Sun StorEdge™ SAN 4.0 Release Field Troubleshooting Guide

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Part No. 816-6580-11
October 2002, Revision A

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Preface

This *Sun StorEdge SAN 4.0 Release Field Troubleshooting Guide* describes how to diagnose and troubleshoot the Sun StorEdge SAN 4.0 hardware. It provides information and pointers to additional documentation you may need for installing, configuring, and using the configuration. The book is intended for use by Sun Service Engineers who have a good understanding of the product.

The Appendices found in this guide explain how to diagnose and troubleshoot Brocade Communications Systems, Inc. Silkworm™ switches.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment
- Other software documentation that you received with your system

Typographic Conventions

Typeface	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Related Documentation

TABLE P-1 Sun StorEdge SAN 4.0 Release Related Documentation

Product	Application	Title	Part Number
Sun StorEdge Network SAN 4.0 Release	Documentation information	*Sun StorEdge SAN 4.0 Release Guide to Documentation*	816-4470
	Latest information	*Sun StorEdge SAN 4.0 Release Notes*	816-4472
		Brocade Fabric OS v 3.0 Release Notes	
	Installation	*Sun StorEdge SAN 4.0 Release Installation Guide*	816-4469
	Configurations	*Sun StorEdge SAN 4.0 Release Configuration Guide*	806-5513
	Safety and Compliance	*Sun StorEdge SAN 4.0 Release Regulatory and Safety Compliance Manual*	816-5246
	Installer / user information—1 Gbyte switch	*Sun StorEdge Network Switch-16 (SANbox-16) with E_Ports Installer's/User Manual*	N / A*
		Sun StorEdge Network Switch with E_Ports Management Manual	N / A*
		Sun StorEdge Network FC Switch-8 and Switch-16 Release Notes	816-0842
	Installer / user information—2 Gbyte switch	*Sun StorEdge Network 2Gb Switch-8/16 (SANbox2) Management Manual*	875-3264*
		Sun StorEdge Network 2 Gb FC Switch-16 FRU Installation	816-5285
		Sun StorEdge Network 2Gb Switch-16 (SANbox2) Installer's/User's Manual	875-3263*
	Reference information	*Brocade Fabric OS Reference Manual Version 3.0*	53-0000127-03
		Brocade SilkWork®3800 Hardware Reference Guide	53-0001576-03
	User's information	*Brocade ZONING User's Guide Version 3.0*	53-0000135-03
		Brocade WEB TOOLs User's Guide Version 3.0	53-0000130-03

TABLE P-1 Sun StorEdge SAN 4.0 Release Related Documentation *(Continued)*

Arrays	Latest information	*Sun StorEdge T3+ Array 2.1 Firmware Release Notes*	816-4771
	Safety information	*Sun StorEdge T3+ Array Regulatory, Safety Compliance Manual*	816-4773
	Documentation information	*Sun StorEdge T3+ Array Start Here*	816-4768
	Installation	*Sun StorEdge T3 and T3+ Array Site Preparation Guide*	816-0778
		Sun StorEdge T3+ Array Disk Tray Installation Task Map	816-4775
		Sun StorEdge T3+ Array Installation and Configuration Manual	816-4769
	User information	*Sun StorEdge T3+ Array Administrator's Manual*	816-4770
Host Bus Adapters	Installation	*Sun StorEdge PCI Single Fibre Channel Network Adapter Installation Guide*	806-7532
		Sun StorEdge PCI Dual Fibre Channel Host Adapter Installation Guide	806-4199
		Sun StorEdge CompactPCI Dual Fibre Channel Network Adapter Installation and User's Guide	806-6991
		Sun StorEdge SBus Dual Fibre Channel Host Adapter Release Notes	816-2490
		Sun StorEdge 2G FC PCI Single Channel Network Adapter Installation Guide	816-4999
		Sun StorEdge 2G FC PCI Double Channel Network Adapter Installation Guide	816-5001
Tools	Sun StorEdge Traffic Manager	*Sun StorEdge Traffic Manager Software Installation and Configuration Guide*	816-1420
	Diagnostics	*Storage Automated Diagnostic Environment User's Guide, Version 2.1*	816-5324
	Sun Cluster	*Sun Cluster 3.0 Installation Guide*	806-1419
	Solaris Volume Manager installation	*VERITAS Volume Manager 3.2 Installation Guide*	875-3165
	RAID	*RAID Manager 6.22 User's Guide*	806-0478
Storage Cabinet	Rackmount information	*Rackmount Placement Matrix*	805-4748

TABLE P-1 Sun StorEdge SAN 4.0 Release Related Documentation *(Continued)*

man pages	cfgadm utility	cfgadm_fp (1M)	n/a
	format utility	format (1M)	n/a
	luxadm utility	luxadm (1M)	n/a

* Find these documents at:
`http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/SAN/index.html`
→ Other Documentation.

Accessing Documentation Online

The `docs.sun.com`sm web site enables you to access select Sun technical documentation on the Web. You can browse the `www.sun.com` archive or search for a specific book title at:

```
http://www.sun.com/products-n-solutions
/hardware/docs/Network_Storage_Solutions/SAN/index.html
```

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Please include the part number (816-6580-11) of your document in the subject line of your email.

CHAPTER 1

Introduction

This *Sun StorEdge SAN 4.0 Release Field Troubleshooting Guide* provides basic procedures for isolating problems of systems that are configured as identified in the *Sun StorEdge SAN 4.0 Release Configuration Guide.*

The intended audience for this troubleshooting guide is Sun Service Representatives. As such, it is therefore assumed that you have been trained on all the components that comprise your particular storage and switch configuration. This manual only addresses troubleshooting. No repair or corrective action procedures are contained herein.

This chapter contains the following sections:

Document Scope

The scope of this document includes the switch and interconnections (host bus adapter (HBA), Small Form Factor Pluggable (SFP) 2-gigabit transceiver, and cables) on either side of the switch, as shown in the following diagram.

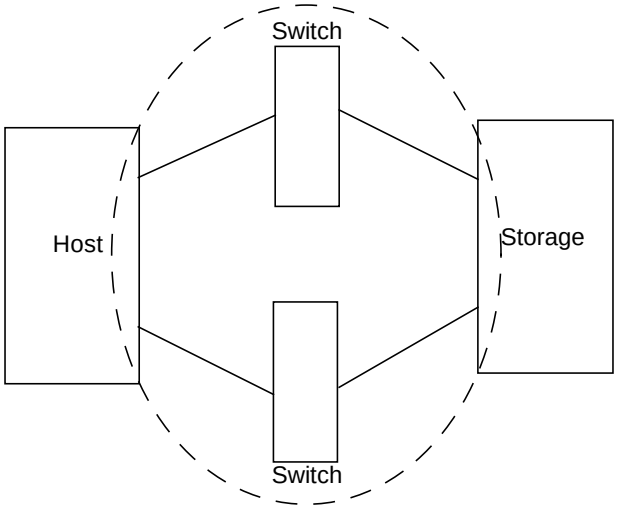

FIGURE 1-1 Switch and Interconnections

The Storage Automated Diagnostic Environment version 2.1 software package is required to support the configurations in this document.

Additional information and resources are available at: `http://www.sun.com/storage/san/`, or at: `http://sunsolve.Sun.COM` → Product Patches → PatchPro. These websites contain information on software versions and provide necessary patches.

New Features of the Sun StorEdge SAN 4.0 Release

The Sun StorEdge SAN 4.0 release supports many new features, that are summarized in TABLE 1-1. Several features of the SAN 3.x release are not included in the SAN 4.0 release, and many features were carried forward. For an explanation of the new features, see the *Sun StorEdge SAN 4.0 Release Configuration Guide*.

TABLE 1-1 Comparison of the SAN 3.0 and SAN 4.0 Releases

Feature	SAN 3.*x* Features Not Supported in SAN 4.*x*	SAN 3.x Features Included In SAN 4.*x*	SAN 4.*x* New Features
Supported Configurations	Cascaded configurations limited to three linear connected switches, or three ISL links between switches.	N/A	Cascaded configuration limit increased to eight linear connected switches, or seven ISL links between switches. Two of the ISL links can use long-wave transceivers and cables.
	SAN configurations limited to single-switch or simple cascades.	Support for local host and storage device attachment with short- or long-wave cables and transceivers for disaster tolerant configurations.	SAN configuration restrictions lifted. Meshes and other configurations are now possible.
	Limit of 2 switches supported in a SAN.	N/A	Configurations support up to 239 switches. Check with the vendor-specific switch documentation for details.
	Limited partial fabric supported for connections between hosts and switches.	N/A	Full fabric support for connections between storage devices, hosts and switches.

TABLE 1-1 Comparison of the SAN 3.0 and SAN 4.0 Releases *(Continued)*

Feature	SAN 3.*x* Features Not Supported in SAN 4.*x*	SAN 3.x Features Included In SAN 4.*x*	SAN 4.*x* New Features
Ports and Zones	Configurations limited to use of Segmented Loop (SL) or Name Server (NS) port-based zoning.	NS port-based zoning supported for fabric capability.	WWN-based zoning supported for interoperability support among FC-SW2 standard compliant switches.
	N/A	Overlapping port-based NS zones supported.	WWN-based zones supported on all switches.
	Nested port-based zoning supported.	N/A	Nested zoning supported but not required.
	Hard zones supported.	N/A	N/A
	SL_port connections to arrays supported.	TL_port connections to the Sun StorEdge T3 and T3+ arrays supported for fibre channel-arbitrated loop and fabric configurations.	G_ and GL_ports supported for connections to arrays. (G_ and GL_ports automatically negotiate in inter-switch connections to E_ports. TL_ports should be manually configured for loop connections to storage devices.)
ISLs	N/A	Short- and long-wave cables and transceivers supported.	Same.
	Long-wave only 1-Gbit GBICs supported for connectivity.	N/A	Long-wave and short-wave Small Form-factor Pluggable (SFP) 2-Gbit transceivers replace GBICs.
	Long-wave only SC-SC cables supported.	Long-wave and short-wave SC cables supported.	Long-wave and short-wave SC-SC, SC-LC, and LC-LC cables supported.

TABLE 1-1 Comparison of the SAN 3.0 and SAN 4.0 Releases *(Continued)*

Feature	SAN 3.*x* Features Not Supported in SAN 4.*x*	SAN 3.x Features Included In SAN 4.*x*	SAN 4.*x* New Features
Supported Switches	Switch hardware limited to Sun 1-Gbit 8- and 16-port switches.	SAN 3.0 switches can be upgraded with the SAN 4.0 firmware. If you do not upgrade the firmware, the 1-Gbit switches can exist on the same host as the 2-Gbit switches, but they can not connect to each other.	New 2-Gbit switches introduced.
Tools	SANbox switch management application manages the 1-Gbit switches with old firmware only.	N/A	New switch management tools are available. See the vendor-specific documentation for details.
	N/A	Multipathing and load balancing supported with the Sun StorEdge Traffic Manager application.	Multipathing and load balancing through the Sun StorEdge Traffic Manager application with SunCluster 3.0 or VERITAS Cluster Server.

TABLE 1-1 Comparison of the SAN 3.0 and SAN 4.0 Releases *(Continued)*

Feature	SAN 3.*x* Features Not Supported in SAN 4.*x*	SAN 3.x Features Included In SAN 4.*x*	SAN 4.*x* New Features
Host Bus Adapters (HBAs)	N/A	1-Gbit host bus adapters supported include: • Sun StorEdge PCI Dual Fibre Channel Network Adapter • Sun StorEdge PCI Single Fibre Channel Network Adapter, • Sun StorEdge CPCI Dual Fibre Channel Network Adapter • Sun StorEdge SBus Dual Fibre Channel Network Adapter	Newly supported host bus adapters include: • Sun Sun StorEdge 2G FC PCI Single Channel Network Adapter card • Sun StorEdge 2G FC PCI Dual Channel Network Adapter card
Supported Storage Devices	Sun StorEdge A5200 and A3500FC arrays supported.	Sun StorEdge T3 and T3+ arrays supported.	New Sun StorEdge T3+ array firmware is supported. The Sun StorEdge 39x0, 69x0 and 99x0 series are also supported.
Third-party Compatibility	N/A	N/A	Interoperability capability with FC-SW2 mode on the new switches.

Cascading Switches (E_Ports)

Note – See TABLE 2-9 on page 19 and TABLE 2-10 on page 20 for a comparison of the port nomenclature differences between Sun StorEdge and Brocade Communications Systems, Inc.

In the Sun StorEdge SAN 4.0 release, switches are allowed to be cascaded together by using E_Ports. This cascading is allowed with either a shortwave or longwave Small Form Factor Pluggable (SFP) 2-gigabit transceiver. The use of shortwave SFPs allows a higher port count in a local configuration. The use of longwave SFPs and long haul fiber optics allows users to reach geographically separated storage and servers, perhaps for disaster recovery purposes.

The following limitations exist for cascading with the Sun STorEdge SAN 4.0 release:

- If 1- and 2-gigabit switches are used together, a maximum of 16 switches can be cascaded.
- If only 2-gigabit switches are used, a maximum of 64 switches can be cascaded.
- The maximum distance is 10 kilometers.
- Any number of ISL hops can be used between two switches. ISL hops do not include the connections between hosts and switches or between switches and storage.
- A maximum of 8 switches with 7 ISL links between the switches can be cascaded in a linear fashion.

CHAPTER 2

Configurations

This chapter contains information and instructions for configuring your Sun StorEdge Network Fibre Channel Switch-16 with one or more hosts and storage.

This chapter contains the following sections:

Supported Hardware

In a single switch configuration, the switch is connected to the host through a fiber optic cable to a Sun StorEdge PCI Fibre Channel Network Adapter. The other ports of the switch are connected to storage devices through a fiber optic cable.

In a cascaded configuration, two switches are connected together by way of Inter Switch Links (ISL). A name server zone can span both switches.

TABLE 2-1 Supported Hardware

Model, Part Number, or System Code	Description
T3BES-RR-22-655R5	Sun StorEdge T3 and T3+ arrays
T3BWG-RR-11-327R5	
3910, 3960	Sun StorEdge 39x0 storage series
6910, 6960	Sun StorEdge 69x0 storage series
9910, 9960	Sun StorEdge 99x0 storage series
X6799A	Sun StorEdge PCI Single Fibre Channel Network Adapter
X6727A	Sun StorEdge PCI Dual Fibre Channel Network Adapter+
X6748A	Sun StorEdge cPCI Dual Fibre Channel Network Adapter
X6757A	Sun StorEdge SBus Dual Fibre Channel Host Bus Adapter
X6767A	Sun StorEdge 2G FC PCI Single Channel Network Adapter
X6768A	Sun StorEdge 2G FC PCI Dual Channel Network Adapter
XSFP-SW-2Gb	Short-wave SFP (up to 300 meters)
XSFP-LW-2Gb	Long-wave SFP (up to 10 km with no modifications to the switch or up to 40 km with modifications to the switch port buffer credits)[1]
X973A	2-meter fiber-optic cable (SC-SC)
X9715A	5-meter fiber-optic cable (SC-SC)
X978A	15-meter fiber-optic cable (SC-SC)
X9720A	SC-SC cable coupler

TABLE 2-1 Supported Hardware *(Continued)*

Model, Part Number, or System Code	Description
X9721A	0.4-meter fiber cable (LC-SC)
X9722A	2-meter fiber cable (LC-SC)
X9723A	5-meter fiber cable (LC-SC)
X9724A	15-meter fiber cable (LC-SC)
X9732a	2-meter fiber cable (LC-LC)
X9733a	5-meter fiber cable (LC-LC)
X9734a	15-meter fiber cable (LC-LC)

1 You must use a long-wave SFP and corresponding long-wave fiber cable if you cascade more than 500 meters.

Supported Configurations

To support a high-availability environment, use these configurations to ensure switch redundancy. See the example diagrams in this chapter for more information on the supported configurations.

Operating Environments

TABLE 2-2 Sun StorEdge SAN 4.0 Release Sun Operating Environment Compatibility Matrix

Operating Environment	Version	Notes
Sun Solaris 2.6		Not supported
Sun Solaris 7		Not supported
Sun Solaris 8	02/02 (Update 7) or later	
Sun Solaris 9		

Hosts

TABLE 2-3 Sun StorEdge SAN 4.0 Release Server Compatibility Matrix

Server	Bus Architecture	HBAs	Physical Connection	Required Sun Software Packages and Patches
Sun Enterprise 3x00, 6x00, and 10000	SBus	X6757A[1]	1-Gbyte FC	**Sun StorEdge Network Foundation Software** 6.0 or later with the following unbundled packages: • SUNWsan • SUNWcfpl • SUNWcfplx found at the Download Center: http://www.sun.com/storage/san/ → Sun StorEdge SAN 4.0 release Software/Firmware Upgrades and Documentation → login → license agreement: • → Solaris 8 SUNWcfpl/x and SUNWsan packages, or • → Solaris 9 SUNWcfpl/x and SUNWsan packages **Sun StorEdge Traffic Manager Software** installed as part of the Sun StorEdge Network Foundation Software **Storage Automated Diagnostic Environment** 2.1 To find all required **patches**: http://sunsolve.Sun.COM/ → Product Patches → PatchPro: • → Network Storage Products, or • → Solaris Recommended Patch Cluster Describe your system, then click Generate Patch List.
	PCI	X6799A[2] X6727A[3]	1-Gbyte FC	
	PCI	X6767A[4] X6768A[5]	2-Gbyte FC	
Sun Fire 3800	cPCI	X6748A[6]	1-Gbyte FC	
Sun Fire 4800—6800	cPCI	X6748A	1-Gbyte FC	
	PCI	X6799A X6727A	1-Gbyte FC	
		X6767A X6768A	2-Gbyte FC	
Sun Fire 15k, 12k, E4x0, E2x0, SF480, SF280R, V880, SB1000, SB2000, Netra 1125 and 140X	PCI	X6799A X6727A	1-Gbyte FC	
		X6767A X6768A	2-Gbyte FC	

1 Sun StorEdge SBus Dual Fibre Channel Host Bus Adapter (Ivory)

2 Sun StorEdge PCI Single Fibre Channel Network Adapter (Amber)

3 Sun StorEdge PCI Dual Fibre Channel Network Adapter+ (Crystal+)

4 Sun StorEdge 2G FC PCI Single Channel Network Adapter (Amber 2)

5 Sun StorEdge 2G FC PCI Dual Channel Network Adapter (Crystal+ 2)

6 Sun StorEdge cPCI Dual Fibre Channel Network Adapter (Diamond)

Host/Operating Environment Rules

- All hosts in a zone must be running Solaris 8 Release 4/01 operating environment with all appropriate patches installed.
- Mixing PCI Dual Fibre Channel Network Adapter and PCI single Fibre Channel Network Adapter HBAs in the same switch zone is supported.
- Mixing an Sbus host (with a PCI card) and PCI hosts within the same zone is supported. You must be using PCI dual Fibre Channel Network Adapter and PCI single Fibre Channel Network Adapter HBAs.

Storage Arrays

TABLE 2-4 Sun StorEdge SAN 4.0 Release Storage Array Compatibility Matrix

Firmware Levels for Storage	Version	Notes
Sun StorEdge T3 array	1.17b and 1.18 controller firmware	Translated loop (TL) switch mode
Sun StorEdge T3+ array	2.1 controller firmware	TL/fabric switch mode
Sun StorEdge 39x0 array	2.0 and 2.1	TL/fabric switch mode
Sun StorEdge 69x0 array		Requires switch hardware or firmware upgrade to use SAN 4.0 capabilities.
Sun StorEdge 9960 & 9910 arrays		
Sun StorEdge 9980 & 9970 arrays		

Array Storage Rules

The following tables specify the supported features of the Sun StorEdge T3 array.

TABLE 2-5 Supported Features of the Sun StorEdge T3 Array

Feature	Supported
Cascading	Yes
Zone Type	Name Server zone[1]
Maximum number of arrays per SL zone	8
Maximum initiators per LUN	2
Maximum initiators per zone	2[2]

1 The host must be connected to the F_Port on the switch; a Sun StorEdge T3 array must be connected to the TL port of the switch.

2 This implies 2 initiators (2 hosts) for simple arrays (T3WG), but 4 initiators (2 hosts) for a partner pair (T3ES). Each host has one path to each of the Sun StorEdge T3 arrays in the partner pair.

