the VERITAS Enterprise Administrator (VEA) Console to display inventory reports about the objects on your SAN.

The Reporter Window (Showing the Fabric Inventory Report)
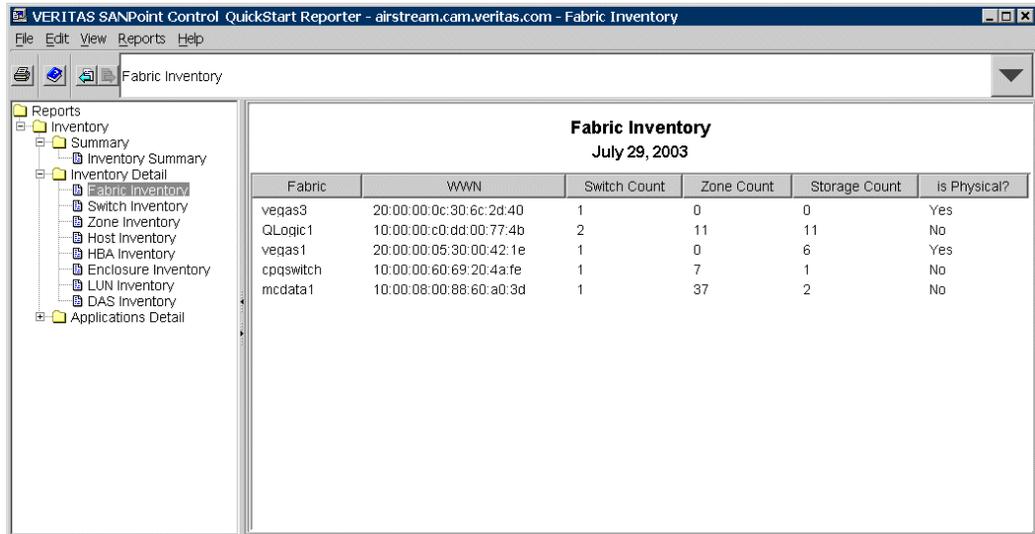
▼ **To display reports**

1. Select the Reports icon on the VEA Console Toolbar, or select **Tools > SANPoint Control QuickStart > Reports** in the menu bar.

   The Reporter window displays.

2. In the Reporter window, select the report you want to display.

3. To display another report, select it from the tree view on the left side of the Reporter window, or from the drop-down list at the top of the window.

▼ **To redisplay a report**

❖ In the Reporter window, use the Previous Report and Next Report buttons (located immediately to the left of the drop-down list) to scroll among the reports you have already viewed.

Printing Reports

You can print the report that is currently displayed in the Reporter window.

▼ **To print the currently displayed report**

1. In the VEA Console menu bar, select **File > Print** or select the printer icon on the Toolbar.

2. Specify page setup options as desired.

3. Select **OK**.

4. Specify printer options as desired.

5. Select **OK**.

Saving Report Data in a File

You can save data from the report that is currently displayed in the Reporter window. Data can be saved in any of three different formats:

♦ Comma-separated, for importing to a spreadsheet program

♦ HTML, for displaying in a Web browser

♦ Plain text

▼ **To save report data to a comma-separated file**

1. Display the report in the Reporter window.

2. In the VEA Console menu bar, select **File > Export**.

3. Specify a path and name for the file and select **Save**.

   The report data is saved in comma-separated format in the location you specify.

▼ **To save report data to an HTML file**

1. Display the report in the Reporter window.

2. In the Reporter window menu bar, select **File > Save as HTML**.

3. Specify a path and name for the file and select **Save**.

   The report data is saved in an HTML file in the location you specify.

▼ **To save report data as plain text**

1. Display the report in the Reporter window.

2. Do one of the following:

   ♦ Right-click within the report and select **Edit > Copy**.

   ♦ In the Reporter window menu bar, select **Edit > Copy**.

   The report's data is copied to your system's buffer (clipboard). You can open a text editor or similar application to paste and view the report's content.

Types of Reports

The reports displayed by SANPoint Control QuickStart contain summary information in tabular form about different categories of SAN objects. The reports are based on information from the SAN discovery data store, which resides on the SANPoint Control QuickStart Server.

The reports are organized as follows:

- The **Inventory Summary Report** displays summary information about:
    - Hosts and the applications running on them
    - Fabrics and their associated switches
    - Storage devices
    - Groups
- The **Inventory Detail Reports** display detailed information about:
    - Fabrics
    - Switches
    - Zones
    - Hosts
    - HBAs
    - Enclosures
    - LUNs
    - Direct-attached storage (DAS) devices
- The **Applications Detail Reports** display detailed information about:
    - Oracle servers, instances, tablespaces, and files
    - DB2 instances, databases, and tablespaces
    - Microsoft Exchange Server servers, files, and storage groups
    - VERITAS Cluster Server clusters

Additional reporting functionality—including reports about SAN capacity, performance, errors, and alerts—is available with the full SANPoint Control product. For information about ordering this product, contact your VERITAS sales representative.

Finding the Report You Need

Use the following list of questions to find the report you need.

How can I view a summary of the SAN's physical makeup?