Host Bus Adapters

TABLE 2-6 Sun StorEdge SAN 4.0 Release HBA Compatibility Matrix

FW-Code Levels for HBAs and I/O Boards	Version
X6757A, Sun StorEdge SBus Dual Fibre Channel Host Bus Adapter	1.13.06 or higher
X6799A, Sun StorEdge PCI Single Fibre Channel Network Adapter	1.13 or higher
X6727A, Sun StorEdge PCI Dual Fibre Channel Network Adapter+	1.13 or higher
X6767A, Sun StorEdge 2G FC PCI Single Channel Network Adapter	1.13.08 or higher
X6768A, Sun StorEdge 2G FC PCI Dual Channel Network Adapter	1.13.08 or higher
X6748A, Sun StorEdge cPCI Dual Fibre Channel Network Adapter	1.13 or higher

Software Packages and Patches

You can download software packages or patches with the following procedures.

▼ To generate the most recent patch list for a Sun Solaris Release

1. **Access the SunSolve web site.**

   `http://sunsolve.Sun.COM/`

   The SUNSOLVE ONLINE menu is displayed.

2. **Under SunSolve Contents, click Product Patches.**

3. **Under Patch Analysis Tools, click PatchPro.**

4. **Click Solaris Recommended Patch Cluster.**

   The PATCHPRO Interactive menu is displayed.

5. **Select all the appropriate features of your system in the following areas of the menu**:

   - Operating System Release
   - Platform

6. **Click Generate Patch List.**

▼ To generate the most recent patch list for a specific Sun StorEdge SAN 4.0 Release Configuration

1. **Access the SunSolve web site.**

   `http://sunsolve.Sun.COM/`

   The SUNSOLVE ONLINE menu is displayed.

2. **Under SunSolve Contents, click Product Patches.**

3. **Under Patch Analysis Tools, click PatchPro.**

4. **Click Network Storage Products.**

   The PATCHPRO Interactive menu is displayed.

5. **Select all the appropriate features of your system in the following areas of the menu**:

   - OS Release
   - Platform
   - Disk Array
   - Tape Libraries

- Disk Drives
- Tape Drives
- Switches and HBAs
- SAN Products | Brocade SAN Release
- Software

6. Click Generate Patch List.

Unbundled Software

For a list of unbundled software, refer to TABLE 2-7.

TABLE 2-7 Unbundled Software

Package	Minimum Revision	Minimum Patch (if any)
JAVA SDK/JDK	1.3.02	
StorageTek 9840	1.28.126	
Instant Image	3.0	
SNDR	3.0	
Alternate Pathing	2.3.1	110722-01 110432-04
Sun Enterprise 3x00/4x00/5x00/6x00 Flash Prom	3.2.28	103346-29
Sun Fire 3800/4800/4810/6800 Flash Prom	5.11.6	111346-02
E450 Flash Prom	3.22.0	106122-09
E250 Flash Prom	3.22.0	106530-06
E420R Flash Prom	3.29.0	109082-04

Note – The packages and/or patches listed in TABLE 2-7 may not be present in all configurations.

TABLE 2-8 Sun StorEdge SAN 4.0 Release Optional Software Packages Compatibility Matrix

Optional Software Packages	Version/upgrade	Notes
Sun Cluster	3.0	Update 2
VERITAS Cluster Support	3.4	
VERITAS File System	3.4	
VERITAS Volume Manager (VxVM) Support (includes VERITAS DMP)	3.2	
Solstice DiskSuite	4.2.1	See SunSolve for the latest patches.
StorTools	4.2	Extra functionality for V880
Storage Automated Diagnostic Environment	2.1	See SunSolve for the latest patches.
Sun StorEdge Network Storage Agent	2.1	See SunSolve for the latest patches.
Sun StorEdge Network Data Replicator	3.0	See SunSolve for the latest patches.
Sun StorEdge Component Manager	2.2	See SunSolve for the latest patches.
VERITAS NetBAckup	3.4	
Solstice Backup	6.0b	See SunSolve for the latest patches.
Sun StorEdge Instant Image	3.0	See SunSolve for the latest patches.
“On Demand Node Creation”	SUNWcfpl:VERSION=11.8.0, REV=2001.07.14.21.42, SUNWcfplx:VERSION=11.8.0, REV=2001.07.14.21.42	

Switches

For high availability, configure the Sun StorEdge Network FC Switch-16 switch in parallel.

Switch Port Types

New Sun StorEdge SAN 4.0 Release Port Types

The Sun StorEdge SAN 4.0 release port types now follow industry standards. E_Ports replace T_Ports for switch-to-switch connections. G_ and GL_Ports automatically configure to F_, FL_, or E_Ports upon device detection. Private loop devices that require SL ports can not connect to the new switches.

The 2-Gbit Sun StorEdge network adapters in this release will recognize the private loop arrays as fabric devices when they are connected with TL_Ports or L_Ports.

Sun StorEdge and Brocade Communications Systems Port Descriptions and Differences

TABLE 2-9 Sun StorEdge and Brocade Communications Systems Port Descriptions

Port Nomenclature	Function
E_Port	Expansion or inter-switch port. A type of switch port that can be connected to an E_Port of another switch to, in effect, create a cascading interswitch link (ISL).
F_Port	Fabric port. A fabric port that is point-to-point only, not loop capable, and used to connect N_Ports to the switch.
FL_Port	Fabric loop port. A fabric port that is loop-capable and used to connect NL_Ports to the switch.
G_Port	Generic port. This port can automatically configure as either an E_Port or an F_Port. A port is defined as a G_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric.
GL_Port	Generic loop port. This port can automatically configure as either an E_Port, F_Port, or an FL_Port. A port is defined as a G_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric.

TABLE 2-10 Differences Between Sun StorEdge and Brocade Port Communications Systems Port Nomenclature

Sun StorEdge Port	Brocade Port	Function
TL_Port	L_Port	Translated loop port / Loop port. This port enables private devices to communicate with fabric or public devices. In the Brocade switch, this address translation is automatic. In Sun StorEdge switches, the private device must be configured on a TL_Port.
N / A	U_Port	Universal Port. This port can operate as an E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric.

Zones

Zoning allows the user to divide the switch ports into zones for more efficient and secure communication among functionally grouped nodes. There are several types of zones and a port may be defined in any. No port can be in all zone types simultaneously.

Name Server Zones

Name server zones allow the division of the fabric (one or more Switch chassis) into as many as 256 fabric-wide zones; each name server zone defines which ports or devices receive name server information, as defined by the FC-GS3 document.

Overlapping Zones

The new Sun StorEdge SAN 4.0 release now supports WWN-based zones, as well as port-based zones. Port-based and WWN-based zones can overlap. When creating overlapping NS zones, one or more switch ports is in at least two zones. When a port is in multiple zones, one host or storage device attached to a switch port to be a member of many zones and resources can be shared. If a resource is shared in multiple zones, it can be made available to multiple zones by using overlapping zones.

When connecting multiple switches, zones can help manage the complexity of sharing resources. For example, you can use port zoning to make all the disks of a Sun StorEdge T3 array belong to the same zone in a SAN. Alternately, you can share the resources of the array among several NS zones.

Refer to vendor-specific switch documentation to determine the maximum number of zones you can have in a configuration.

Zone nesting, where zones exist inside other zones, is also possible.

Zoning Rules

- A minimum of one switch port per zone
- A maximum of 16 zones per 16-port switch
- A maximum of 30 zones for cascading 16-port to 16-port switches
- Port-based and world-wide name (WWN)-based zoning is supported.
- Server and storage may be in the same name server zone across ISLs on separate switches. This enables you to have servers at a recovery site. It also means you can have local and remote storage in the same zone, so that storage can be mirrored at both locations.

Configuration Guidelines

Switches

For high-availability applications, configure two sets of switches in parallel.

Zones and Arrays

- Sun StorEdge T3 arrays support name server zones (or zones in which a host has made a point-to-point Fabric connection to a switch and the Sun StorEdge T3 array is attached to a TL port).
- Do not mix different arrays in the same zone. A single zone can contain only Sun StorEdge 3900 arrays, or only Sun StorEdge T3 arrays.
- You may configure a minimum of one port per zone
  For example, a 16-port switch can have a maximum of 16 zones.

Zones and Storage

You can dynamically add storage to a port-based or WWN-based zone, using `cfgadm` procedures for the Sun StorEdge T3 arrays. This requires the Sun StorEdge T3 and T3+ arrays to be connected as TL or Fabric devices.

TABLE 2-11 Arrays, Zones, and Initiators

Array	Maximum Arrays/Zone	Maximum Initiators/Zone
Sun StorEdge T3 array	252 (252 Sun StorEdge T3 arrays in a work group, or 126 Sun StorEdge T3 arrays in an enterprise configuration)	252

Cascading Rules

- Hub-to-switch connectivity is not supported
- If 1- and 2-gigabit switches are used together, a maximum of 16 switches can be cascaded.
- If only 2-gigabit switches are used, a maximum of 64 switches can be cascaded.
- The maximum distance is 10 kilometers.
- Any number of ISL hops can be used between two switches.
- ISL hops do not include the connections between hosts and switches or between switches and storage.

Rules for Adding and Removing Devices While the Hosts are Online

You can add all initial and additional storage devices while the host is online.

In high availability configurations, where alternative methods to reconstruct the data exist, you can remove a device or path. Host volume management or multi-pathing software handles this device removal. For non-available configurations, you must ensure that no host application is configured to use the device.

In the case of a fabric configuration (name server zone), you must unconfigure the device on the host. This ensures that during the boot process the host does not attempt to probe this device to create device nodes.

You can add or remove a host without shutting down the SAN.

Configuration Examples

Single Host Connected to One Storage Array

FIGURE 2-1 shows one host connected through fiber-optic cables to a Sun StorEdge T3 array enterprise configuration.

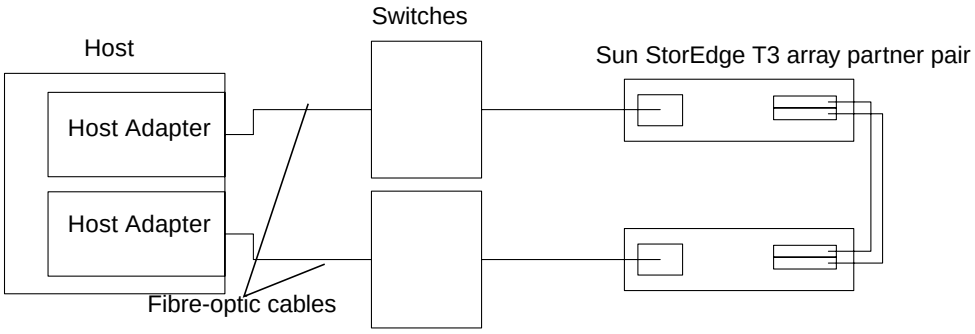

FIGURE 2-1 Single Host Connected to One Sun StorEdge T3 Array Enterprise Configuration

Single Host Connected to Multiple Storage Arrays

FIGURE 2-2 shows a single host connected to multiple Sun StorEdge T3 array partner pairs.

Note – You can attach different types of storage devices to the same switch, as long as the storage devices are on different zones.

Each controller that is connected to a switch must have a unique loop ID. Whenever you add a second controller to a switch, make sure that the loop ID of the controller being connected is different from the loop ID of any other controller currently connected to the same switch.

Caution – Make sure that the controller module of the array is split between two switches. For example, connect controller A to switch 1 and controller B to switch 2.

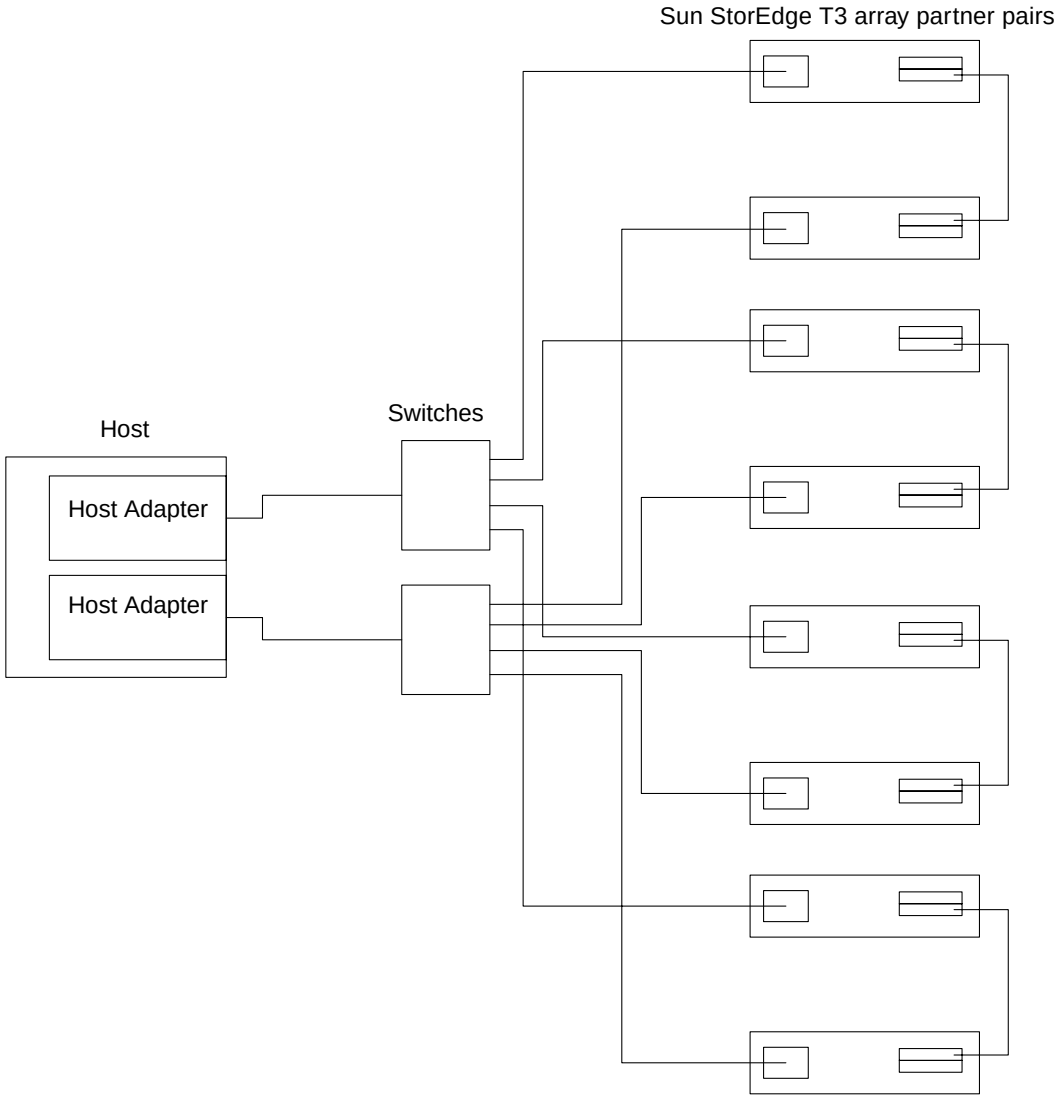

FIGURE 2-2 Single Host Connected to Multiple Sun StorEdge T3 Array Enterprise Configurations

Multihost

FIGURE 2-3 shows two hosts connected to four Sun StorEdge T3 array partner pairs.

FIGURE 2-4 shows two hosts connected to a Sun StorEdge T3 array Partner Group in which each host maintains separate, non-shared storage.

Note – You can attach different storage types to the same switch so long as the storage devices are on different zones.

Each controller that is connected to a switch must have a unique loop ID. Whenever you add a second controller to a switch, make sure that the loop ID of the controller being connected is different from the loop ID of any other controller currently connected to the same switch.

Caution – Ensure that the controller modules are not connected to the same switch.

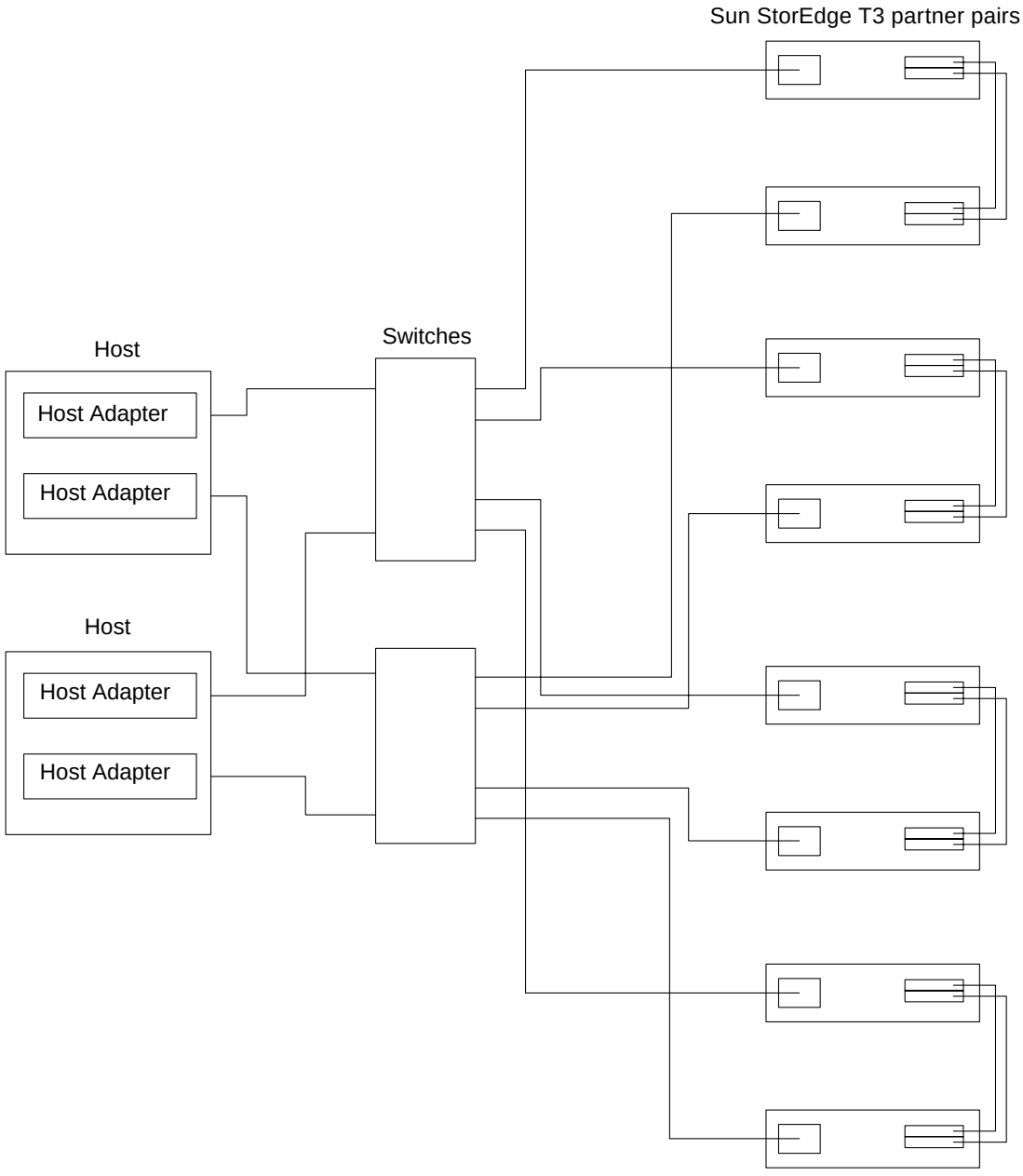

FIGURE 2-3 Two Hosts Connected to Four Sun StorEdge T3 Array Enterprise Configurations

Note – You must enable Sun StorEdge Traffic Manager software for failover across multiple hosts to function. The `mp_support` on the Sun StorEdge T3 array should be set to `mpxio` (Sun StorEdge Traffic Manager Software).