Inventory Summary Report

How can I view information about devices on the SAN, like switches and enclosures?

Switch Inventory Report

Host Inventory Report

Enclosure Inventory Report

Direct Attached Storage Inventory Report

How is storage partitioned within storage devices?

LUN Inventory Report

What storage is already masked to a particular host?

LUN Inventory Report

What storage is available for masking to a host?

Enclosure Inventory Report

Direct Attached Storage Inventory Report

What fabrics and virtual fabrics are defined on the SAN?

Fabric Inventory Report

What zones are defined on the SAN?

Zone Inventory Report

What groups are defined on the SAN?

Inventory Summary Report

Which LUNs are associated with specific hosts, and which are not?

LUN Inventory Report

What storage is connected to hosts on the SAN, but not connected to the SAN itself?

Direct Attached Storage Inventory Report

How can I view information about hosts on the SAN?

Host Inventory Report

HBA Inventory Report

Where can I find more storage that's available for a file system to use?

LUN Inventory Report

How can I view information about storage associated with specific applications?

VERITAS Cluster Server: Cluster Inventory Report

Oracle: Oracle Inventory Report

DB2: DB2 Inventory Report

Microsoft Exchange Server: Exchange Server Inventory Report

Troubleshooting **A**

This section describes how to handle issues related to using SANPoint Control QuickStart functions in the VERITAS Enterprise Administrator (VEA) Console to view objects, arrays, HBAs and hosts, bridges, switches, and fabrics.

Many of the solutions provided in this section will involve updating your system's configuration. For help with these tasks, refer to *SANPoint Control QuickStart Installation and Configuration Guide*.

This section contains the following topics:

Issues When Viewing HBAs and Hosts

This section explains how to fix problems related to viewing HBAs and hosts, such as hosts not being displayed properly.

Issues When Viewing HBAs and Hosts

Problem	Explanation	Solution
Nothing is displayed except the host to which you are connected	The HBA driver or the firmware for the switch to which the driver is connected may not be supported.	Check *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List* to make sure the HBA driver and the firmware for the switch to which the driver is connected are fully supported. If necessary, upgrade the driver or firmware. See your vendor documentation.
	The SNMP explorer may be disabled.	Enable the SNMP explorer. See *SANPoint Control QuickStart Installation and Configuration Guide*.
	The switch could be down or restarting.	Check to make sure the switch is running properly. See your vendor documentation.
An HBA is not being displayed in the VEA Console	In-band discovery may be configured and the HBA or HBA driver may not support the Common Transport (CT) protocol.	Disable the Management Explorer from using Fibre Channel connections via CT. **Note** Disabling the Management Explorer from using Fibre Channel connections via CT only affects the QuickStart Server; DisableCT does not affect MGEX running in-band on any QuickStart Agent. See *SANPoint Control QuickStart Installation and Configuration Guide*.

Issues When Viewing HBAs and Hosts (continued)

Problem	Explanation	Solution
QuickStart Agent hosts are not displayed in the VEA Console	The QuickStart Agent hosts may not be listed or specified correctly in SANPoint Control QuickStart.	Make sure the hosts are listed correctly, using fully-qualified DNS names, dot notation, or host name. See *SANPoint Control QuickStart Installation and Configuration Guide*.
	The hosts may be listed by IP address in SANPoint Control QuickStart; however, the hosts may be using DHCP. When the hosts are rebooted, there is no guarantee that they will have the same IP address.	If the hosts are listed by IP address, give the hosts' static IP addresses. See your vendor documentation.
	The hosts may be listed by fully-qualified domain names. If so, it may not be possible for SANPoint Control QuickStart to resolve those names.	If the hosts are listed by fully-qualified domain names, make sure they can be resolved correctly. See your vendor documentation.
	The QuickStart Server may not be able to communicate with hosts inside a firewall. If the QuickStart Server itself is outside the firewall, ports 161 and 162 must be enabled.	Enable ports 161 and 162. See your vendor documentation.
SANPoint Control QuickStart discovered the HBA, but not the host	The host may not be running the QuickStart Server or the QuickStart Agent.	Install the QuickStart Agent on the host. See *SANPoint Control QuickStart Installation and Configuration Guide*.
	The HBA may not have been discovered by the HBA Explorer. The Management Explorer and SNMP Explorer provide limited discovery, creating a unidentified adapter object for the HBA.	Check the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List* to make sure the HBA is fully supported. Configure SANPoint Control QuickStart to discover the HBA. See *SANPoint Control QuickStart Installation and Configuration Guide*.