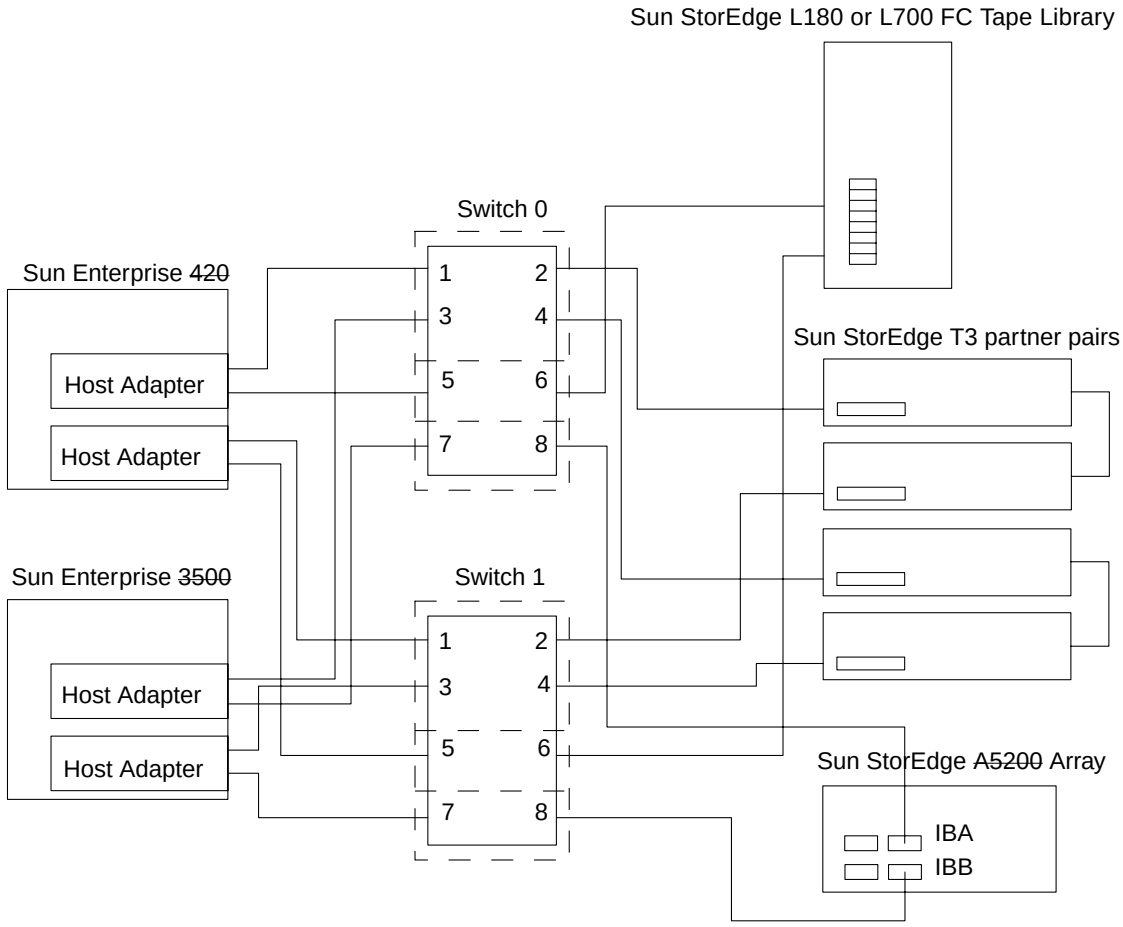

FIGURE 2-4 Two Hosts Connected to Sun StorEdge T3 Array Partner Group—Each Host with Separate Non-shared Storage

Note – You must enable Sun StorEdge Traffic Manager software for failover across multiple hosts to function. The `mp_support` on the Sun StorEdge T3 array should be set to `mpxio` (Sun StorEdge Traffic Manager Software).

CHAPTER 3

Diagnostics

This chapter provides an overview of the tools you can use to monitor, diagnose, troubleshoot, and gather information on the Sun StorEdge SAN 4.0 Release and on the Sun StorEdge Network Fibre Channel Switch-16. Detailed installation and configuration information can be found in the respective documentation of the tools.

This chapter contains the following sections:

Diagnostic Tools

Storage Automated Diagnostic Environment Version 2.1

The Storage Automated Diagnostic Environment version 2.1 is a host-based online health and diagnostic monitoring tool for a storage area network (SAN) and direct-attached storage (DAS) devices. It can be configured to monitor on a 24-hour basis, collecting information that enhances the reliability, availability, and serviceability (RAS) of the storage devices.

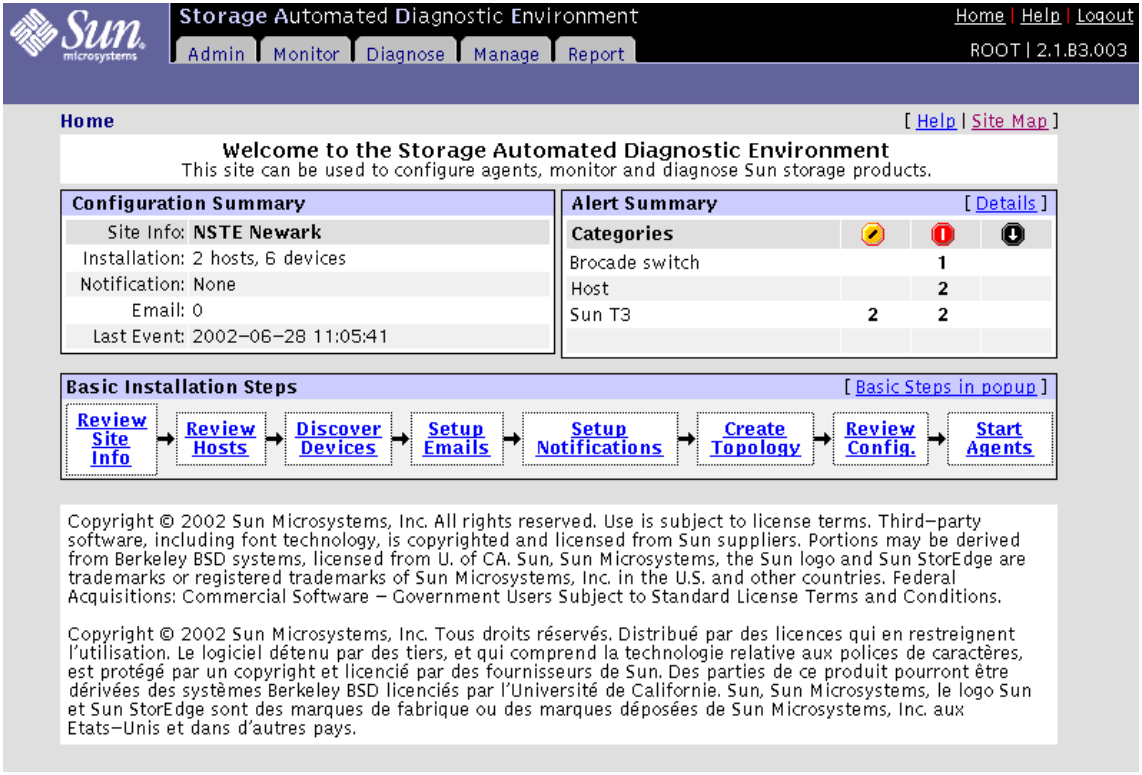

FIGURE 3-1 Storage Automated Diagnostic Environment Version 2.1 Home Window

The Storage Automated Diagnostic Environment version 2.1 offers the following features:

- A common web-based user interface for device monitoring and diagnostics
- Distributed test invocation by means of lists or topology. You can run the tests through the Storage Automated Diagnostic Environment GUI or through the command line interface (CLI).
- Topology grouping for multi-level hosts and components
- Alternate master support for redundancy
- Revision checking
- Support for the Storage Service Processor and virtualization engine components of Sun StorEdge 3900 and 6900 series offerings
- Remote notification through SRS, SRS/NetConnect, Sun StorEdge Remote Response (SSRR), HTTP, and SNMP Providers, or email
- Support for direct attached storage (DAS) and storage area networks (SANs)

Storage Automated Diagnostic Environment Version 2.1 Functions

For each device, the Storage Automated Diagnostic Environment version 2.1 performs the following functions:

1. Sends the information, by way of a discovery event, to the system administrator through an interface with the transport mechanisms.

Note – The first access to a device yields a discovery event that collects all the information about that device, plus other events for other preconfigured devices, that may be generated by health monitors.

---

2. Reads the proper `/var/adm/messages` files, finds relevant entries, and reports them as events through the local email notification mechanism, if configured.
3. Connects to Sun StorEdge T3 and T3+ array storage devices directly through in-band data paths and out-of-band management paths.
4. Reads the device's configuration and state information, stores it locally in the cache, compares the results of the last run, and transmits the differences.
5. Reads threshold information and reports errors when the frequency threshold reaches predefined levels.

Storage Automated Diagnostic Environment Version 2.1 Agent Functionality

The Storage Automated Diagnostic Environment version 2.1 remotely monitors Sun network storage devices. The Storage Automated Diagnostic Environment can monitor host message files for errors, or connect directly through the “in-band” data path or “out-of-band” management path of Sun StorEdge devices, in order to obtain status information about each device being monitored.

Storage Automated Diagnostic Environment Version 2.1 Diagnostic Functionality

Diagnostic tests have been integrated into the Storage Automated Diagnostic Environment for device diagnostics and field replaceable unit (FRU) isolation. Each test can be run individually from the command line interface (CLI) or from the Storage Automated Diagnostic Environment GUI.

The following tests are described in the *Storage Automated Diagnostic Environment User’s Guide, Version 2.1*.

- Sun StorEdge PCI FC-100 Host Adapter Board Test (`ifptest`)
- Sun StorEdge PCI Dual Fibre Channel Host Adapter Board Test (`qlctest`)
- Sun StorEdge SBus FC-100 Host Adapter Board Test (`socaltest`)
- Sun StorEdge Network FC Switch-16 Switch Test (`switchtest`)
- Sun StorEdge T3 and T3+ array Tests (`t3ofdg`, `t3test`, `t3volverify`)
- Virtualization Engine Tests (`vediag`, `veluntest`)
- Brocade Silkworm Test (`brocadetest`)

From the Storage Automated Diagnostic Environment GUI, you can select tests from the topology or from a list view. When the tests execute, the Storage Automated Diagnostic Environment initiates the test on the proper host. You can retrieve test results by using the Test Manager selection from the GUI.

Running Diagnostic Tests From the GUI

If you run the diagnostic test from the Storage Automated Diagnostic Environment home window, you can easily access test configuration, control, and results using the buttons in the dialog boxes. The test parameter options, however, are unique for each test and are illustrated in the individual sections with each test in this chapter.

▼ To Access the Diagnostic Tests

1. **Click the Diagnose tab in the Storage Automated Diagnostic Environment home window.**

   Three links are then displayed below the tab as shown in FIGURE 3-2.

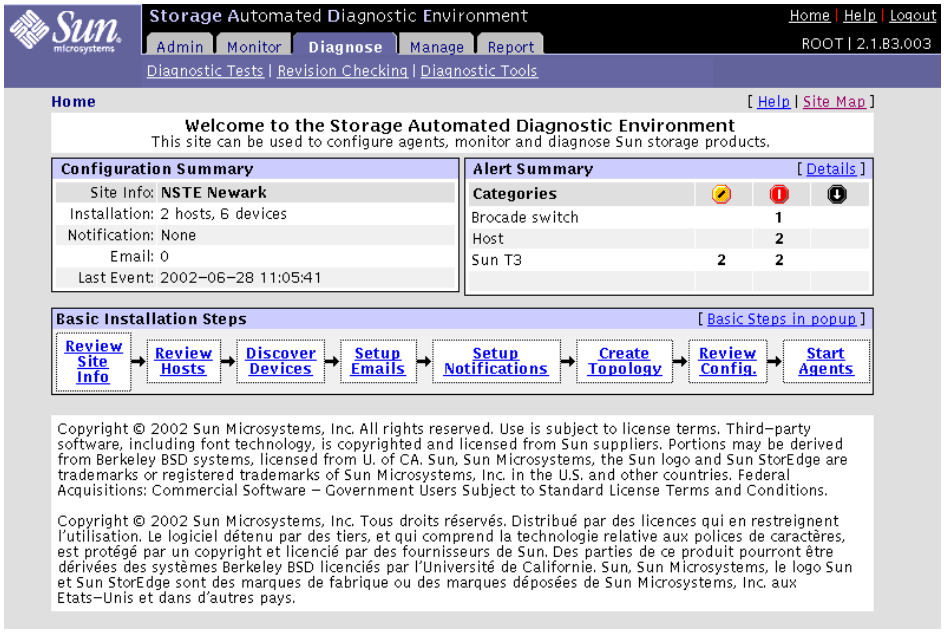

FIGURE 3-2 Storage Automated Diagnostic Environment—Diagnose Tab Selected

2. **Click the Diagnostic Tests link.**

   Five tests are displayed as shown in FIGURE 3-3.

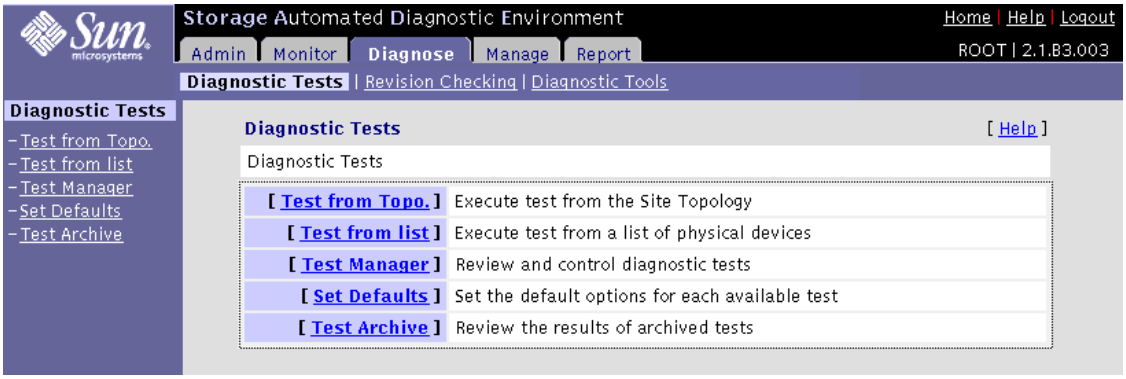

FIGURE 3-3 Storage Automated Diagnostic Environment—Diagnostic Tests Window

You can run Storage Automated Diagnostic Environment diagnostic tests from the "Test from Topo" or from the Test from List links. FIGURE 3-4, FIGURE 3-5, and FIGURE 3-6 show an example of selecting and modifying the Test from Topo link. The functional tests are designed to test the target FRU and operate on in-band or out-of-band data paths. The Storage Automated Diagnostic Environment causes the test to be run on the appropriate Host.

Storage Automated Diagnostic Environment's implementation of diagnostic tests verify the operation of all the user-selected components. Tests are selected from a graphical view of the system's topology. The Storage Automated Diagnostic Environment version 2.1 Graph view shows the physical topology of a system or merged system. Using the Topology view, you can select specific subtests and test options. The monitoring status of devices and links appears both in the test topology view and in the list view.

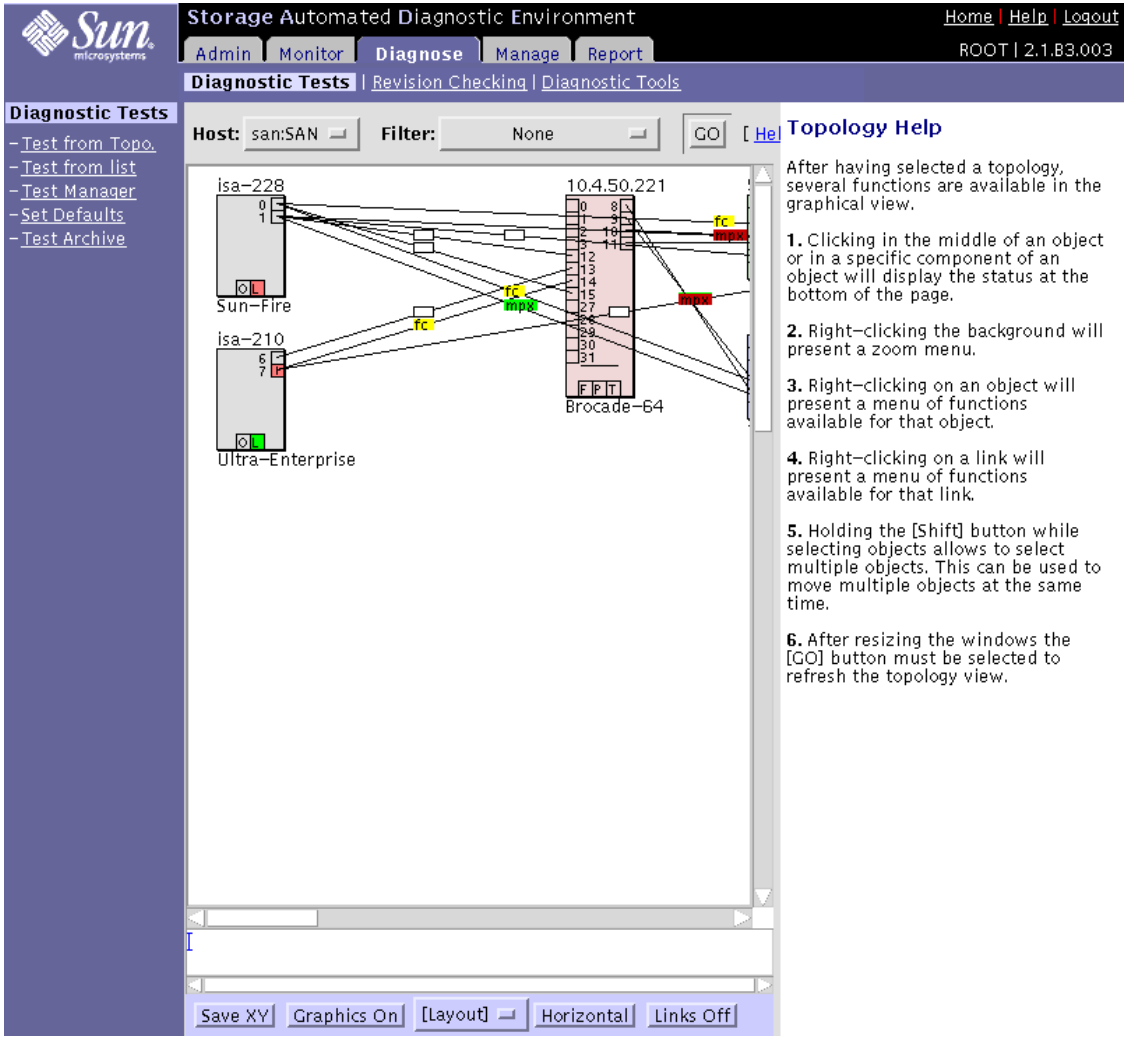

FIGURE 3-4 Storage Automated Diagnostic Environment—Test from Topology Window

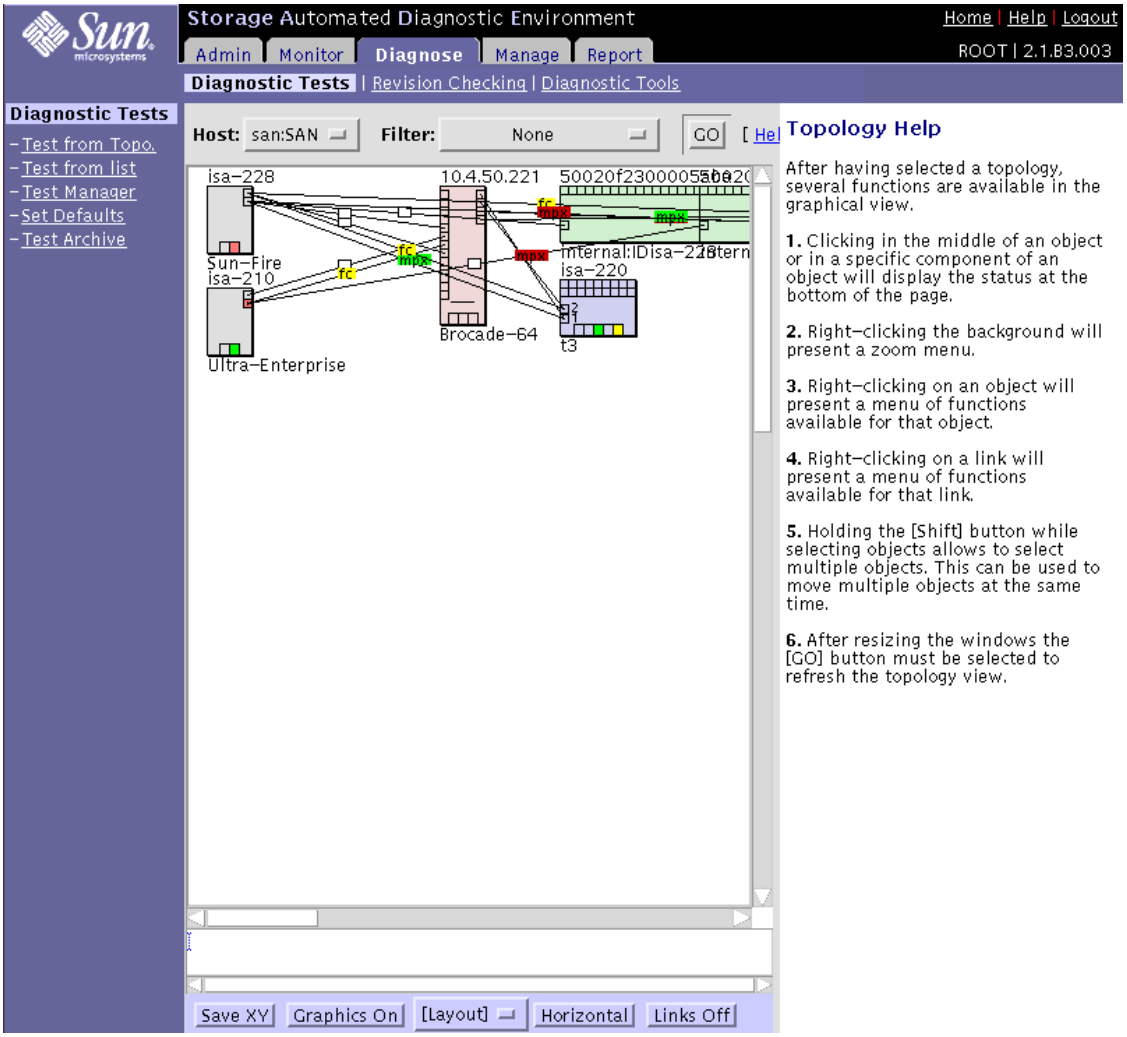

FIGURE 3-5 Storage Automated Diagnostic Environment—Test from Topology Window with Background Reduced to 66%

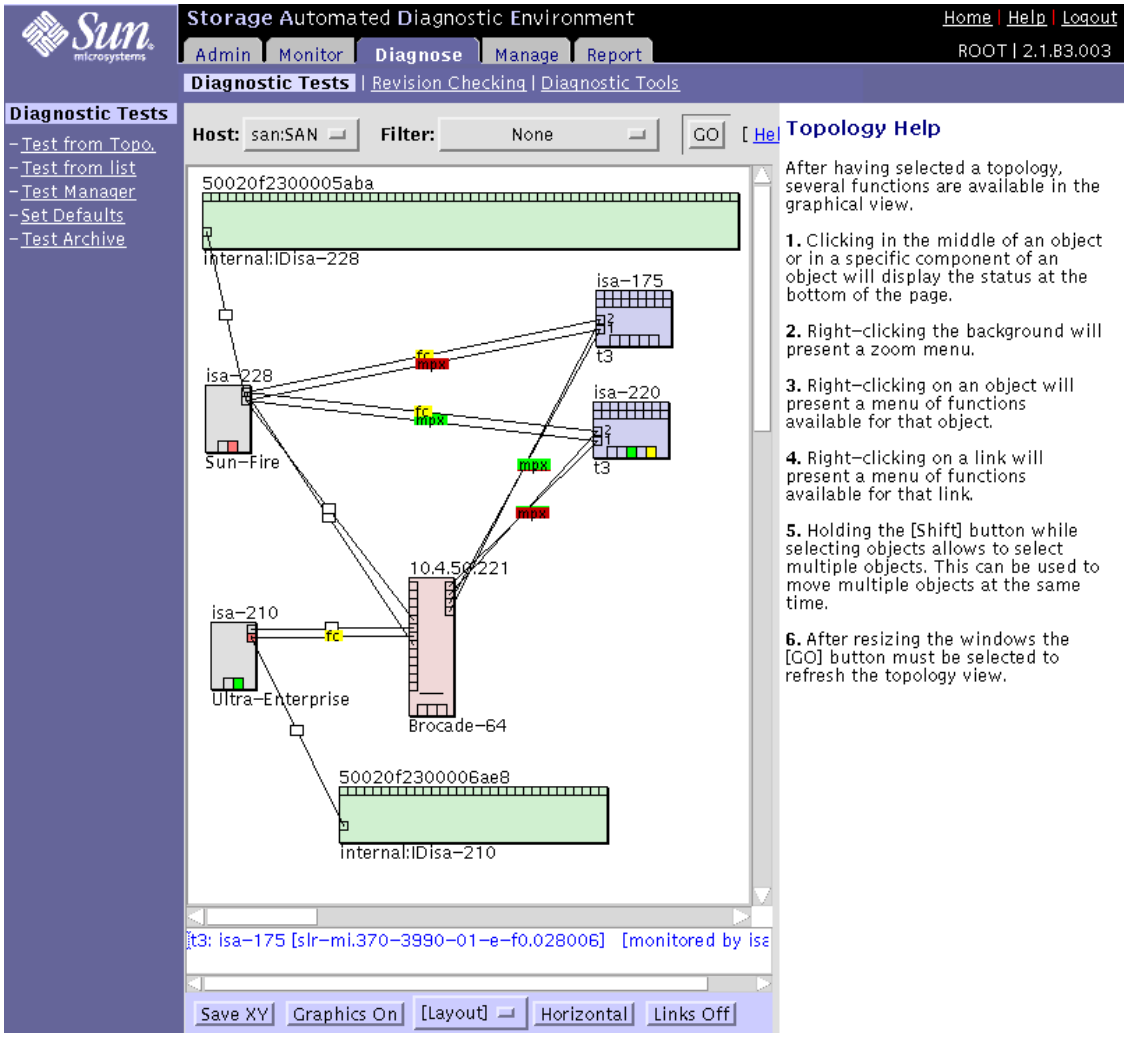

FIGURE 3-6 Storage Automated Diagnostic Environment—Test from Topology Window with Background Reduced to 66% and Components Arranged for Viewing

Sun Explorer Data Collector (SUNWexplo) and T3Extractor

Both the Sun Explorer Data Collector and the T3Extractor are essential data gathering tools that are required for service calls or escalations. Both are command-line, host-based tools that collect pertinent information you need to see the complete picture of the host.

Visit the following websites for more information and to download these tools.

Explorer

`http://eservices.central/knowledge/products/explorer/`

T3Extractor

`http://hes.west/nws/products/T3/tools.html`

Note – You can gather the same information by querying the Storage Automated Diagnostic Environment version 2.1 that you can gather using the sanbox API. These methods are completely supported, unlike command-line sanbox API usage.

Diagnosing and Troubleshooting the Sun Switch

For procedures for diagnosing and troubleshooting the Sun StorEdge Network Fibre Channel Switch-16, see the *Sun StorEdge Network 2Gb Switch-16 (SANbox2) Installer's/User's Manual*. This manual can be found with the following steps.

1. **Access the SAN Solutions web site.**

   `http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/SAN/index.html`

   The SAN Solutions menu is displayed.

2. **Click Other Documentation.**

3. **Click Sun StorEdge[tm] Network 2Gb Switch-16 (SANbox2) Installer's/User's Manual.**

   See Section 4, Diagnostics / Troubleshooting.

Using Switch Counter Information

Switch counter information can be helpful in supporting troubleshooting the Sun StorEdge Network Fibre Channel Switch-16. Some general points to keep in mind when viewing switch counter information are:

- Quickly increasing counter values or abnormally high counter values may indicate a problem.
- A LIP that occurs on one port in a zone propagates to all the ports that have devices attached to them in the same zone. The LIP counter is incremented on all those ports.
- Normal activity can also increase counter values.
- Counters increment on power cycles.

Note – Switch Counter data should only be used as supporting data for diagnostics. Do not use switch counter information as the primary source in the troubleshooting process.

Sun StorEdge Network Fibre Channel Switch-16 counter information can be called up by using the SANbox Manager application. See the *Sun StorEdge Network 2Gb Switch-16 (SANbox2) Management Manual*. This manual can be found with the following steps.

1. **Access the SAN Solutions web site.**

   `http://www.sun.com/products-n-solutions/hardware/docs/Network_Storage_Solutions/SAN/index.html`

   The SAN Solutions menu is displayed.

2. **Click Other Documentation.**

3. **Click Sun StorEdge[tm] Network 2Gb Switch-16 (SANbox2) Management Manual.**

   See Section 4, Managing Ports.

`qlctest` Test

If you are running the Storage Automated Diagnostic Environment version 2.1 application, you can also run the Sun StorEdge PCI Dual Fibre Channel Host Adapter Board Test (`qlctest`) which might increase the following counters if the test is run while the HBA is connected to the switch:

- In frames
- Out frames
- Link failure
- Sync losses 100ms
- Invalid tx words rec
- LIP total received
- LIP F7F7
- LIP F8F7
- AL Init Attempts
- Sync Loss
- LIP during Init

CHAPTER 4

Troubleshooting Example

In this section, a troubleshooting example is shown with a SAN 4.0 configured with Sun StorEdge 2 Gbyte FC switches and two Sun StorEdge T3+ arrays in an enterprise configuration.

This chapter contains the following sections:

Example Configuration

The troubleshooting example has the following configuration:

- One Enterprise 450 Workgroup Server
- Solaris 9 update 1 with all relevant Sun StorEdge SAN 4.0 Release patches and packages
- Two Sun StorEdge T3+ arrays in an enterprise configuration (1 LUN per array)
- Two Sun StorEdge 2-Gbyte Fibre Channel switches
- One single-port 2-Gbyte HBA and one dual-port 2-Gbyte HBA
- Storage Automated Diagnostic Environment version 2.1 with patch 113230-01

The setup example high-level topology is displayed in FIGURE 4-1.

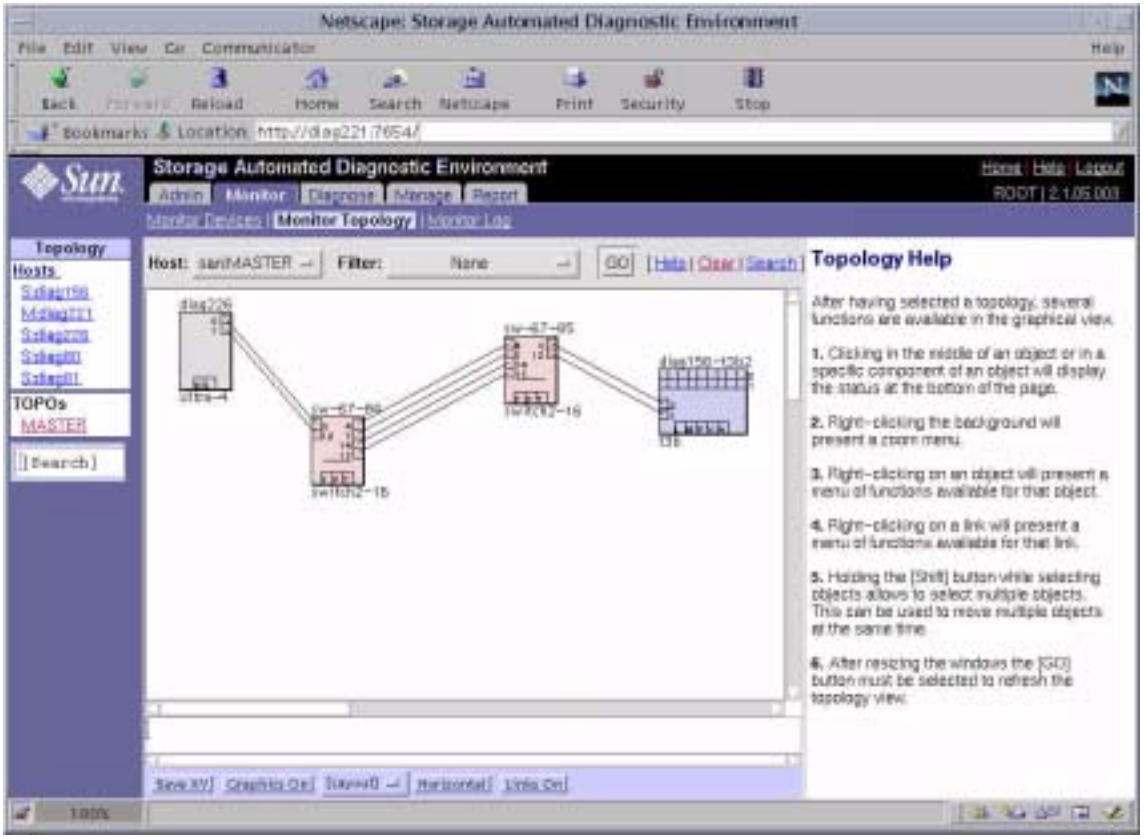

FIGURE 4-1 Troubleshooting Example Viewed with Storage Automated Diagnostic Environment Version 2.1

Example Assumptions

The troubleshooting example has the following assumptions:

- The latest patches, firmware, and packages are installed and running
- No host-based volume management software installed
- The two switches are zoned such that they present two isolated paths from the HBAs through the ISL links to the Sun StorEdge T3+ arrays
- Each HBA has physical connectivity to only one Sun StorEdge T3+ arrays
- The Storage Automated Diagnostic Environment version 2.1 is configured to automatically send email alert messages to the root user email account

Troubleshooting Outline

This section lists the broad steps on how to approach a SAN problem. It lays out a methodical approach and lists various tools and resources available at each step. Using the Storage Automated Diagnostic Environment version 2.1 for monitoring vastly decreases the time-consuming process of narrowing down the problem.

1. **Determine the error.**
   - Storage Automated Diagnostic Environment version 2.1 alert/email
   - `/var/adm/messages`
   - Application-specific errors
2. **Determine the extent of the problem.**
   - Storage Automated Diagnostic Environment version 2.1 topology or device monitoring view
   - `cfgadm -al` command output
   - `luxadm -e port` command output
   - Multipathing information

Note – The information gathered at this point determines the subsection to focus attention on: Host-to-Switch, Switch-to-Switch (cascaded), or Switch-to-Storage.

---

3. **Check the array status.**
   - `luxadm display` command output
   - LED status
   - Output from telnet session to the Sun StorEdge T3+ array
   - Explorer / Sun StorEdge T3+ array Extractor output
4. **Check the Sun StorEdge 2 Gb FC switch status.**
   - Storage Automated Diagnostic Environment version 2.1 device monitoring view
   - SANbox2 Switch GUI display
   - LED status on the Sun StorEdge 2 Gb FC switch

Note – You can use the Storage Automated Diagnostic Environment version 2.1 to detect user configuration errors that may not show up as hard errors anywhere else. For example, a user might accidentally change a switch port to a different mode (TL to F), or rezone a switch.

---

5. **Test the FRUs.**
   - Storage Automated Diagnostic Environment version 2.1 diagnostic tests (`switchtest` and `qlctest`)
   - Sun StorEdge T3+ array tests (OFDG)
6. **Verify the fix.**
   - Storage Automated Diagnostic Environment version 2.1 monitoring status
   - Storage Automated Diagnostic Environment version 2.1 diagnostic tests
   - `/var/adm/messages` log information
   - Multipathing status returns to normal condition
   - LED status

Troubleshooting Example of a Host–to–Switch Error

Determine the Error

The first indication of a problem can come from a Storage Automated Diagnostic Environment version 2.1 email alert:

```
You requested the following events be forwarded to you from
'diag221.central.sun.com'.

Site     : FSDE LAB Broomfield CO
Source   : diag156.central.sun.com
Severity : Warning
Category : T3   DeviceId : t3:sci-sj.370-3990-01-e-d0.000981
EventType: LogEvent.warning
EventCode:
EventTime: 2002/09/13 14:08:05

DESCRIPTION: 1 warning(s) found in logfile of t3b2:


DETAILS:
Sep 13 20:15:41 t3b2 MNXT[2]: W: u2ctr starting lun 0 failover

------------------------------------------------------------------------

Site     : FSDE LAB Broomfield CO
Source   : diag226.central.sun.com
Severity : Warning
Category : MESSAGE   DeviceId : message:diag226.central.sun.com
EventType: LogEvent.driver.SSD_WARN
EventCode: 9.20.330
EventTime: 2002/09/13 13:06:26

DESCRIPTION: Found 1 'driver.SSD_WARN' warnings(s) in logfile:
/var/adm/messages on diag226.central.sun.com (id=80fee746):

INFORMATION:
These warnings could indicate a faulty link.

PROBABLE-CAUSE:
This could indicate a marginal or failing component or disk drive

RECOMMENDED-ACTION:
1. Run the appropriate disk test Diagnostic to isloate the failing drive
 2. The messages report the device that is posting the errors and the full path

... (continued)
```

```
... (continuation)
DETAILS:
Sep 13 13:04:57 WWN:    Received 6 'SSD Warning' message(s) on 'ssd2'  in 14
mins [threshold is 5 in 24hours]  Last-Message: 'diag226.Central.Sun.COM scsi:
[ID 107833 kern.warning] WARNING:
/scsi_vhci/ssd@g60020f20000003d53d3493930006a222 (ssd2): '
------------------------------------------------------------
Site     : FSDE LAB Broomfield CO
Source   : diag226.central.sun.com
Severity : Warning
Category : MESSAGE   DeviceId : message:diag226.central.sun.com
EventType: LogEvent.driver.SCSI_TRAN_FAILED
EventCode: 9.20.318
EventTime: 2002/09/13 13:06:26

DESCRIPTION: Found 1 'driver.SCSI_TRAN_FAILED' warnings(s) in logfile:
/var/adm/messages on diag226.central.sun.com (id=80fee746):

INFORMATION:
The SCSI driver is posting warnings.

RECOMMENDED-ACTION:
1. Check for further device specific errors in log files
 2. Run the appropriate device test to find faulty FRU.

... (continued)
```

```
... (continuation)
DETAILS:
Sep 13 13:04:57 WWN:    Received 12 'SCSI transport failed' message(s)  in 14
mins [threshold is 10 in 4hours]  Last-Message: 'diag226.Central.Sun.COM  SCSI
transport failed: reason 'timeout': retrying command '
----------------------------------------------------------------------
Site     : FSDE LAB Broomfield CO
Source   : diag226.central.sun.com
Severity : Warning
Category : MESSAGE   DeviceId : message:diag226.central.sun.com
EventType: LogEvent.driver.MPXIO_offline
EventCode: 9.20.313
EventTime: 2002/09/13 13:06:27

DESCRIPTION: Found 4 'driver.MPXIO_offline' warnings(s) in logfile:
/var/adm/messages on diag226.central.sun.com (id=80fee746):

INFORMATION:
The MPxIO multipathing software has noted the path to a storage device has gone
offline.

RECOMMENDED-ACTION:
1. Check the Topology View to see what device(s) are affected.
 2. Check all cables and connections.
 3. Check for other alerts that may indicate an underlying problem. (ex. Switch
Ports offline)
 4. The outputs of 'cfgadm -al' and 'luxadm -e port' may uncover other fabric
problems.

... (continued)
```

```
... (continuation)
DETAILS:
Sep 13 13:05:36 WWN:50020f23000003d5    diag226.Central.Sun.COM mpxio: [ID
779286 kern.info] /scsi_vhci/ssd@g60020f20000003d53d34940b0004e6b6 (ssd0)
multipath status: degraded, path /pci@1f,2000/SUNW,qlc@1/fp@0,0 (fp4) to target
address: 50020f23000003d5,3 is offline
Sep 13 13:05:36 WWN:50020f23000003d5    diag226.Central.Sun.COM mpxio: [ID
779286 kern.info] /scsi_vhci/ssd@g60020f20000003d53d3493d80003c090 (ssd1)
multipath status: degraded, path /pci@1f,2000/SUNW,qlc@1/fp@0,0 (fp4) to target
address: 50020f23000003d5,2 is offline
Sep 13 13:05:36 WWN:50020f23000003d5    diag226.Central.Sun.COM mpxio: [ID
779286 kern.info] /scsi_vhci/ssd@g60020f20000003d53d3493930006a222 (ssd2)
multipath status: degraded, path /pci@1f,2000/SUNW,qlc@1/fp@0,0 (fp4) to target
address: 50020f23000003d5,1 is offline
Sep 13 13:05:36 WWN:50020f23000003d5    diag226.Central.Sun.COM mpxio: [ID
779286 kern.info] /scsi_vhci/ssd@g60020f20000003d53d349365000c1691 (ssd3)
multipath status: degraded, path /pci@1f,2000/SUNW,qlc@1/fp@0,0 (fp4) to target
address: 50020f23000003d5,0 is offline

------------------------------------------------------------------------
Site     : FSDE LAB Broomfield CO
Source   : diag226.central.sun.com
Severity : Warning (Actionable)
Category : HOST   DeviceId : host:diag226.central.sun.com
EventType: AlarmEvent.M.hba
EventCode: 7.5.20
EventTime: 2002/09/13 13:06:49

DESCRIPTION: status of hba /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl on
diag226.central.sun.com changed from CONNECTED to NOT CONNECTED

INFORMATION:
monitors changes in the output of luxadm -e port

 Found path to 20 HBA ports

 /devices/sbus@2,0/SUNW,socal@d,10000:0   NOT CONNECTED
 .....

RECOMMENDED-ACTION:
use 'luxadm -e port' to confirm hba status, verify if all paths are working

... (continued)
```

```
... (continuation)
------------------------------------------------------------------------

Site     : FSDE LAB Broomfield CO
Source   : diag226.central.sun.com
Severity : Error (Actionable)
Category : SWITCH2   DeviceId : switch2:100000c0dd00bfda
EventType: StateChangeEvent.M.port.0
EventCode: 12.26.35
EventTime: 2002/09/13 13:06:35

DESCRIPTION: 'port.0' in SWITCH2 sw-67-84 (ip=172.20.67.84) is now Not-
Available (state changed from 'online' to 'offline'):

INFORMATION:
A port on the switch2 has logged out of the fabric and gone offline

RECOMMENDED-ACTION:
1. Verify cables, GBICs and connections along Fibre Channel path
2. Check SAN Topology GUI to identify failing segment of the data path
3. Verify correct FC switch2 configuration
```

From the messages above, it is apparent that the following events occurred:

- The `u2ctlr` took control of LUN 0 on `t3b2`
- SSD and SCSI warnings were seen on host `diag226`
- Sun StorEdge Traffic Manager Software has degraded the paths to a device with WWN 50020f23000003d5
- One HBA went from CONNECTED to NOT CONNECTED
- Port 0 on a Sun StorEdge 2 Gb FC switch (ip=172.20.67.84) went offline

Determine the Extent of the Problem

Use the topology display of the Storage Automated Diagnostic Environment version 2.1 to see if any problems are shown. An example is shown in FIGURE 4-2.