Issues When Viewing HBAs and Hosts (continued)

Problem	Explanation	Solution
A down arrow displays next to a host	The down arrow indicates the host is disconnected.	If a connected HBA (unidentified adapter) is added to a host using the Host Wizard, the down arrow goes away.
HBAs in the QuickStart Server host show up in the SAN discovery data store and in the VEA Console as unknown nodes	The HBA Explorer may be disabled on the QuickStart Server host.	Create a host object to enclose the unknown HBAs. See "Creating, Modifying, and Deleting Host Objects" on page 37.
	The Agent may not be pointing to the QuickStart Server.	Make sure the QuickStart Agent is configured correctly. See *SANPoint Control QuickStart Installation and Configuration Guide*.
SANPoint Control QuickStart is receiving inconsistent information from the HBA driver	The firmware may not have been flash-updated to the version required by SANPoint Control QuickStart. The firmware that is supplied from the factory does not work with the HBA driver that is needed to support CT passthru.	To check the correct version, see the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List*. To flash-update the HBA, see your vendor documentation.
An HBA can't connect to a fabric	The HBA may be in Loop mode while the switch is in Fabric mode.	Set the HBA to Fabric mode. See your vendor documentation.
	The HBA may not be able to log in to a fabric again after it has logged out.	After disconnecting an HBA from a switch, then reconnecting it, you may have to reboot the host. See your vendor documentation
An HBA can't connect to a Brocade fabric	Brocade switches that are set to QuickLoop mode may prevent HBAs from connecting to SAN fabrics.	Set the switch to Fabric mode. See your vendor documentation.

Issues When Viewing HBAs and Hosts (continued)

Problem	Explanation	Solution
An HBA can't connect to a QLogic or JNI fabric	The HBA may not be configured to connect to the fabric. The default value in the HBA configuration file prevents the HBA from connecting to the fabric.	Configure the HBA to connect to the fabric. See your vendor documentation.

Issues When Viewing Switches

This section explains how to fix problems related to viewing switches, such as switches not being displayed and switch states being unknown.

Issues When Viewing Switches

Problem	Explanation	Solution
A switch is not being displayed in the VEA Console	The switch may not be supported.	Check the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List* to make sure the device is supported.
	The firmware version may be incorrect. If the firmware is an incorrect version, in-band and out-of-band discovery may not work.	Check the required firmware version in the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List*. Upgrade the firmware if necessary. If required by the vendor, reboot the device. See your vendor documentation.
	The switch may be down.	Make sure the switch is running properly. See your vendor documentation.
	There may be error conditions involving the ports.	Check the ports on the switch to see if there are error conditions. If there are, resolve them. See your vendor documentation.
	If you are using out-of-band discovery, the switch may not be configured for out-of-band addressing (IP address, subnet mask, and gateway). If so, SANPoint Control QuickStart can't discover the switch out-of-band.	Configure the switch for out-of-band addressing if necessary, or use in-band discovery. See your vendor documentation.
	If you are using out-of-band discovery, the Ethernet connection may be down.	Make sure the connection is up. See your vendor documentation.

Issues When Viewing Switches (continued)

Problem	Explanation	Solution
	If using in-band discovery, the switch may not be configured so that it is accessible through a Fibre Channel (FC) connection by the host on which the Server is installed. An FC connection is required for in-band discovery.	Make sure the switch and the QuickStart Server host have a direct Fibre Channel connection, or use out-of-band discovery. See your vendor documentation.
	If using out-of-band discovery, the switch may not be accessible through IP by the host on which the QuickStart Server or QuickStart Agent is installed. If the switch is isolated on a separate subnet, SANPoint Control QuickStart can't resolve IP addresses, and as a result, can't discover the switch out-of-band. **Note** For McDATA, the proxy, not the switch, must be available.	From the QuickStart Server or QuickStart Agent host, try pinging the host running the application. If this is unsuccessful, then there is a problem with the network. See your vendor documentation.
	`vxsald` may not be running on your QuickStart Agents.	Make sure `vxsald` is running on all of your QuickStart Agents. See the description of `vxsal` in *SANPoint Control QuickStart Installation and Configuration Guide*.
A McDATA switch is not being displayed in the VEA Console using in-band discovery	If you are trying to use in-band discovery, in-band CT commands (in particular, Management Server commands) may not be enabled. SANPoint Control QuickStart in-band discovery and zoning commands can't work unless in-band CT Management Server commands are turned on.	Check to make sure in-band CT commands are enabled in the EFC Manager (EFCM). Enable in-band CT Management Server commands if necessary. See your vendor documentation.

Issues When Viewing Switches (continued)

Problem	Explanation	Solution
	The McDATA Open Systems Management Server (OSMS) license may not be installed. OSMS is required for in-band discovery.	If necessary, purchase and install the OSMS license. See your vendor documentation.
The wrong IP address is being displayed for a McDATA switch	The IP address may be the proxy's IP address. If the switch is attached to a proxy, the proxy's IP address is displayed.	Check to see if the switch has a proxy. See your vendor documentation.
The Domain ID for a McDATA switch keeps changing from one value to another	Out-of-band and in-band discovery both may be enabled.	Enable only one method of discovery. See *SANPoint Control QuickStart Installation and Configuration Guide*.
Free ports are not being displayed in the VEA Console	The switch may not report that attribute.	Check the vendor documentation to see if it reports free ports.
The port count is not being displayed in the VEA Console	The switch may not report that attribute.	Check the vendor documentation to see if it reports port count.
No interconnect lines are displayed between two switches in the Topology Map, even though the two switches are connected to each other	The firmware version may not support E-Ports.	Check the required firmware version in the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List*. Upgrade the firmware if necessary. See your vendor documentation.
	The port setting on one or both switches may be incorrect. For example, one may be set to be an F-port.	Set the ports according to *SANPoint Control QuickStart Installation and Configuration Guide* and the *SANPoint Control QuickStart Release Notes*.
	There may be zoning conflicts between the switches.	Eliminate zoning conflicts. See your vendor documentation.