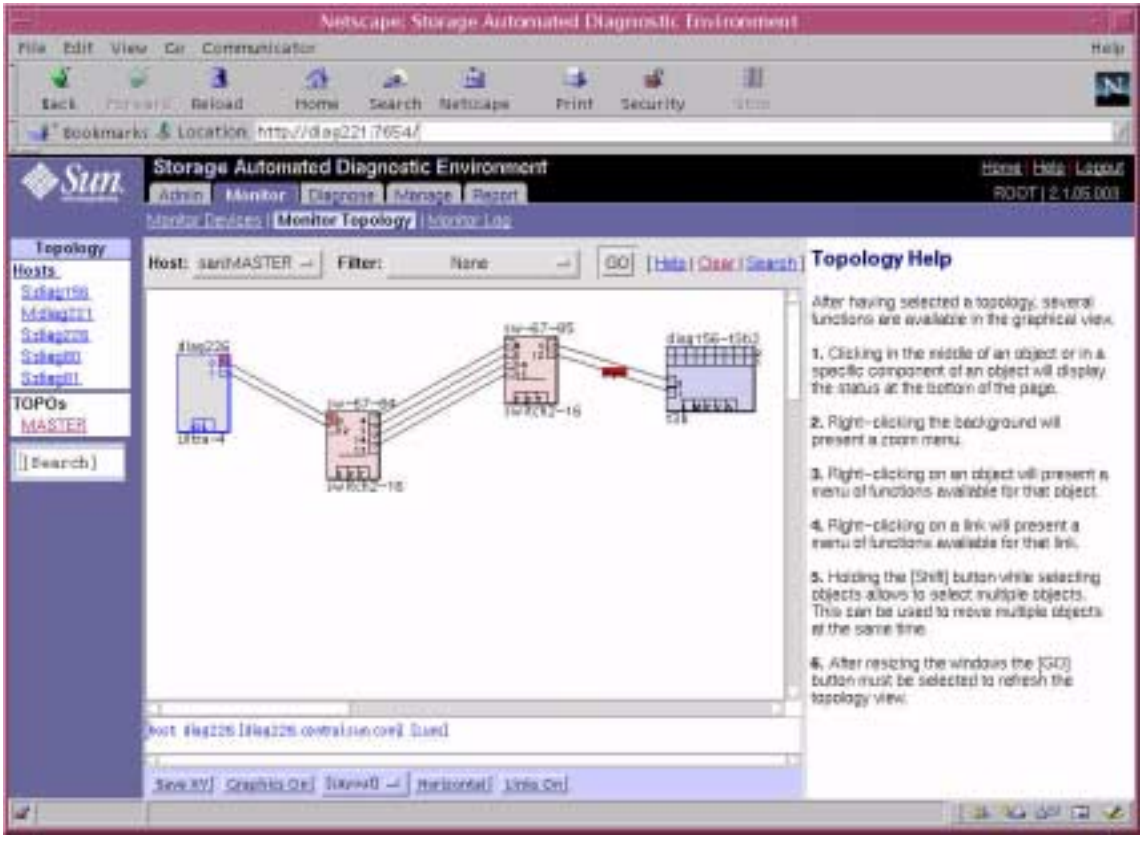

FIGURE 4-2 Troubleshooting Example View 2

From FIGURE 4-2 it can be seen that the error is only affecting a single path. This can be confirmed by using the `cfgadm` command.

1. **Issue the** `cfgadm -al` **command to display the state and condition of all hardware attachment points.**

```
# cfgadm -al
Ap_Id                  Type         Receptacle     Occupant       Condition
c0                     scsi-bus     connected      configured     unknown
c0::dsk/c0t0d0         disk         connected      configured     unknown
c0::dsk/c0t1d0         disk         connected      configured     unknown
c1                     scsi-bus     connected      configured     unknown
c1::dsk/c1t6d0         CD-ROM       connected      configured     unknown
c2                     fc           connected      unconfigured   unknown
c3                     fc           connected      unconfigured   unknown
c4                     fc-private   connected      unconfigured   unknown
c5                     fc           connected      unconfigured   unknown
c6                     fc-fabric    connected      configured     unknown
c6::50020f23000003d5   disk         connected      configured     unusable
c7                     fc-fabric    connected      configured     unknown
c7::50020f23000003c5   disk         connected      configured     unknown
c8                     fc           connected      unconfigured   unknown
```

The `cfgadm` output indicates that the c6::50020f230000003d5 device is unusable, but the c7::50020f230000003c5 device is ok.

2. **Issue the** `luxadm -e port` **command to query the status of the host ports using the expert mode (-e).**

```
# luxadm -e port

Found path to 2 HBA ports

/devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl                 NOT CONNECTED
/devices/pci@4,2000/SUNW,qlc@1/fp@0,0:devctl                 CONNECTED
```

The `luxadm -e port` output shows that one of the HBAs has been affected. This leads to the conclusion that we have a single path problem, most likely affecting the HBA-to-switch link between `/devices/pci@1f,2000/SUNW,qlc@1/fp@0,0` and port 0 of one switch.

Check the Array Status

1. **Telnet to the affected Sun StorEdgeg T3+ array (t3b2 in this example).**
2. **Issue the** `fru stat` **command to status the FRUs.**

```
t3b2:/:<2>fru stat
CTLR    STATUS   STATE       ROLE         PARTNER    TEMP
------  -------  ----------  ----------   -------    ----
u1ctr   ready    enabled     master       u2ctr      41.5
u2ctr   ready    enabled     alt master   u1ctr      39.0
```

3. **Issue the** `port list` **command to status the controllers.**

```
t3b2:/:<3>port list

port   targetid   addr_type   status   host   wwn
u1p1      4         hard       online   sun    50020f23000003d5
u2p1      5         hard       online   sun    50020f23000003c5
```

4. **Issue the** `port listmap` **command to determine the LUN mapping.**

```
t3b2:/:<4>port listmap

port   targetid   addr_type   lun   volume        owner   access
u1p1      4         hard        0    vol1          u2      primary
u1p1      4         hard        1    vol1          u2      primary
u1p1      4         hard        4    vol1          u2      primary
u1p1      4         hard        2    vol2          u2      failover
u1p1      4         hard        3    vol2          u2      failover
u1p1      4         hard        5    vol2          u2      failover
u2p1      5         hard        0    vol1          u2      failover
u2p1      5         hard        1    vol1          u2      failover
u2p1      5         hard        4    vol1          u2      failover
u2p1      5         hard        2    vol2          u2      primary
u2p1      5         hard        3    vol2          u2      primary
u2p1      5         hard        5    vol2          u2      primary
```

These command outputs indicate that both controllers are active, u2 owns all the LUNs, and WWN `50020f23000003d5` corresponds to the WWN of the Master Controller. This confirms that the problem is most likely not with the Sun StorEdge T3+ arrays. Thus, there is probably an upstream path problem.

Check the Switch Status

View the Monitor Device display of the Storage Automated Diagnostic Environment as shown in FIGURE 4-3.

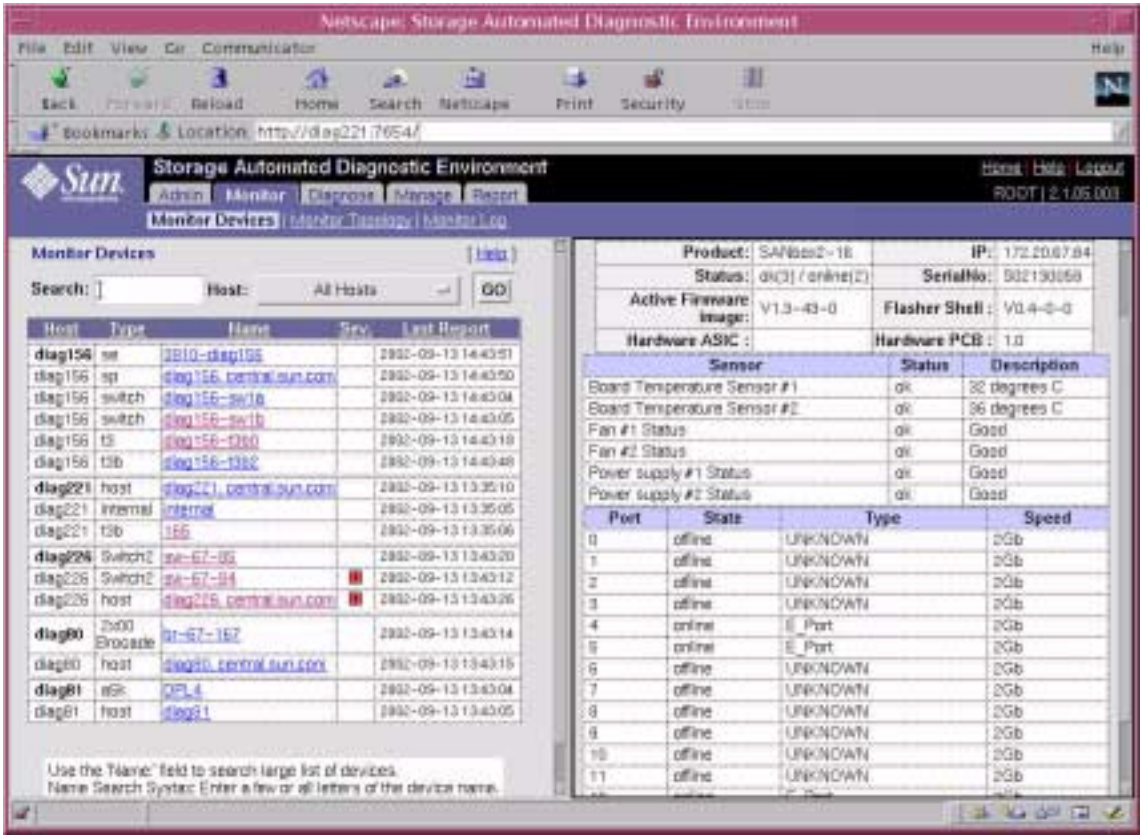

FIGURE 4-3 Troubleshooting Example View 3

FIGURE 4-3 indicates that the problem is that the switch Port 0 has gone offline. It also shows that the only other device that is affected is the host. This indicates a host-switch connection problem.

Test the FRUs

The following FRUs exist in the host-to-switch link:

- Switch or switch port
- Switch-side SFP
- Cable
- Host HBA

To isolate the cause, perform one of the following options with the Storage Automated Diagnostics Environment:

- The `switchtest` in combination with the `qlctest`
- The `linktest`

Storage Automated Diagnostics Environment `switchtest` and `qlctest` Tests

1. **Remove one end of the cable of the HBA-switch link**
2. **Insert loopback plug into the HBA**
3. **Run the** `qlctest`
   - If the test fails, replace HBA and re-run the `qlctest`
   - If the test passes, continue below
4. **Insert loopback plug into Switch SFP/Port**
5. **Run the** `switchtest`
   - If the test passes, most likely problem is cable
   - If the test fails, continue below
6. **Replace SFP and re-run the** `switchtest`
   - If the test passes, the most likely problem was SFP connector
   - If the test fails, the most likely problem is the switch port or the entire switch

Storage Automated Diagnostics Environment `linktest` Test Output

```
running on diag221.central.sun.com
 linktest started on FC interconnect: fp to switch2
 qlctest started on hba port
 "qlctest: called with options:
 dev=/devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl|
 run_connect=Yes| selftest=Disable| mbox=Disable| checksum=Disable|
 ilb_10=Disable| ilb=Disable| elb=Enable| iterations=100| xcnt=65536|
 selectpattern=critical| userpattern=0x7e7e7e7e"
 "qlctest: Started."
 "Program Version is 4.0.1"
 "Testing qlc0 device at
 /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl."
 "QLC Subsystem ID = 0x106"
 09/13/02 13:52:23 diag226.Central.Sun.COM MSGID 6028
 qlctest.port_online.FATAL : "ERROR: Didn't detect loop as being online
 and user selected external loopback option.
 Return code from checking path
 /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl was 131337
 "
qlctest failed
 error code: 256
 Remove FC Cable from hba:
 /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl
 Insert FC Loopback Cable into hba:
 /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl
 Continue Isolation ?
 qlctest started on hba port
 "qlctest: called with options:
 dev=/devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl|
 run_connect=Yes| selftest=Disable| mbox=Disable| checksum=Disable|
 ilb_10=Disable| ilb=Disable| elb=Enable| iterations=100| xcnt=65536|
 selectpattern=critical| userpattern=0x7e7e7e7e"
 "qlctest: Started."
 "Program Version is 4.0.1"
 "Testing qlc0 device at
 /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl."
 "QLC Subsystem ID = 0x106"
 "QLC Adapter Chip Revision = 1, Risc Revision = 4,
 Frame Buffer Revision = 1287, Riscrom Revision = 1,
 Driver Revision = 6.0-2-1.17 "

... (continued)
```

```
... (continuation)
"Running external loopback test"
 "Performing Loop Back Frame Test. Pattern: 0x7e7e7e7e"
 "Performing Loop Back Frame Test. Pattern: 0x7e7e7e7e"
 "Performing Loop Back Frame Test. Pattern: 0x1e1e1e1e"
 "Performing Loop Back Frame Test. Pattern: 0xf1f1f1f1"
 "Performing Loop Back Frame Test. Pattern: 0xb5b5b5b5"
 "Performing Loop Back Frame Test. Pattern: 0x4a4a4a4a"
 "Performing Loop Back Frame Test. Pattern: 0x78787878"
 "Performing Loop Back Frame Test. Pattern: 0xe7e7e7e7"
 "Performing Loop Back Frame Test. Pattern: 0xaa55aa55"
 "Performing Loop Back Frame Test. Pattern: 0x7f7f7f7f"
 "Performing Loop Back Frame Test. Pattern: 0x0f0f0f0f"
 "Performing Loop Back Frame Test. Pattern: 0x00ff00ff"
 "Performing Loop Back Frame Test. Pattern: 0x25252525"
 "qlctest: Stopped successfully."
 qlctest completed successfully
 error code: 0
 Remove FC Loopback Cable from hba:
 /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl
 Restore ORIGINAL FC Cable into hba:
 /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl
 ORIGINAL hba: /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0:devctl is
 Functional
 Remove FC Cable from switch2: 100000c0dd00bfda (sw-67-84), port: 0
 Insert FC Loopback Cable into switch2: 100000c0dd00bfda (sw-67-84),
 port: 0
 Continue Isolation ?
 switch2test started on switch2 100000c0dd00bfda port 0
 "Called with options: dev=0:172.20.67.84:| passwd=x|
 selectpattern=critical| userpattern=0x7e7e7e7e"
 "switch2test: Started."
 "Connected to 172.20.67.84"
 "Switch Model type is: SANbox2-16"
 "Power and Fans are okay"
 "Detected a loopback plug inserted onto this port"
 "Get original port counters for port 0"
 "Detected port type Not Initialized"
 09/13/02 13:58:59 diag226.Central.Sun.COM MSGID 6021
 switch2test.run_offline_loopback.ERROR 0:172.20.67.84:: "Loopback test
 failed to start"

... (continued)
```

```
... (continuation)
switch2test failed
 error code: 256
 Remove FC Loopback Cable from switch2: 100000c0dd00bfda
 (sw-67-84), port: 0
 Insert a NEW FC GBIC or SFP into switch2: 100000c0dd00bfda
 (sw-67-84), port: 0
 Insert FC Loopback Cable into switch2: 100000c0dd00bfda (sw-67-84),
 port: 0
 Continue Isolation ?
 switch2test started on switch2 100000c0dd00bfda port 0
 "Called with options: dev=0:172.20.67.84:| passwd=x|
 selectpattern=critical| userpattern=0x7e7e7e7e"
 "switch2test: Started."
 "Connected to 172.20.67.84"
 "Switch Model type is: SANbox2-16"
 "Power and Fans are okay"
"Detected a loopback plug inserted onto this port"
 "Get original port counters for port 0"
 "Detected port type Not Initialized"
 "External loopback test passed"
 "Get port counters after testing for port 0"
 "Compare of port counters passed"
 "Test Passed"
 switch2test completed successfully
 error code: 0
 Remove FC Loopback Cable from switch2: 100000c0dd00bfda
 (sw-67-84), port: 0
 Restore ORIGINAL FC Cable into switch2: 100000c0dd00bfda
 (sw-67-84), port: 0
 Suspect ORIGINAL FC GBIC or SFP in switch2: 100000c0dd00bfda
 (sw-67-84), port: 0

 Retest to verify FRU replacement.
 linktest completed on FC interconnect: hba to switch2
```

Verify the Fix

The Storage Automated Diagnostics Environment has identified the SFP as the most likely suspect. It suggests reconnecting the link and re-running the `linktest` to verify the results. You could also run the `switchtest` to stress the link with the number of test Fibre Channel frames.

1. **Issue the `cfgadm -al` command.**

```
# cfgadm -al
Ap_Id                  Type         Receptacle      Occupant       Condition
c0                     scsi-bus     connected       configured     unknown
c0::dsk/c0t0d0         disk         connected       configured     unknown
c0::dsk/c0t1d0         disk         connected       configured     unknown
c1                     scsi-bus     connected       configured     unknown
c1::dsk/c1t6d0         CD-ROM       connected       configured     unknown
c2                     fc           connected       unconfigured   unknown
c3                     fc           connected       unconfigured   unknown
c4                     fc-private   connected       unconfigured   unknown
c5                     fc           connected       unconfigured   unknown
c6                     fc-fabric    connected       configured     unknown
c6::50020f23000003d5   disk         connected       configured     unknown
c7                     fc-fabric    connected       configured     unknown
c7::50020f23000003c5   disk         connected       configured     unknown
c8                     fc           connected       unconfigured   unknown
```

The output of the `cfgadm -al` command indicates that the device is back in the Fabric. Note that both c6::50020f23000003d5 and c7::50020f23000003c5 are "connected" and "configured".

2. **Issue the** `luxadm display` **command to the affected Sun StorEdge T3+ array LUN.**

   Refer to the original Storage Automated Diagnostic Environment email alert for the LUN ID.

```
# luxadm display /dev/rdsk/c9t60020F20000003D53D349365000C1691d0s2
DEVICE PROPERTIES for disk: /dev/rdsk/c9t60020F20000003D53D349365000C1691d0s2
  Status(Port A):        O.K.
  Status(Port B):        O.K.
  Vendor:                SUN
  Product ID:            T300
  WWN(Node):             50020f20000003c5
  WWN(Port A):           50020f23000003d5
  WWN(Port B):           50020f23000003c5
  Revision:              0201
  Serial Num:            Unsupported
  Unformatted capacity:  51203.250 MBytes
  Write Cache:           Enabled
  Read Cache:            Enabled
     Minimum prefetch:   0x0
     Maximum prefetch:   0x0
  Device Type:           Disk device
  Path(s):
  /dev/rdsk/c9t60020F20000003D53D349365000C1691d0s2
  /devices/scsi_vhci/ssd@g60020f20000003d53d349365000c1691:c,raw
  Controller             /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0
     Device Address      50020f23000003d5,0
     Class               primary
     State               STANDBY
  Controller             /devices/pci@4,2000/SUNW,qlc@1/fp@0,0
     Device Address      50020f23000003c5,0
     Class               secondary
     State               ONLINE
```

The `luxadm display` command output indicates that both paths to the Sun StorEdge T3+ array LUN are seen again. However, the array is still using the secondary paths for the I/O data stream (secondary path is ONLINE; primary path is STANDBY).

3. Issue the `luxadm failover primary` **command to the affected LUN.**

```
# luxadm failover primary  /dev/rdsk/c9t60020F20000003D53D349365000C1691d0s2
# luxadm display  /dev/rdsk/c9t60020F20000003D53D349365000C1691d0s2
DEVICE PROPERTIES for disk: /dev/rdsk/c9t60020F20000003D53D349365000C1691d0s2
  Status(Port A):        O.K.
  Status(Port B):        O.K.
  Vendor:                SUN
  Product ID:            T300
  WWN(Node):             50020f20000003d5
  WWN(Port A):           50020f23000003d5
  WWN(Port B):           50020f23000003c5
  Revision:              0201
  Serial Num:            Unsupported
  Unformatted capacity:  51203.250 MBytes
  Write Cache:           Enabled
  Read Cache:            Enabled
     Minimum prefetch:   0x0
     Maximum prefetch:   0x0
  Device Type:           Disk device
  Path(s):
  /dev/rdsk/c9t60020F20000003D53D349365000C1691d0s2
  /devices/scsi_vhci/ssd@g60020f20000003d53d349365000c1691:c,raw
  Controller             /devices/pci@1f,2000/SUNW,qlc@1/fp@0,0
     Device Address      50020f23000003d5,0
     Class               primary
     State               ONLINE
  Controller             /devices/pci@4,2000/SUNW,qlc@1/fp@0,0
     Device Address      50020f23000003c5,0
     Class               secondary
     State               STANDBY
```

The `luxadm failover primary` command causes the I/O data stream to resume to the primary path and the system returns to full operational mode.

APPENDIX **A**

Brocade Communications Systems Upgrades and Installations

This appendix contains topics that describe how to install a new SAN system using Brocade Communications Systems, Inc. Silkworm™ switch.

Installing a New SAN

Required Software Components

The following software components might be required for your particular SAN system. Refer to the documentation for each individual product to insure proper installation.

Software Components

- Sun StorEdge Traffic Manager

This is available as a patch which can be installed on Solaris 8 release 02/02 (Update 7) or later. It should be installed with the latest revision of Sun StorEdge Network Foundation Software.

- Sun StorEdge Network Foundation Software

This software is included with the Solaris upgrades for the FC switch product. It includes the drivers to support switches, management tools and storage devices.

- VERITAS Volume Manager

VERITAS Volume Manager is a separately installed software product that provides host-based storage management, such a disk labeling, mirroring, striping, and RAID 5.

- Brocade Webtools

Brocade switches support Java-enabled Webtools. Brocade Webtools is a GUI that provides management capabilities, such as maintaining zones, setting port attributes, and setting up cascaded switches.

- `cfgadm` plug-in for Fabric on-demand node creation

This component is delivered with the Solaris upgrades for the FC switch product. It is used to discover SAN-attached devices, in addition to creating and deleting nodes for these devices. These features are implemented through the `cfgadm` framework. See the `cfgadm_fp`(1M) man page for additional information.

- `luxadm` and `libg_fc/liba5k`

These components are enhanced to support the SAN-attached devices. They provide persistent switch-attached device configuration across reboots, probe SAN-attached devices that are available on a host, and provide information on various devices.

- Storage Automated Diagnostic Environment version 2.1

The Storage Automated Diagnostic Environment version 2.1 is a separately installed software product. It is a lightweight, remote, monitoring agent designed to track storage product reliability, availability and serviceability. The Storage Automated Diagnostic Environment version 2.1 also provides revision and patch level checking, log file monitoring, and diagnostic testing.

Downloading Patches and Packages

You can download the required software components from the following web sites listed in TABLE A-1.

TABLE A-1 Software Download Sites

Software	Downloading Web Site
packages and documentation	`http://www.sun.com/storage/san/`
patches	`http://sunsolve/sun.com`

▼ To Verify Successful Patch Downloads

1. **Use one of the following three utilities to obtain the `checksum` value of the patch you downloaded:**

CODE EXAMPLE A-1 Solaris `/usr/bin/sum` Utility

```
% /usr/bin/sum 108982-09.zip
2010 880 108982-09.zip
% /usr/bin/sum -r 108982-09.zip
63160    880 108982-09.zip
```

Note – The sum utility can also be located in the `/usr/ucb` directory.

CODE EXAMPLE A-2 Example of GNU md5sum Utility

```
% md5sum 108982-09.zip
1297fcd385f618c726489c6c7f57c900 108982-09.zip
```

Download the GNU md5sum utility from http://www.sunfreeware.com or from http://sunsolve.Sun.com/md5/md5.tar.z.

2. **Compare the** checksum **value that is displayed to the patch** checksum **value given at the** checksum **File link**:

   http://sunsolve.Sun.com

   If the values are identical, the patches were properly downloaded.

Note – The checksum file at http://sunsolve.Sun.com is approximately 614 Kbytes.

Installing the Software

TABLE A-2 lists the required software packages and patches installation sequence.

TABLE A-2 Software Installation Sequence

Order No.	Patch or Package	Software
1	Solaris 8	Solaris 8 02/02 (Update 7) or later
2	8_Recommended	Solaris 8 Recommended and Security patch cluster
3	SUNWsan	Sun StorEdge SAN Foundation Kit
4	SUNWcfpl	`cfgadm` plug-in 32-bit package
5	SUNWcfplx	`cfgadm` plug-in 64-bit package
6	111412-07	Sun StorEdge Traffic Manager
7	111095-07	`fcp/fp/fctl/usoc` drivers patch
8	111096-03	`fcip` driver patch
9	111097-07	`qlc` driver patch
10	111413-07	`luxadm/liba5k` and `libg_fc` patch
11	111846-03	`cfgadm` plug-in library patch
12	111847-04	SANWsan patch; SAN Foundation Kit patch
13	SUNWstade	Storage Automated Diagnostic Environment version 2.1 package

▼ To Install the Software

Note – These instructions are to install the Sun StorEdge Network Foundation Software 6 patch.

1. **Install Solaris 8 02/02 (Update 7) or later.**
2. **Install the latest Solaris 8 Recommended Security patch cluster.**

   See the README file for patch installation instructions and notes.
3. **Install the `SUNWsan` package.**

```
# pkgadd -d SUNWsan
```

4. **Install cfgadm plug-in library packages `SUNWcfpl` and `SUNWcfplx`.**

```
# pkgadd -d pkg-location SUNWcfpl
# pkgadd -d pkg-location SUNWcfplx
```

5. **Install the SAN Foundation Kit `SUNWsan` patch 111847-04, or higher, if required.**
6. **InstallSun StorEdge Traffic Manager patch 111412-07.**

```
# patchadd 111412-07
```

7. **Install `fctl/fp/fcp/usoc` driver patch 111095-xx.**

```
# patchadd 111095-07
```

8. **Install `fcip` driver patch.**

```
# patchadd 111096-03
```

9. **Install `qlc` driver patch.**

```
# patchadd 111097-07
```

10. **Install** `luxadm`, `liba5k`, and `lib_fc` **patch.**

```
# patchadd 111413-07
```

11. **Install** `cfgadm` **plug-in library patch.**

```
# patchadd 111846-03
```

12. **Update MANPATH to access** `cfgadm_fp`**(1M) man page.**

    For `sh` or `ksh`, type:

```
# MANPATH=/opt/SUNWsan/man:$MANPATH;export MANPATH
```

    For `csh`, type:

```
% setenv MANPATH /opt/SUNWsan/man:$MANPATH
```

13. **Install the Storage Automated Diagnostic Environment package** SUNWstade**.**

```
# pkgadd -d SUNWstade
```

14. **Install the Storage Automated Diagnostic Environment Brocade patch.**

```
# patchadd 112580-01
```

15. **Reboot the system.**

    For each of the storage devices, upgrade the software, firmware, or configuration.

    After the above steps, you can leverage additional features provided by Brocade Silkworm 2400 (8-port), 2800 (16-port), 3800 (16-port), and 12000 (32/64/128 port) for:

- Sun StorEdge Traffic Manager functionality
- additional fabric zones
- additional initiators per zone
- host fabric connectivity
- cascaded switch configurations
- `Quickloop` zones

Installing Firmware on Brocade Communications Systems Silkworm Switches

▼ To Download Firmware from the Brocade Web Site

You can locate and download Brocade firmware on a special website provided by Brocade. The URL for the Brocade site is site is `http://www.brocade.com`.

1. **Click the Partners link.**
2. **Click the Brocade Partner Network link.**
3. **Enter the Sun-internal login.**

   Enter the Sun-internal password.
4. **Under Services and Support, click Firmware.**
5. **Click the appropriate firmware version (see** TABLE B-3**).**
6. **Download the appropriate firmware version (see** TABLE B-3**—UNIX version) and the Readme.txt file to your local host.**

▼ To Install Firmware from UNIX (Solaris)

Follow these steps:

1. **From the Brocade web site, retrieve the switch firmware (for example, v2.6.x).**
2. **Download the firmware into your root (/) directory.**

Note – Since UNIX contains `rshd` and `cat` daemons, you do not need to retrieve the `rsh.ZIP` file.

---

3. **Log into the UNIX system as root and edit the following files:**

   a. **Type the IP address and the switch name into the** `/etc/hosts` **file.**

```
# vi /etc/hosts <IP_address><switch_name>
```

   The output is displayed, as in CODE EXAMPLE 4-1.

   CODE EXAMPLE 4-1 `/etc/hosts` file

```
# cat /etc/hosts
#
# Internet host table
#
10.4.50.208 iopswitch03.ebay
10.4.50.212 iopswitch08.ebay
```

   b. **Type the switch name into the** `/.rhosts` **file.**

```
# /.rhosts <switch_name>
```

Note – If you are logged in as a normal user and not as “root”, the `/.rhosts` file is referred to the user’s home directory .rhosts file. For example, if a normal user named `nancy` is logged in, she would edit the file `/home/nancy/.rhosts`.

---

4. **If you are using a UNIX system with Solaris installed, check the** `/etc/nsswitch.conf` **file to make sure the [hosts] lookup table is appropriately set.**

▼ To Install Firmware using FTP

As an alternative to modifying the `/.rhosts` file, you can use the `ftp` method, which is explained below.

Note – You can invoke the command without any parameters, in which case you are prompted for input, including the choice of whether to use `ftp` or `rshd`.

If you invoke the command with three parameters, `rshd` is used. If you invoke the command with four parameters, `ftp` is used.

---

1. **From a UNIX system, telnet into the switch and download the firmware with the** `firmwareDownload` **command.**

```
firmwareDownload

<Your UNIX IP address>
<Your UNIX Login user's name>
</v2.4.1f>
<FTP_password>
```

2. **To check the syntax, type:**

```
help firmwareDownload
```

Note – With version 2.1 and higher, commands are not case-sensitive.

---

3. **Check the syntax by typing** `firmwaredownload` **and following the screen prompts. See** CODE EXAMPLE A-3 **for an FTP example.**

CODE EXAMPLE A-3 FTP Example

```
oem240:admin>firmwareDownload

Server Name or IP Address [host]: 10.32.99.29
User Name [user]: root
File Name [/usr/switch/firmware]: /var/tmp/v2.6.x
Protocol (RSHD or FTP) [rshd]: ftp
Password:
84776+3832+130980, csum 2ef6
loading to ram ......................
writing flash 0 ......................
writing flash 1 ......................
download complete
oem240:admin>fastboot
```

4. **To download a firmware file from the host “citadel”, using the account “jdoe”, and the file “/home/jdoe/firmware”, type the following:**

CODE EXAMPLE 4-2 RSHD Example

```
sw5:admin> firmwareDownload “citadel”, “jdoe”,
“/home/jdoe/firmware”
```

5. **Reboot the switch. Type:**

```
fastboot
```

Note – It takes less than one minute for a `fastboot` that bypasses POST.

---

6. **Log back into the switch to verify the correct version, as shown in** CODE EXAMPLE A-4**.**

CODE EXAMPLE A-4 Verification of Firmware Version

```
oem240:admin> version

Kernel: 5.3.1
Fabric OS: v2.6.x
Made on: Wed Sep 19 13:05:15 PDT 2001
Flash: Wed Sep 19 13:07:16 PDT 2001
BootProm: Thu Jun 17 15:20:39 PDT 1999
```

Upgrading the SAN

This section contains topics about how to upgrade your SAN system to the latest version.

Downloading Patches and Packages

Download all patches and packages to the host prior to beginning the upgrade procedure.

Verifying Upgrade Compliance

Before starting the upgrade, insure that your system is stable and that all required software and patches are accessible. Refer to TABLE B-1 on page 84 for the supportability matrix.

▼ To Upgrade the Software

If you have multiple hosts on your SAN, you can upgrade them simultaneously or one at a time without affecting your SAN environment. Hosts that are not being upgraded will not be affected during the upgrade. You can upgrade the host software one host at a time or several hosts in parallel.

Caution – Your system will be unavailable to users and the SAN during the upgrade procedure.

The order in which the SAN components should be upgraded is as follows:

1. **Familiarize yourself with the required software components, versions and patches. Refer to Appendix B for the supportability matrix.**
2. **Back up all data.**

Volume Management

If you are using VERITAS Volume Manager, refer to the *VERITAS Volume Manager Installation Guide* for special instructions about upgrading your system. There are several steps that need to be followed prior to your system upgrade.

1. **Upgrade the Solaris Operating System.**

   To take advantage of full Fabric support for your SAN, you must upgrade to at least Solaris 8 02/02 (Update 7). For information on how to upgrade your systems, refer to *Solaris 8 Installation Supplement*, part number 806-5182, available at http://docs.sun.com.

Sun StorEdge SAN 4.0 Release

The packages on your system that were previously used should be available. To verify their availability, use the `pkginfo` command.

pkg_name is the name of the package on which you need to obtain the information.

```
# pkginfo -l pkg_name
```

1. **Upgrade your SUNWsan package to Sun StorEdge SAN 4.0 Release.**

   Before you start, check your system to see if it has been installed, and if it is already up to date. Use the `pkginfo` command to see if it has been installed.

```
# pkginfo SUNWsan
```

The system returns:

```
system    SUNWsan     SAN Foundation Kit
```

The output indicates that the SUNWsan package has already been installed. If your system has the SUNWsan package installed, use the `showrev` command to see if it is up-to-date.

```
# showrev -p | grep 111847
```

The system returns:

```
Patch: 111847-01 Obsoletes:  Requires:  Incompatibles:  Packages:
SUNWsan
```

The `showrev` results line indicates that the SUNWsan package is already up to date. If patch 111847-01 has not been installed, install it using the `patchadd` command.

```
# patchadd patch-location/111847-04
```

2. **If your system does not have the SUNWsan package installed, install the new SUNWsan package from your Sun StorEdge SAN 4.0 Release software.**

```
# pkgadd -d pkg-location SUNWsan
```

`cfgadm` Plug-in Library Packages

1. **Install `cfgadm` plug-in library packages `SUNWcfpl` and `SUNWcfplx`.**

```
# pkgadd -d pkg-location SUNWcfpl
# pkgadd -d pkg-location SUNWcfplx pkgadd -d pkg-location SUNWcfplx
```

Software Installation

For the Brocade Silkworm switch, the GUI capability is available through the switch firmware and requires a Java-enabled browser on the host. Refer to “Related Brocade Documentation” in Appendix B for instructions on how to access Brocade documentation.

Note – Once the packages have successfully installed, follow steps 6 through 13 in “To Install the Software” on page 70.

▼ To Upgrade the Storage Automated Diagnostic Environment Version 2.1 Package

For all upgrades, you must first install the most recent Sun StorEdge Network Foundation Software patches. Refer to “To Install the Software” on page 70 for installation instructions before installing the `SUNWstade` package and the Brocade Communications Systems patch.

For detailed installation and usage instructions for the Storage Automated Diagnostic Environment version 2.1, refer to the *Storage Automated Diagnostic Environment User’s Guide, Version 2.1*.

1. **If your SAN Management host is not running the current version, remove the existing package and install the latest version. Remove the old package with the** `pkgrm` **command.**

```
# pkgrm SUNWstade
```

Removing the initial installation does not erase the previous configuration information. The cache and topology information of each device is also retained to maintain a consistent, historical view of the Sun StorEdge devices.

2. **Reinstall the package using the following command:**

```
# pkgadd -d .
```

3. **Run** `ras_install` **to enable the** `cron` **and to configure the agent as master or slave (a master agent acts as a collection point for events originating in other slave agents).**

4. **Upgrade the master agent first.**

5. **Check your SAN Management host to verify the version of the Storage Automated Diagnostic Environment version 2.1 installed.**

```
# pkginfo -l SUNWstade
```

APPENDIX **B**

Brocade Communications Systems Switch Troubleshooting

This appendix provides basic guidelines that you can use to isolate problems found in a configuration using Brocade Communications Systems, Inc. Silkworm switches. It assumes you have been trained on all the components, such as storage and switches, that make up the configuration.

The scope of this appendix is to highlight the differences of troubleshooting with a Brocade Silkworm configuration to that of a configuration that contains the current Sun StorEdge Network Fibre Channel family of switches. Current support is limited to diagnosing failures down to the FRU level. In Sun's support model, the entire Silkworm switch is considered a FRU. Many of Brocade's internal diagnostics and messages, while useful for depot or Root Cause Analysis situations, are not ultimately relevant to a Sun Service Engineer trying to isolate to a FRU.

This appendix contains the following topics:

Related Documentation

Brocade Communications Systems Documentation

The following Brocade manuals are shipped on a CD with their related products.

- *Brocade Silkworm® 2400/2800 Hardware Reference Manual*
- *Brocade Silkworm® 3800 Hardware Reference*
- *Brocade Silkworm® 12000 Hardware Reference Manual*
- *Brocade Fabric OS™ Reference*
- *Brocade Fabric OS™ Release Notes*
- *Brocade Fabric OS™* Procedures Guide
- *Brocade WebTools User's Guide*
- *Brocade Zoning User's Guide*
- *Brocade QuickLoop User's Guide*

Sun Documentation

The Sun StorEdge switch documents are referenced for overall configuration guidelines.

- *Sun StorEdge SAN 4.0 Release Installation Guide*
- *Sun StorEdge SAN 4.0 Release Configuration Guide*
- *Sun StorEdge SAN 4.0 Release Notes*

Supported Configurations

The Brocade Communications Systems Silkworm switch configurations and the Sun StorEdge switch configurations follow the same rules for maximum number of initiators, supported number of arrays per zone, and other hardware-specific information.

Refer to Chapter 2, “Configurations” of this guide for supported hardware configurations. Brocade Communications Systems Silkworm switch configurations and Sun switch configurations have the minimum software package requirements shown in TABLE B-1.