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Issues When Viewing Switches (continued)

Problem	Explanation	Solution
	The switches may be incompatible.	Check the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List* and your vendor documentation to determine whether the switches are supported and compatible.
	The two switches may be configured to have the same Domain ID, which prevents them from joining a fabric.	Make sure each switch has a different Domain ID.

Issues When Viewing Fabrics

This section explains how to fix problems related to viewing fabrics, such as not being able to discover a fabric.

Issues When Viewing Fabrics

Problem	Explanation	Solution
SANPoint Control QuickStart didn't discover a fabric	Loop mode may be enabled on the HBA.	Enable Fabric mode for your HBA to work correctly with SANPoint Control QuickStart. See your vendor documentation.
A SAN fabric was split after switch rebooting	The zoning table on the switch may have some inconsistencies.	Refresh the switch zoning table. See your vendor documentation.
The primary switch in the fabric is not listed first	The switch display name may not be first because the list is sorted alphabetically.	None.

Issues When Viewing Other Objects

This section explains how to fix problems related to viewing other SAN objects, such as routers and hubs not being displayed.

Issues When Viewing Other Objects

Problem	Explanation	Solution
Deleted objects keep reappearing in the VEA Console	The deleted object may be discoverable, which means it is added to the SAN discovery data store again the next time an Explorer successfully discovers it and the VEA Console is refreshed.	This is the expected result for discoverable objects. However, you can move objects to another fabric or filter them.
Objects in the Topology Map or the Tree View change unexpectedly	spcconfig may have been run after SANPoint Control QuickStart was already installed. If the old configuration file (sal.conf) was configured manually, the new file may not be the same. (The old file will have been archived.) As a result, you may see changes in the Topology Map or the Tree View.	Reconfigure the QuickStart Server, or archive the new file and restore the old file. See *SANPoint Control QuickStart Installation and Configuration Guide*.
Objects in the Topology Map or the Tree View are not being updated	The QuickStart Agents may not be discovering the SAN because the QuickStart Server has been shut down.	Make sure the QuickStart Server is running.
Objects are missing from the Tree View	The objects may not have been discovered.	Make sure discovery is configured correctly for all objects. See *SANPoint Control QuickStart Installation and Configuration Guide*. Also, see the rest of the topics in this section to troubleshoot specific devices.
Objects are missing from the Topology Map	Filtering may be turned on, which can exclude the items you want to view.	Turn off filtering. See "Filtering in the Topology Map" on page 22.

Issues When Viewing Other Objects (continued)

Problem	Explanation	Solution
Devices attached to a Brocade switch are missing	The firmware version for the devices may be incorrect.	Check the required firmware version in the *VERITAS SANPoint Control QuickStart 4.0 Hardware and Software Compatibility List*. Upgrade the firmware if necessary. If required by the vendor, reboot the device. See your vendor documentation.
SANPoint Control QuickStart discovered incorrect objects attached to a Brocade switch	The QuickStart Server may have been running when the switch was rebooted.	Stop the QuickStart Server, reboot the switch, and restart the QuickStart Server. See *SANPoint Control QuickStart Installation and Configuration Guide*.
	The Brocade switch may not be able to see the devices.	`telnet` to the switch and run `nsShow` and `switchShow`. If the correct devices still are not discovered, troubleshoot the physical connection between the switch and the devices. Here are some things to try: ◆ Check whether the device is powered up. ◆ Find the wire or fibre from the device to the switch and make sure the LED status is solid green. ◆ Move the switch end of the wire to a different port. ◆ Replace the wire or fiber. ◆ Diagnose the device itself. See your vendor documentation.

Issues When Viewing Other Objects (continued)

Problem	Explanation	Solution
OS handle (device handle) status for some devices changes frequently	An Emulex HBA may be on the same SAN fabric as a QLogic HBA. The Emulex HBA executes an invalid login sequence, which causes the QLogic HBA to constantly retry port discovery, with inconsistent results.	Keep the Emulex HBA and QLogic HBA on separate fabrics. For more details, see your vendor documentation.

Issues When Creating or Updating Objects

This section explains how to fix problems such as not being able to create or delete objects.

Issues When Creating or Updating Objects

Problem	Explanation	Solution
You can't create, change, or delete objects	The VEA Console may not be able to connect to the Server.	Check the connection and try again.
Multiple SAN discovery data stores contain conflicting information about the same objects on the SAN	Multiple QuickStart Servers may be trying to discover and manage the same fabric. Users may be making simultaneous and conflicting changes to the SAN.	Use only one QuickStart Server to discover and manage a SAN fabric. For more information about installing SANPoint Control QuickStart components, see *SANPoint Control QuickStart Installation and Configuration Guide*.

Issues When Grouping Objects

This section explains how to fix problems such as not being able to add an object to a storage account or storage group.