TABLE B-1 SAN Supportability Matrix with Solaris 8 02/02 (Update 7) or Later

Server	Bus Architecture	HBAs	Physical Connection	Required Sun Software Packages and SAN 4.0/Brocade Patches
Sun Enterprise 3x00, 6x00, and 10000	SBus	X6757A[1]	1-Gbyte FC	**Sun StorEdge Network Foundation Software** 6.0 or later with the following unbundled packages: • SUNWsan • SUNWcfpl • SUNWcfplx found at the Download Center: http://www.sun.com/storage/san/ → Sun StorEdge SAN 4.0 release Software/Firmware Upgrades and Documentation → login → license agreement: • → Solaris 8 SUNWcfpl/x and SUNWsan packages, or • → Solaris 9 SUNWcfpl/x and SUNWsan packages **Sun StorEdge Traffic Manager Software** as part of Sun StorEdge Network Foundation Software **Storage Automated Diagnostic Environment** 2.1 To find all required **patches**: http://sunsolve.Sun.COM/ → Product Patches → PatchPro: • → Network Storage Products, or • → Solaris Recommended Patch Cluster Describe your system, then click Generate Patch List.
	PCI	X6799A[2] X6727A[3]	1-Gbyte FC	
	PCI	X6767A[4] X6768A[5]	2-Gbyte FC	
Sun Fire 3800	cPCI	X6748A[6]	1-Gbyte FC	
Sun Fire 4800—6800	cPCI	X6748A	1-Gbyte FC	
	PCI	X6799A X6727A	1-Gbyte FC	
		X6767A X6768A	2-Gbyte FC	
Sun Fire 15k, 12k, E4x0, E2x0, SF480, SF280R, V880, SB1000, SB2000, Netra 1125 and 140X	PCI	X6799A X6727A	1-Gbyte FC	
		X6767A X6768A	2-Gbyte FC	

1 Sun StorEdge SBus Dual Fibre Channel Host Bus Adapter (Ivory)

2 Sun StorEdge PCI Single Fibre Channel Network Adapter (Amber)

3 Sun StorEdge PCI Dual Fibre Channel Network Adapter+ (Crystal+)

4 Sun StorEdge 2G FC PCI Single Channel Network Adapter (Amber 2)

5 Sun StorEdge 2G FC PCI Dual Channel Network Adapter (Crystal+ 2)

6 Sun StorEdge cPCI Dual Fibre Channel Network Adapter (Diamond)

TABLE B-2 Disk Array Supportability Matrix with Solaris 8 02/02 (Update 7) or Later

Disk Arrays	Disk Firmware	Dynamic addition of target to a zone. Add First/Additional
T3A WG/ES	1.18	Yes/Yes
T3B WG/ES	2.1	Yes/Yes

TABLE B-3 Fibre Channel Switch Supportability Matrix with Solaris 8 02/02 (Update 7) or Later

FC Switches	Firmware	Switch Software	Licenses
Brocade Silkworm 2400[1]	v2.6.0c	Fabric OS v2.6.0c	Zoning Quickloop Webtools
Brocade Silkworm 2800	v2.6.0c	Fabric OS v2.6.0c	Zoning Quickloop Webtools
Brocade Silkworm 3800[2]	v3.0.2c	Fabric OS v3.0.2c	Zoning Quickloop Webtools
Brocade Silkworm 12000	v4.0.0a	Fabric OS v4.0.0a	Zoning Quickloop Webtools

1 Brocade Silkworm 2400, 2800, and 3800 FC Switches may be intermixed. Interoperability with other vendor switches is not supported at this time.

2 Brocade Silkworm 3800 FC Switches are supported in the 1 and 2 Gbyte mode by auto-sensing.

TABLE B-4 Application Supportability Matrix with Solaris 8 02/02 (Update 7) or Later

Name	Version	Patches
VERITAS Volume Manager	3.2 GA	To find all VERITAS Volume Manager patches: http://sunsolve.Sun.COM/ → Product Patches → PatchPro → Network Storage Products Then select: • OS Release • Platform • Software | Veritas Volume Manager Click Generate Patch List.

1. **Access the SunSolve web site.**

   `http://sunsolve.Sun.COM/`

   The SUNSOLVE ONLINE menu is displayed.

2. **Under SunSolve Contents, click Product Patches.**

3. **Under Patch Analysis Tools, click PatchPro.**

4. **Click Network Storage Product.**

   The PATCHPRO Interactive menu is displayed.

5. **Select all the appropriate features of your system in the following areas of the menu:**

   - OS Release
   - Platform
   - Disk Array
   - Tape Libraries
   - Disk Drives
   - Tape Drives
   - Switches and HBAs
   - SAN Products | Brocade SAN Release
   - Software

6. **Click Generate Patch List.**

QuickLoop

QuickLoop is a feature of the Brocade Silkworm switches that allows hosts with host bus adapters (HBAs) that are not fully Fabric-aware to communicate with other devices attached to the switch. In addition, QuickLoop allows switches to replace hubs in a private loop environment. QuickLoop is a separately licensed product.

Note – For the Brocade Sun StorEdge SAN 4.0 Release phase, Sun StorEdge T3 and T3+ arrays do not need Quickloop, nor do host bus adapters. Sun StorEdge T3 and T3+ arrays will auto-configure as L_Ports and HBAs will auto-configure as F_Ports if the switch is in the fabric mode.

Current Issues with the Storage Automated Diagnostic Environment Version 2.1 and Brocade Switches

The minimum Brocade Silkworm switch firmware to use with Storage Automated Diagnostic Environment version 2.1 is v2.6.0c.

Diagnostic Tools

The tools available for troubleshooting differ from the original release of the Sun StorEdge SAN 4.0 Release. Since then, Sun StorEdge StorTools 4.x and Network Storage Agent 2.1 have had their functionality combined into a single diagnostic package called the Storage Automated Diagnostic Environment version 2.1. Brocade Silkworm switches also have their own GUI called WebTools.

Storage Automated Diagnostic Environment Version 2.1 and Brocade Switches

With the Storage Automated Diagnostic Environment version 2.1, Brocade switches are now supported under the same diagnostic framework as the rest of the Sun SAN product family. This support includes monitoring for error and alert conditions, revision checking, graphic topology display, and fault isolation diagnostics.

brocadetest(1M)

The Storage Automated Diagnostic Environment version 2.1 has incorporated the launching of various Brocade Silkworm switch diagnostic tests under one Storage Automated Diagnostic Environment version 2.1 test, brocadetest(1M). This test is launched within the Storage Automated Diagnostic Environment version 2.1 framework and determines the correct Brocade specific test to run, depending on port type.

Example CLI brocadetest(1M)

```
# /opt/SUNWstade/Diags/bin/brocadetest -v -o "dev=5:172.20.67.167|passwd=
password|iterations=1000"

Called with options: dev=5:172.20.67.167|passwd=xxxxxxx|iterations=1000
Connect to 172.20.67.167
Opened 172.20.67.167
Logged into 172.20.67.167
Clear port errors: send diagClearError 5
Port errors cleared
port is in loopback mode
Running command: CrossPortTest 1000,1
Note: You should only have a loopback on port 5.
If you have more than one loopback installed,
this test may report false errors.
Test Passed
Loopback took 34 seconds to run.
Fan #1 is OK, speed is 8640 RPM
Fan #2 is OK, speed is 8760 RPM
Fan #3 is OK, speed is 8910 RPM
Fan #4 is OK, speed is 8820 RPM
Fan #5 is OK, speed is 8820 RPM
Fan #6 is OK, speed is 8820 RPM

*********************************
Detected possible bad Power supply
Power Supply #1 is absent
*********************************

Power Supply #2 is OK

Close 172.20.67.167
```

Other Diagnostic Tools

Brocade Silkworm switches also support a wide range of CLI tests that can be invoked while connected directly to the switch via a serial connection to the Silkworm 2400, by opening a telnet session, or by way of the front panel of the Silkworm 2800. Some of the tests pertinent for troubleshooting are listed below.

Storage Automated Diagnostic Environment's `brocadetest` invokes crossPortTest for testing loopback ports, spinFab for testing E-Port connections between switches, and loopPortTest for testing L Ports.

- `supportShow`
- `switchShow`
- `qlShow`
- `diagShow`
- `crossPortTest`
- `loopPortTest`
- `spinFab`
- `nsShow`

supportShow

`supportShow` runs nearly all commands and should be gathered when placing a service call or escalation. The Explorer Data Collection utility, `SUNWexplo`, gathers the `supportShow` output if the Brocade Silkworm switch is placed in the `/opt/SUNWexplo/etc/saninput.txt`

```
# Input file for extended data collection
# Format is SWITCH SWITCH-TYPE PASSWORD LOGIN
# Valid switch types are ancor and brocade
# LOGIN is required for brocade switches, the default is admin
172.20.67.167   brocade password admin
172.20.67.164   brocade password admin
```

CODE EXAMPLE B-1 supportShow Sample Output

```
telnet> Trying 172.20.67.167...
Connected to 172.20.67.167.
Escape character is '^]'.

Fabric OS (tm)  Release v2.6.0

login: admin
Password:

diag167:admin> supportshow

Kernel:     5.4
Fabric OS:  v2.6.0
Made on:    Tue Jan 15 15:10:28 PST 2002
Flash:      Tue Jan 15 15:12:04 PST 2002
BootProm:   Thu Jun 17 15:20:39 PDT 1999

 26   25   26   25   27  Centigrade
 78   77   78   77   80  Fahrenheit

Power Supply #1 is absent
```

CODE EXAMPLE B-2 `switchshow` Example Output

```
diag167:admin> switchshow
switchName:     diag167
switchType:     3.4
switchState:    Online
switchMode:     Native
switchRole:     Subordinate
switchDomain:   1
switchId:       fffc01
switchWwn:      10:00:00:60:69:20:1e:fc
switchBeacon:   OFF
Zoning:         ON (Main)
port  0: sw  Online      E-Port  10:00:00:60:69:10:71:25 "diag164"
(upstream)
port  1: --  No_Module
port  2: sw  Online        F-Port  21:01:00:e0:8b:23:61:f9
port  3: --  No_Module
port  4: --  No_Module
port  5: --  No_Module
port  6: sw  Online      E-Port  10:00:00:60:69:10:71:25 "diag164"
port  7: sw  Online        F-Port  21:00:00:e0:8b:03:61:f9
```

CODE EXAMPLE B-3 `qlshow` Example Output

```
diag167:admin> qlshow
Self:   10:00:00:60:69:20:1e:fc domain 1
State:  Master
Scope:  single
AL_PA bitmap:   30000000 00000000 00000000 00000000
Local AL_PAs
                (not available)
Local looplet states
    Member:     1 3 4
    Online:     - - -
    Looplet 1:  offline
    Looplet 3:  offline
    Looplet 4:  offline
```

CODE EXAMPLE B-4 `diagShow` Example Output

```
diag167:admin> diagshow
nTicks: 0, Max: 4473924

Diagnostics Status:  Tue Mar 19 14:04:30 2002

port#:   0   1   2   3   4   5   6   7
diags:  OK  OK  OK  OK  OK  OK  OK  OK
state:  UP  DN  UP  DN  DN  DN  UP  UP

  pt0:    4086880 frTx   64382622 frRx          0  LLI_errs.
  pt2:   38616950 frTx     300398 frRx         12  LLI_errs.
  pt6:   28852033 frTx  235091315 frRx        111  LLI_errs.
  pt7:  331090679 frTx    8930476 frRx         31  LLI_errs.

Central Memory OK
Total Diag Frames Tx: 8318
Total Diag Frames Rx: 8911
```

CODE EXAMPLE B-5 `crossPortTest` Example Output

```
diag167:admin> crossporttest 1000,1

Running Cross Port Test ....... passed.
```

The "1000" is the number of passes, the "1" denotes singlePortAlso mode, which allows the test to be run on a single port with a loopback connector plug inserted

CODE EXAMPLE B-6 loopPortTest Example Output

```
diag164:admin> loopporttest 100,2,0x7e7e7e7e,4
Configuring L-port 2 to Cable Loopback Port........done.
Will use pattern: 7e7e7e7e     7e7e7e7e     7e7e7e7e     7e7e7e7e

Running Loop Port Test ........ passed.

Configuring Loopback L-port(s) back to normal L-
port(s).........done.
```

Note – Notes on `loopPortTest`

- Syntax is `loopporttest` <*num_passes*>,<*port*>,<*user_pattern*>,<*pattern_width*>
- Only works on logged in L-Ports
- To test ports with Loopback connectors, use crossPortTest

CODE EXAMPLE B-7 spinFab Example Output

```
diag167:admin> spinfab 1,0,0

spinFab0 running...

spinFab0: Completed 1 megs, status:  passed.
        port 0 test status: 0x00000000 --  passed.
```

CODE EXAMPLE B-8 nsShow Example Output

```
diag164:admin> nsshow
{
 Type Pid    COS     PortName               NodeName
TTL(sec)
 NL   0312e4;
3;50:02:0f:23:00:00:3d:2c;50:02:0f:20:00:00:3d:2c; na
    FC4s: FCP [SUN     T300            0118]
    Fabric Port Name: 20:02:00:60:69:10:71:25
 NL   031ee8;
3;50:02:0f:23:00:00:3e:e5;50:02:0f:20:00:00:3e:e5; na
    FC4s: FCP [SUN     T300            0118]
    Fabric Port Name: 20:0e:00:60:69:10:71:25

The Local Name Server has 2 entries }
```

Note – nsShow is a listing of WWNs of the devices connected to the switch.

Sun StorEdge and Brocade Communications Systems Port Descriptions and Differences

TABLE B-5 Sun StorEdge and Brocade Communications Systems Port Descriptions

Port Nomenclature	Function
E_Port	Expansion or inter-switch port. A type of switch port that can be connected to an E_Port of another switch to, in effect, create a cascading interswitch link (ISL).
F_Port	Fabric port. A fabric port that is point-to-point only, not loop capable, and used to connect N_Ports to the switch.
FL_Port	Fabric loop port. A fabric port that is loop-capable and used to connect NL_Ports to the switch.
G_Port	Generic port. This port can automatically configure as either an E_Port or an F_Port. A port is defined as a G_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric.
GL_Port	Generic loop port. This port can automatically configure as either an E_Port, F_Port, or an FL_Port. A port is defined as a G_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric.

TABLE B-6 Differences Between Sun StorEdge and Brocade Port Communications Systems Port Nomenclature

Sun StorEdge Port	Brocade Port	Function
TL_Port	L_Port	Translated loop port / Loop port. This port enables private devices to communicate with fabric or public devices. In the Brocade switch, this address translation is automatic. In Sun StorEdge switches, the private device must be configured on a TL_Port.
N / A	U_Port	Universal Port. This port can operate as an E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric.

Accessing the Brocade Silkworm Switch

You can access Brocade Silkworm switches in a number of ways:

- Open a telnet session by way of a standard RJ-45 Ethernet port
- Access the front panel (Brocade Silkworm 2800 only)
- Use a serial connection (Brocade Silkworm 2400 only)
- Use the Brocade WebTools GUI

The serial connection available on the Brocade Silkworm 2400 switch is intended for initial IP address configuration only. Once the IP address is configured, the switch is to be accessed via telnet or the WebTools GUI. See the *Brocade Silkworm 2400 Hardware Reference Manual* for further serial port details.

The Front Panel access method on the 2800 switch can be used to run most commands that the switch supports. However, the screen is limited in size and messages are restricted to one or two lines of output. Once the IP addressed is configured through the front panel, further switch setup and diagnostics can be run via a telnet connection or the WebTools GUI. See the *Brocade Silkworm 2800 Hardware Reference Manual* for more details on the front panel operation.

WebTools GUI

The WebTools GUI (see FIGURE B-1) is a separately licensed feature. All Brocade switches that are sold by Sun Professional Services should come with the license pre-installed.

You can access the WebTools GUI with a standard web browser (Netscape or Microsoft Internet Explorer with a Java Plug-in) by pointing the browser to `http://<ip_address_of_switch>`.

Note – The Java Plug-in that is supplied with Solaris 8 02/02 (Update 7) is required.

- **To Verify the Web License, type the following:**

```
admin> licenseshow

SeRdQeQSbzTfSqSY:
Web license
Zoning license
Quickloop license
```

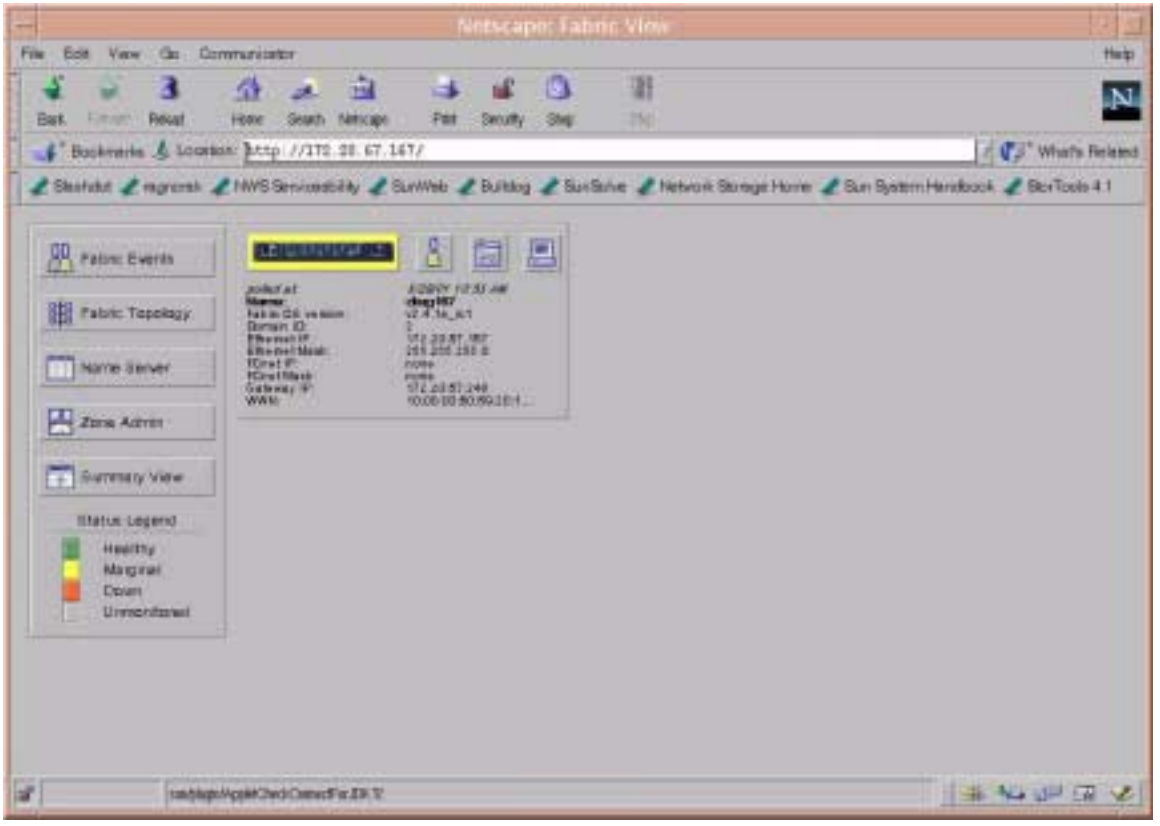

FIGURE B-1 Brocade Webtools GUI

See the *Brocade Web Tools User's Guide* for more information on WebTools usage.

Note – The rest of this guide will assume telnet usage.

Power On Self Test (POST)

When the switch is powered up, it runs a series of POST tests including:

- Dynamic RAM Test
- Port Register Test
- Central Memory Test
- CMI Connector Test
- CAM Test
- Port Loop Back Test

POST behaves differently, depending on boot method. A power-cycle (power-off and power-on) is considered a cold boot. All other boots from a powered-on state are considered warm boots.

POST execution per cold boot executes a longer version of the Memory Test. POST execution per warm boot executes a shorter version of Memory Test. Boot time with POST varies, depending on boot method.

As the POST test successfully performs each test, a message “Passed” is displayed via telnet on the front panel.

After the switch completes the POST, the port module returns to a steady state from the flashing state shown during tests.

If a yellow port module light is displayed or is slowly flashing, this indicates that the port is in a failed state.

Should the switch fail to complete POST, the green power LED will be set to blink. This indicates that the switch failed one of the initial stages of POST and that the CPU is not able to bring up the operating system. Should this occur, replace the switch.