Issues When Grouping Objects

Problem	Explanation	Solution
Can't add an object to a storage account	The object may already be a member of another storage account.	Remove the object from the other storage account. See "Creating, Modifying, and Deleting Groups" on page 45.
Can't add an object to a storage group	The object may already be a member of another storage group.	Remove the object from the other storage group. See "Creating, Modifying, and Deleting Groups" on page 45.
Can't add a storage group to another storage group	The second group may be a member of the first group. SANPoint Control QuickStart checks for cyclic dependency.	Remove the second group from the first group. See "Creating, Modifying, and Deleting Groups" on page 45.
Can't add generic groups to storage accounts or storage groups	A storage account may contain other storage accounts or storage groups, but can't contain generic groups. A storage group may only contain other storage groups. A storage group can't contain storage accounts or generic groups.	Add storage accounts or storage groups to storage accounts. Add storage groups to storage groups. See "Creating, Modifying, and Deleting Groups" on page 45.

Issues When Viewing Reports

This section explains how to fix problems such as reports not being available for groups.

Issues When Viewing Reports

Problem	Explanation	Solution
The inventory report for a specific object type is empty	No objects of that type—such as groups or zones—are defined on the SAN.	To define a group, see "Using Groups to Simplify SAN Management" on page 42. To define other kinds of objects, see "Creating and Modifying SAN Objects" on page 29.

Glossary

addressable unit

Any storage resource in the SAN. Also *AddrUnit* or *AU*.

Agent

See "SANPoint Control QuickStart Agent."

allocated storage

The portion of an object's storage capacity that has been made available to a lower-level entity. For example, array storage is allocated to a host when OS handles (device handles) exist in the host operating system. The device handle provides a name identifying a storage resource and the means (driver, system call) to access it. Contrast with "unallocated storage."

arbitrated loop

A topology for Fibre Channel networks in which nodes are connected in a single logical loop or ring created by tying the transmit lead of one Node Loop Port to the receive lead of its downstream neighbor. There are primarily two types of arbitrated loops—public loops and private loops. A public loop is attached to a SAN fabric. A private loop is a free-standing arbitrated loop with no SAN attachment.

attribute

A property of an object that describes something about the object, such as its World Wide Name. In SANPoint Control QuickStart, the number and kind of attributes a SAN object possesses depends on what type of object it is.

available storage

The portion of an object's storage capacity that has not yet been allocated, expressed as a quantity (such as 10GB) or as a percentage of capacity.

bridge

A device that connects and passes packets between two segments of a SAN that use the same communications protocol. See also "router."

broadcast address

An IP address specified for discovering SANPoint Control QuickStart Servers (hosts running the SAN Access Layer) within a subnet. 255.255.255.255 is a special IP address that SANPoint Control QuickStart can use to search for QuickStart Servers within a subnet without crossing a subnet boundary.

bundle

A logical grouping consisting of up to 16 physical links. SANPoint Control QuickStart can discover and display information about a bundle as if it were a single link. Also *port bundle*.

capacity

The amount of storage an object can allocate or use.

circular layout

A layout option in the Topology Map. This layout arranges SAN objects in circular patterns that represent arbitrated loops on the SAN.

claimed storage

LUNs for which a host has created an OS handle (device handle).

cluster

A set of hosts (each termed a node) that share a set of disks and are connected by a set of redundant heartbeat networks. Clusters can have from one to 32 member systems, or nodes.

Console

See "VERITAS Enterprise Administrator (VEA) Console."

data store

See "SAN discovery data store."

Details View

The portion of the VEA Console that displays details about the object highlighted in the Tree View. The Details View includes several panes (tabs), each of which provides a different form of information.

device

A collective term for disks, tapes, disk arrays, tape arrays, and any other objects that store data. Also *storage device*.

device handle

See "OS handle."

discovery

The process of finding objects on the SAN and adding information about them to a database. In SANPoint Control QuickStart, most discovery is done by the SAN Access Layer (SAL), which stores information about SAN objects in the SAN discovery data store. See also "explorer." See also "SAN discovery data store."

disk array

A collection of disks controlled and managed through firmware.

disk device

A re-writeable, randomly addressable data storage device.

disk group

A collection of disks that share a common configuration. A disk group configuration is a set of records containing detailed information on existing VERITAS Volume Manager objects (such as disk and volume attributes) and their relationships. Each disk group has an administrator-assigned name and an internally defined unique ID. The root disk group (rootdg) is a special private disk group that always exists.

enclosure

A method for visually grouping SAN objects in the VEA Console's Tree View and Topology Map. For example, a VEA Console user might choose to represent a JBOD visually as an enclosure instead of as one or more separate disks.

event

A notification that indicates when an action, such as a change in state, has occurred for one or more objects on the SAN fabric.

explorer

A software tool that uses a unique methodology to discover information about a particular kind of object on the SAN. The SAN Access Layer (SAL) component includes several explorers which are used to locate objects on the SAN and discover information about them. See also "discovery."

fabric

A group of SAN objects connected by a Fibre Channel (FC) switch. A fabric contains at least one FC switch and may also contain zones.

fan layout

A layout option in the Topology Map. This layout arranges SAN objects in a layout that positions the switches at the top of the Topology Map and fans all devices and hosts out at a level below the switches in a symmetrical fashion.

Fibre Channel

A technology for connecting and managing storage networks. A set of standards capable of transferring data between ports and through network devices at higher speeds and over significantly greater distances than SCSI technology. Fibre Channel supports point-to-point, loop, and fabric topologies.

filter

A way of limiting the number of SAN objects represented in the Topology Map. By applying a filter, you can focus on any the object that is selected in the Tree View.

firmware

A set of software instructions set permanently in a device's memory.

GBIC

Gigabit interface converter. A widely used transceiver module for Fibre Channel. A GBIC is modular and hot-swappable and can be either copper or optical.

generic device

A disk or tape device. When generic storage devices are visible to a host running the SAN Access Layer, the VEA Console displays the correct object type.

group

A class or collection of storage objects. You can use groups for a number of different purposes such as meeting certain availability and redundancy requirements, or for administrative or tracking purposes. Groups can be associated with one or more servers, or with a user group (as defined by the operating system). SANPoint Control QuickStart supports three different types of groups: generic groups (switches, hosts, storage devices), storage groups (storage devices only), and storage account groups (hosts, storage devices).

hard zoning

A fabric zoning method in which a Fibre Channel switch actively blocks access to zone members from any objects outside the zone. Because the active blocking takes place at the level of ports on the switch, hard zoning is also referred to as *switch port zoning*. In hard zoning, each switch uses a routing table to determine whether data is allowed to flow across a connection. See also "soft zoning."

HBA

Host bus adapter. An interface between a server or workstation bus and a Fibre Channel network.

hierarchical layout

The default layout option in the Topology Map. This layout stratifies the Topology Map according to object type, with hosts at the top layer, switches below them, and devices of all kinds below the switches.

host

A computer system to which storage devices and file servers are attached. The SANPoint Control QuickStart Server and the SANPoint Control QuickStart Agent reside on hosts.

host bus adapter

See "HBA."

hub

A common connection point for devices in the SAN. The hub may be unmanaged, IP-managed, or FC-managed. An unmanaged hub is passive in the sense that it serves simply as a conduit for data, moving the data from one SAN device to another. IP-managed and FC-managed hubs are intelligent, containing features an administrator can use to monitor the traffic passing through the hub and configure each port in the hub.

in-band

A type of Fibre Channel management protocol. The most prevalent in-band protocol over Fibre Channel is SCSI Enclosure Services (SES). Contrast with "out-of-band."

iSCSI router

A storage router implementing the Internet Small Computer Systems Interface (iSCSI) protocol (SCSI over IP) to extend access of a Fibre Channel fabric and attached storage devices to IP servers. Currently, SANPoint Control QuickStart discovers only the Cisco SN 5420 iSCSI router.

JBOD

>Acronym for "just a bunch of disks." A cabinet of disks.

logical unit number

>See "LUN."

logical volume

>A simple volume that resides on an extended partition on a basic disk and is limited to the space within the extended partitions. A logical volume can be formatted and assigned a drive letter, and it can be subdivided into logical drives. See also "LUN."

LUN

>Acronym for "logical unit number." A unique and discrete addressable unit or logical volume that may reside inside one or more simple or array storage devices. LUNs are exposed to the outside world through an addressing scheme presented to the host as SCSI LUN numbers. Each LUN has a unique OS handle (device handle) and represents a logical volume.

master server

>The NetBackup server that provides administration and control for backups and restores for all clients and servers in a master and media server cluster. NetBackup BusinesServer supports only a single server, and it is the master. See also "media server." See also "VERITAS NetBackup."

media server

>A NetBackup server that provides storage within a master and media server cluster. The master can also be a media server. A media server that is not the master is called a remote media server. NetBackup BusinesServer does not support remote media servers. See also "master server." See also "VERITAS NetBackup."

NetBackup

>See "VERITAS NetBackup."

network layout

>A layout option in the Topology Map. This layout emphasizes the switches on your SAN by displaying them centrally among the various other objects to which they connect.

object

A single, unique addressable entity on a SAN. It is possible for objects to be present within objects. For example, while a tape array is an object, each individual tape drive within the array is also an object. A host is an object, and the HBA inside the host is also an object. Each object has one or more attributes and can be a member of one or more zones.

object tree

A dynamic, hierarchical display of VERITAS Volume Manager objects and other objects on the SAN. Each node in the tree represents a group of objects of the same type.

OS handle

The name the operating system uses to identify a storage resource (known as an addressable unit or LUN), and the correct means (driver, system call) to access it. Also *device handle*.

out-of-band

A type of communication protocol other than the Fibre Channel management protocol, such as SNMP or a vendor-specific proprietary protocol. Contrast with "in-band."

physical fabric

The physical components of a fabric, including all switches and all other SAN objects. You can configure one or more virtual fabrics—each one isolated from the others—based on the hardware components in the physical fabric.

port

A connection through which a device is attached to an I/O bus or to the SAN, or the representation of this physical connection to the link hardware.

port bundle

See "bundle."

provisioning

The set of activities that allocate storage to hosts and host applications. Examples of provisioning activities include creating LUNs in an array, setting up zoning between a host and an array, and giving the server access to the storage.

QuickStart

See "SANPoint Control QuickStart."

Reporter

See "SANPoint Control QuickStart Reporter."

robotic library

A collection of tapes controlled and managed through firmware.

router

A device that connects two segments of a SAN and determines the optimal path along which network traffic should be forwarded. Also *gateway*. See also "bridge."

SAL

See "SAN Access Layer (SAL)."

SAL Remote

See "SANPoint Control QuickStart Agent."

SAN

See "storage area network (SAN)."

SAN Access Layer (SAL)

A component of the SANPoint Control QuickStart Server that performs discovery and access control. By discovering objects and the relationship of these objects to each other, the SAL maintains a real-time topology of the SAN. The SAL also interacts directly with switches and storage arrays to control access to storage resources. The SAL agent—part of the SAL—communicates with client applications by sending and receiving XML messages by means of the http protocol.

SAN discovery data store

The database containing the names and attributes of all objects discovered and maintained by the SAN Access Layer (SAL). This database also contains information about user-defined objects and their attributes.

SANPoint Control QuickStart

A VERITAS software product designed to maximize the return on an enterprise's SAN technology investment by helping the SAN administrator make the SAN operate as effectively as possible. SANPoint Control QuickStart consists of three major components: the QuickStart Server, the QuickStart Agent, and the VEA Console.

SANPoint Control QuickStart Agent

A SANPoint Control QuickStart component that assists the SANPoint Control QuickStart Server in discovering the entire SAN. The QuickStart Agent consists of several SAN explorers that are also used by the QuickStart Server, including the Cisco MDS explorer, the Management explorer, the SNMP explorer, and the HBA explorer. Although the QuickStart Agent uses a modified form of the same SAN Access Layer (SAL) process used in the QuickStart Server, it is not a server itself.

SANPoint Control QuickStart Reporter

A component of the VEA Console with which you can view inventory reports for the objects on your SAN. The Reporter can be invoked at any time during a VEA Console session.

SANPoint Control QuickStart Server

The portion of SANPoint Control QuickStart that resides on the primary host. It consists of the SAN Access Layer (SAL) and the SAN discovery data store.

SCSI

Small Computer Systems Interface. A hardware interface that allows for the connection of multiple peripheral devices to a single expansion board that plugs into the computer. The interface is widely used to connect personal computers to peripheral devices such as disk and media drives.

SCSI bridge

A bi-directional routing device that provides for data transfers between Fibre Channel (FC) SANs and SCSI devices.

SCSI bus

The communication pathway between a SCSI host adapter card and target SCSI devices. Physically, the bus begins at one end of a SCSI cable at the host adapter card and ends at the other end of the cable at the target device.

SCSI disk

A storage device (fixed disk) attached to a SCSI bus.

SCSI LUN

A division within a group of SCSI devices that identifies a sub-device. See also "LUN."

SCSI tape

A tape drive attached to a SCSI bus. Examples of SCSI tape drives include: quarter-inch cartridge (QIC); digital audio tape (DDS DAT); 8mm tape; and digital linear tape (DLT).

SCSI target

A device in a SCSI bus that receives communication from a SCSI initiator (typically a SCSI host adapter card).

Server

See "SANPoint Control QuickStart Server."

slot

An opening in a computer or other network device into which a printed circuit board can be inserted, adding capability to the device. Also *expansion slot*.

soft zoning

A fabric zoning method that filters the visibility of objects on the SAN so that an object can only see other objects that share at least one zone membership with it. Unlike hard zoning, soft zoning is not enforced at the switches themselves. See also "hard zoning."

storage account

A type of storage group containing one or more host objects and all the storage that the administrator assigns to the hosts. The storage account is used to keep track of the storage resources provisioned for hosts on a SAN. A storage account may contain other storage accounts or storage groups, but it cannot contain generic groups.

storage area network (SAN)

A network linking servers or workstations to devices, typically over Fibre Channel, a versatile, high-speed transport. The storage area network (SAN) model places storage on its own dedicated network, removing data storage from both the server-to-disk SCSI bus and the main user network. The SAN includes one or more hosts that provide a point of interface with LAN users, as well as (in the case of large SANs) one or more fabric switches and SAN hubs to accommodate a large number of storage devices.

storage device

See "device."

storage group

See "group."

subnet

A portion of a SAN typically consisting of all machines in one locale, in one building, or on the same local area network (LAN). Internet Request for Comments 950 provides the standard procedure for creating and identifying subnets.

subnet mask

A 32-bit mask that identifies the portions of an IP address to be used for locating addresses in a subnetwork.

switch

A network device to which nodes attach and which provides high-speed switching of node connections via link-level addressing.

tape device

A storage device that writes data to tape. SANPoint Control QuickStart identifies a tape drive, tape transport, and tape arrays as a tape device.

tape mark

A mark that is recorded between backup images on a tape.

topology

The physical or logical arrangement of objects on the SAN and the connections between them.

Topology Map

A graphical representation of the physical or logical arrangement of SAN devices. The Topology Map provides a visual representation of the objects on the SAN and the connections between them. In SANPoint Control QuickStart, the Topology Map displays when the Topology tab is selected in the Details View.

Tree View

The left portion of the VEA Console in which a directory tree of SAN objects is displayed.

unallocated storage

Storage for which OS handles (device handles) do not exist in the host operating system. Contrast with "allocated storage."

unidentified adapter

> An HBA or storage device that has logged into a Fibre Channel switch and about which SANPoint Control QuickStart has no information. For HBAs, this can occur when the SAN runs an unsupported HBA card or driver version, there is no remote SAN Access Layer (SAL) running on the host attached to the HBA, or the SANPoint Control QuickStart Server is not configured to communicate with the remote SAL. For storage devices, this can occur when no LUNs are visible to one of the hosts running the SAL (for example, due to zoning).

unused storage

> Storage that does not have data written to it. Contrast with "used storage."

used storage

> The portion of storage allocated to a file system or database to which data has been written, expressed as a quantity (such as 10GB). Contrast with "unused storage."

VEA

> See "VERITAS Enterprise Administrator (VEA) Console" and "VERITAS Enterprise Administrator (VEA) Server."

VERITAS Cluster Server

> An open systems clustering solution designed to eliminate planned and unplanned downtime, simplify server consolidation, and allow the effective management of a wide range of applications in multiplatform environments.

VERITAS Cluster Server cluster

> A cluster consisting of multiple systems connected in various combinations to shared storage devices. VERITAS Cluster Server monitors and controls applications running in the cluster and can restart applications in response to a variety of hardware or software faults. A cluster is defined as all systems with the same cluster identification and connected via a set of redundant heartbeat networks. Clusters can have from one to 32 member systems, or nodes.

VERITAS Cluster Server service group

> A set of resources working together to provide application services to clients. For example, a Web application service group might consist of: disk groups on which the Web pages to be served are stored; a volume built in the disk group; a file system using the volume; a database whose table spaces are files and whose rows contain page pointers; the network interface card or cards used to export the Web service; one or more IP

addresses associated with the network card(s); the application program and associated code libraries. VERITAS Cluster Server performs administrative operations on resources, including starting, stopping, restarting and monitoring at the service group level.

VERITAS Enterprise Administrator (VEA) Console

A graphical user interface that displays information from the SAN Access Layer (SAL) and other SANPoint Control QuickStart Server components. The VEA Console provides a central point to view and manage objects on the SAN.

VERITAS Enterprise Administrator (VEA) Server

A separate middleware server used in SANPoint Control QuickStart to display the VEA Console and by the SAN Access Layer (SAL) and other processes to provide client-server communication. The VEA infrastructure enables software components to share information about objects, manage those objects, and effect change on those objects. Also *VEA object bus*.

VERITAS NetBackup

A VERITAS product family designed to provide a fast, reliable backup and recovery solution for environments ranging from terabytes to petabytes in size. The term *NetBackup* is used to refer to either of two products that interact with SANPoint Control QuickStart: VERITAS NetBackup DataCenter and VERITAS NetBackup BusinesServer.

VERITAS Volume Manager

A VERITAS software product installed on storage clients that enables management of physical disks as logical devices. Volume Manager enhances data storage management by controlling space allocation, performance, data availability, device installation, and system monitoring of private and shared systems.

virtual fabric

A grouping of switches and other objects that constitute a hardware-based, isolated environment within a physical fabric. This isolation of SAN objects within a single physical fabric is intended to enable more efficient use of the SAN, especially in terms of availability and scalability. Also *virtual SAN*.

virtual hub

A set of switch ports on the same fabric that are placed into a logical grouping and use an address spoofing mechanism to emulate a Fibre Channel Arbitrated Loop (FC-AL) hub. A virtual hub can be comprised of all the ports on a single switch or several ports on one or more switches. It is used primarily to allow older loop-only devices to be attached to a switched fabric and be accessible as though they were fabric capable.

virtual SAN

See "virtual fabric."

virtualization

Representing one or more objects, services, or functions as a single abstract entity so that they can be managed or acted on collectively. An example of virtualization is the creation of a virtual fabric from a switch and associated SAN objects as a means of controlling access and increasing scalability in the SAN.

visible storage

Allocated LUNs that are zoned to a host.

volume

A virtual disk, representing an addressable range of disk blocks used by applications such as file systems or databases. A volume is a collection of from one to 32 plexes.

Volume Manager

See "VERITAS Volume Manager."

World Wide Name (WWN)

A registered, 64-bit, unique identifier that is assigned to nodes and ports.

zone

A named subset of nodes and ports (zone members) on a single fabric. Fabrics secure data from unwanted access by restricting the interconnectivity between nodes belonging to different zones.

zone alias

A symbolic name assigned to a device or group of devices on a SAN fabric. Zone aliases are used to assign a familiar name to a device or to group multiple devices into a single name.

zone member

An object that belongs to a zone. An object can belong to more than one zone.

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