Removing Power

Caution – Error messages are stored in RAM and are lost when power is removed from the switch. Capture and view the error log output and note any error messages before removing power.

Status and Activity Indicators

Front Panel LED Port Indicators

Front Panel LEDs	**Definition**
No light showing	No light or signal carrier (no module, no cable) for media interface LEDs
Steady yellow	Receiving light or signal, but not yet online
Slow[1] yellow	Disabled (result of diagnostics or portDisable command). Flashes every two seconds.
Fast[2] yellow	Error, fault with port. Flashes every 1/2 second.
Steady green	Online (connected with device)
Slow[1] green	Online, but segmented (loopback cable or incompatible switch) flashes every two seconds.
Fast[2] green	Internal loopback (diagnostics). Flashes every 1/2 second.
Flickering green	Online and frames flowing through port.

[1]Slow —2 seconds interval
[2]Fast — 1/2 second interval

See the *Brocade Silkworm Hardware Reference Manual* for further details.

Initialization Steps:

At power-on or reset, the following steps occur.

1. Preliminary POST diagnostics.
2. VxWorks operating system initialization.
3. Hardware initialization (resets, internal addresses assigned to ASICs, serial port initialized, front panel initialized).
4. Full POST test.
5. Universal Port Configuration.
6. Link initialization—receiver / transmitter negotiation to bring connected ports online.
7. Fabric analysis—the switch checks for ports connected to other Fabric elements. If there are other Fabric elements connected, it identifies the master switch.
8. Address assignment—once the master switch has been identified, port addresses may be assigned. Each switch tries to keep the same addresses that were previously used. These are stored in the switch's configuration flash PROM.
9. Routing table construction—after addresses are assigned, the unicast routing tables are constructed.
10. Enable normal port operation.

Note – If any of the steps listed above fails, replace the entire switch as a single FRU.

General Troubleshooting Procedures

This section lists the broad steps on how to approach a Brocade Silkworm switch problem in a SAN environment. It lays out a methodical approach and lists various tools and resources available at each step. It is expected that using Storage Automated Diagnostic Environment version 2.1 for monitoring will greatly reduce the time consuming process of narrowing down the problem.

1. **Discover the Error.**
   - Storage Automated Diagnostic Environment version 2.1 messages and alerts
   - `/var/adm/messages`
   - Application-specific errors
2. **Determine the extent of problem.**
   - `cfgadm -al` output
   - `luxadm -e port` output
   - Storage Automated Diagnostic Environment version 2.1 Topology error display
   - Multipathing information (Sun StorEdge Traffic Manager and VxDMP)

Note – The information gathered here will determine which subsection to focus your attention: Host to Switch, Switch to Switch (cascaded), or Switch to Storage.

---

3. **Check Array Status.**
   - Open a telnet session to the Sun StorEdge T3 array
   - Refer to the `luxadm` display output for Sun StorEdge A5200 arrays
   - Raid Manager Healthcheck for the Sun StorEdge A3500FC arrays
   - Storage Automated Diagnostic Environment version 2.1 instrumentation reports
   - LED status
   - Explorer/T3Extractor output
4. **Check Switch Status.**
   - Explorer output (`supportShow` output)
   - WebTools GUI
   - LED Status
   - Storage Automated Diagnostic Environment version 2.1 instrumentation reports
   - Port Modes (F/L/E, online, offline)
   - Nameserver Information (`nsshow`, `nsallshow`)

5. **Start Testing FRUS.**
   - Storage Automated Diagnostic Environment version 2.1 tests, such as the `brocadetest`(1M), `qlctest`(1M), `t3test`(1M), `linktest`(1M), and a5ktest(1M).
   - Brocade CLI tests (`loopPortTest`, `spinFab`, `crossPortTest`)
   - Sun StorEdge T3 Array tests, such as `T3OFDG`(1M)
   - Sun StorEdge A3500FC arrays Healthcheck

Note – The conclusion of these tests isolate the problem to a FRU to be replaced. Follow the appropriate hardware manual for proper FRU replacement procedures.

---

6. **Verify the fix.**
   - `/var/adm/messages` (path online, multipath informational messages)
   - Storage Automated Diagnostic Environment version 2.1 status
   - Sun StorEdge Traffic Manager or VxDMP, to return the path to its normal state

Troubleshooting Case Study

The following case study illustrates a practical application of the steps outlined above. This is only one way to approach the problem; there may be others.

Note – Knowledge and training on all components in a SAN are prerequisites before you attempt the procedures below.

In this test case, the I/O load was generated using the `dex` disk exerciser to simulate customer load, and the steps below allowed the I/O to continue uninterrupted throughout the procedure.

Configuration

- Sun Fire V880
- Solaris 8 02/02 (Update 7) with all recommended and latest Sun StorEdge Network Foundation Software patches
- Sun StorEdge T3 array Partner Pair with FW 1.18
- Brocade Silkworm 2400 and 2800 switches with v2.6.0 firmware
- Storage Automated Diagnostic Environment version 2.1 with the latest patches

---

Note – The Storage Automated Diagnostic Environment version 2.1 was configured to send email alerts to a system administrator's email address.

Storage Automated Diagnostic Environment Version 2.1 Topology

In FIGURE B-2, a Sun StorEdge T3 array enterprise configuration is connected to a cascaded switch. In another possible configuration, two separate switches can be used to eliminate a single point of failure.

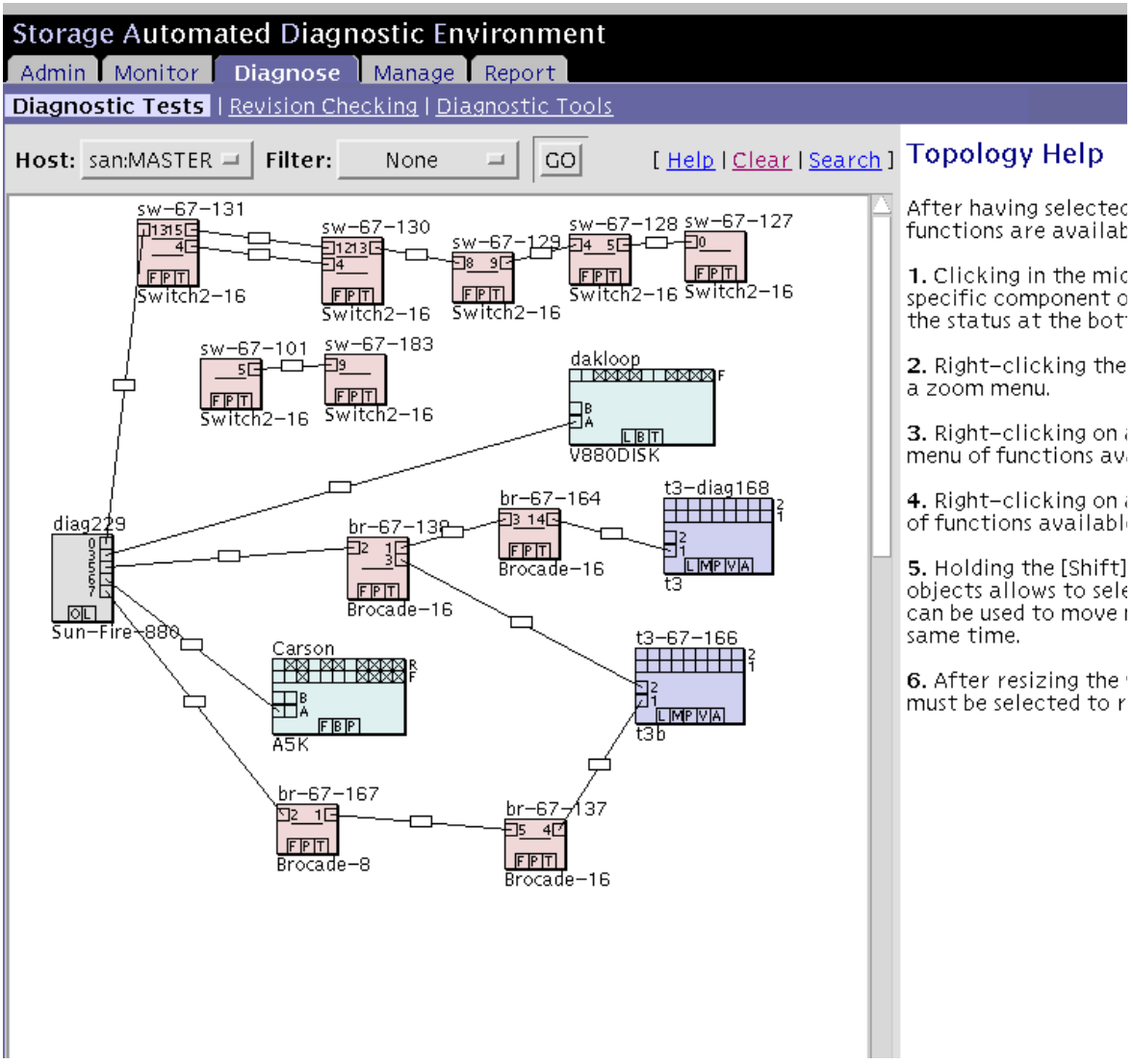

FIGURE B-2 Storage Automated Diagnostic Environment Version 2.1—Test from Topology Window

1. **Discover the Error using Storage Automated Diagnostic Environment Alerts as shown in** FIGURE B-3**.**

```
Site     : Lab Broom
Source   : diag229.central.sun.com
Severity : Error (Actionable)
Category : BROCADE   DeviceId : brocade:1000006069201efc
EventType: StateChangeEvent.M.port.2
EventCode: 5.26.35
EventTime: 2002/07/11 10:32:33

'port.2' in BROCADE br-67-167 (ip=172.20.67.167) is now Not-Available (state changed from
'online' to 'offline'):

INFORMATION:
A port on the switch has logged out of the fabric and gone offline

RECOMMENDED-ACTION:
1. Verify cables, GBICs and connections along Fibre Channel path
2. Check SAN Topology GUI to identify failing segment of the data path
3. Verify correct FC switch configuration
4. Verify port is enabled


------------------------------------------------------------------------
Site     : Lab Broom
Source   : diag229.central.sun.com
Severity : Error (Actionable)
Category : MESSAGE   DeviceId : message:diag229.central.sun.com
EventType: LogEvent.driver.QLC_LOOP_OFFLINE
EventCode: 9.20.315
EventTime: 2002/07/11 10:32:45

Found 1 'driver.QLC_LOOP_OFFLINE' errors(s) in logfile: /var/adm/messages on
diag229.central.sun.com (id=80c61254):

INFORMATION:
Found Loop OFFLINE message.
 This could indicate that a fiber channel cable has been removed.
 This could indicate troubles with a fiber channel loop.
 This could also be caused by running the qlctest.

RECOMMENDED-ACTION:
1. Check to see if a fiber channel cable has been removed.
2. Check for fiber channel errors.
3. Check to see if the qlctest was running at time of the failure.


------------------------------------------------------------------------
[continued on next page]
```

[*continued from previous page*]

```
Jul 11 10:31:12WWN:Received 1 'Loop Offline' message(s)  in 7 mins [threshold is 1 in
5mins]  Last-Message: 'diag229.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE: Qlogic
qlc(4): Loop OFFLINE '

------------------------------------------------------------------------
Site     : Lab Broom
Source   : diag229.central.sun.com
Severity : Error (Actionable)
Category : HOST   DeviceId : host:diag229.central.sun.com
EventType: AlarmEvent.M.lun.T300.c3t50020F23000068CCd0s2.statusA
EventCode: 7.5.27
EventTime: 2002/07/11 10:35:08

The state of 'lun.T300.c3t50020F23000068CCd0s2.statusA' on diag229.central.sun.com
changed from 'O.K.' to 'Missing' (target=t3:t3-67-166/172.20.67.166)

INFORMATION:
luxadm display reported a change in the port-status of one of it's
 paths. The agent then tries to find which enclosure this path corresponds to
 by reviewing it's database of T3's and VE's.

 luxadm display 2a00006022004188
 DEVICE PROPERTIES for disk: 2a00006022004188
   Status(Port A):       O.K.   **** monitoring this field.
   Vendor:               SUN
   Product ID:           SESS01
   WWN(Node):            2a00006022004188
   WWN(Port A):          2b00006022004188
   Revision:             080D
   Serial Num:           Unsupported
   Unformatted capacity: 241724.000 MBytes
   Write Cache:          Enabled
   Read Cache:           Enabled
     Minimum prefetch:   0x0
     Maximum prefetch:   0x0
   Device Type:          Disk device
   Path(s):
   /dev/rdsk/c7t2B00006022004188d0s2
   /devices/sbus@8,0/SUNW,qlc@1,30000/fp@0,0/ssd@w2b00006022004188,0:c,raw


------------------------------------------------------------------------
```

[*continued on next page*]

```
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Site     : Lab Broom
Source   : diag229.central.sun.com
Severity : Error (Actionable)
Category : HOST   DeviceId : host:diag229.central.sun.com
EventType: AlarmEvent.M.lun.T300.c3t50020F23000068CCd1s2.statusA
EventCode: 7.5.27
EventTime: 2002/07/11 10:35:08

The state of 'lun.T300.c3t50020F23000068CCd1s2.statusA' on diag229.central.sun.com
changed from 'O.K.' to 'Missing' (target=t3:t3-67-166/172.20.67.166)

INFORMATION:
luxadm display reported a change in the port-status of one of it's
 paths. The agent then tries to find which enclosure this path corresponds to
 by reviewing it's database of T3's and VE's.

 luxadm display 2a00006022004188
 DEVICE PROPERTIES for disk: 2a00006022004188
   Status(Port A):       O.K.   **** monitoring this field.
   Vendor:               SUN
   Product ID:           SESS01
   WWN(Node):            2a00006022004188
   WWN(Port A):          2b00006022004188
   Revision:             080D
   Serial Num:           Unsupported
   Unformatted capacity: 241724.000 MBytes
   Write Cache:          Enabled
   Read Cache:           Enabled
     Minimum prefetch:   0x0
     Maximum prefetch:   0x0
   Device Type:          Disk device
   Path(s):
   /dev/rdsk/c7t2B00006022004188d0s2
   /devices/sbus@8,0/SUNW,qlc@1,30000/fp@0,0/ssd@w2b00006022004188,0:c,raw


------------------------------------------------------------------------
```

FIGURE B-3 Storage Automated Diagnostic Environment Alert

This alert shows:

- An error on port two of switch `172.20.67.167` occurred
- A Sun StorEdge Traffic Manager offline event occurred
- The HBA is offline

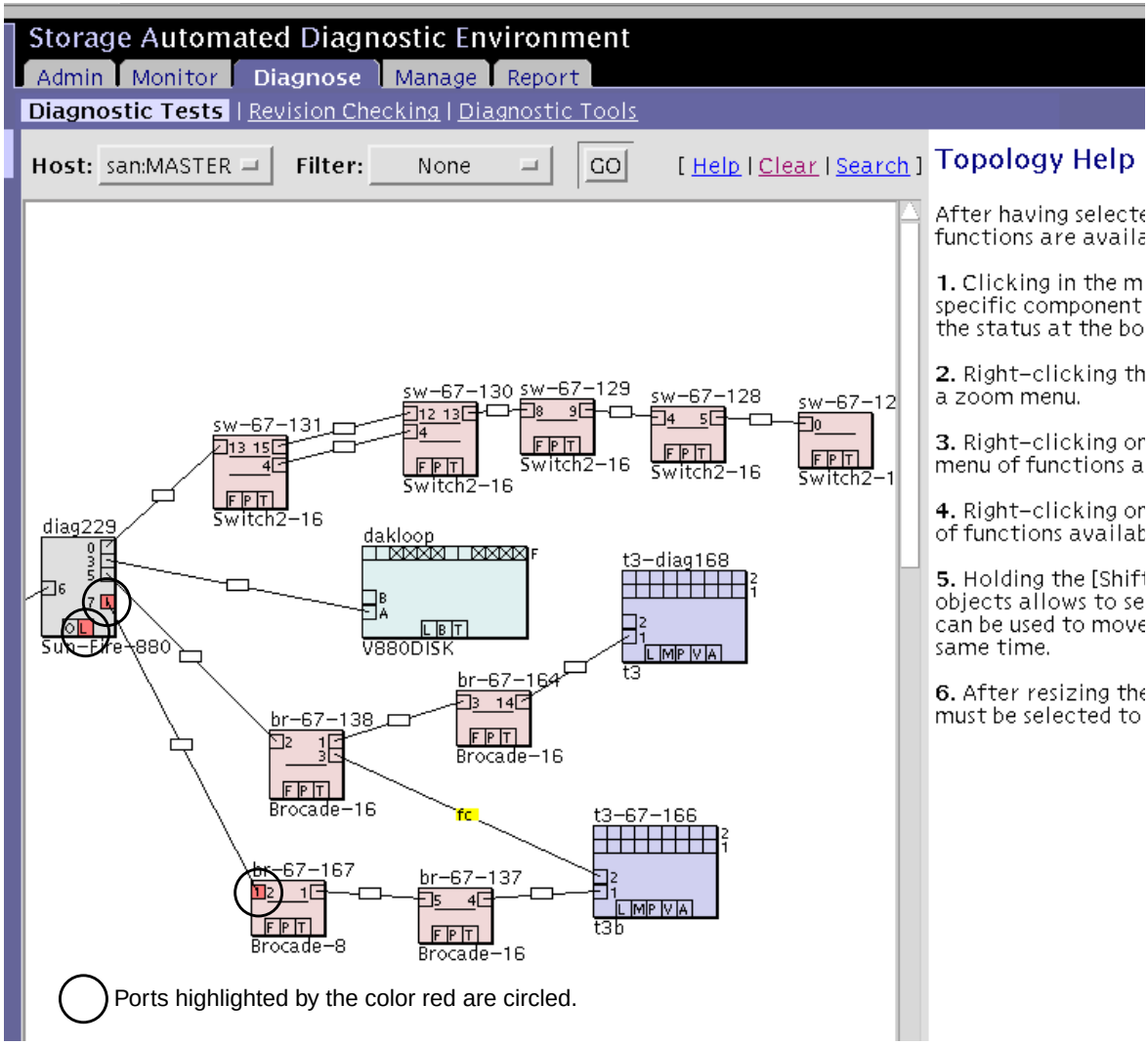
2. **Determine the extent of the problem using `cfgadm -al` output.**

CODE EXAMPLE B-9 `cfgadm -al` output to check OS level fabric condition

```
# cfgadm -al

c3                             fc-fabric     connected      configured     unknown
c3::50020f23000068cc           unavailable   connected      configured     unusable
c4                             fc-private    connected      unconfigured   unknown
c5                             fc-fabric     connected      configured     unknown
c5::210000e08b05041c           unknown       connected      unconfigured   unknown
c5::50020f2300004331           disk          connected      configured     unknown
```

The device on c3 has disappeared. In addition, the `luxadm` output of the Sun StorEdge T3 arrays shows the following.

```
# luxadm display /dev/rdsk/c6t60020F2000003EE53AAF7A09000DA257d0s2

/: luxadm display 50020f23000068cc

  Error: Invalid pathname (50020f23000068cc)
/:
```



From the topology, notice the HBA and port two of the first switch have errors.

Note – From this Topology view, concentrate on the link between the HBA and the switch port 2.

---

3. **Check the status of the array.**

```
diag168.Central.Sun.COM:/etc:<18>port listmap

port   targetid   addr_type   lun   volume        owner   access
u1p1      1         hard        0    diag169u1v1   u1      primary
u1p1      1         hard        1    diag169u2v1   u1      failover
u2p1      2         hard        0    diag169u1v1   u1      failover
u2p1      2         hard        1    diag169u2v1   u1      primary
```

All LUNs have failed over to the u1 controller.

4. **Check the status of the switch using switchshow.**

```
diag167:admin> switchshow
switchName:     diag167
switchType:     3.4
switchState:    Online
switchMode:     Native
switchRole:     Subordinate
switchDomain:   1
switchId:       fffc01
switchWwn:      10:00:00:60:69:20:1e:fc
switchBeacon:   OFF
Zoning:         ON (Main)
port  0: sw  Online        E-Port  10:00:00:60:69:10:71:25 "diag164"
(upstream)
port  1: --  No_Module
port  2: sw  No_Light
port  3: --  No_Module
port  4: --  No_Module
port  5: --  No_Module
port  6: sw  Online        E-Port  10:00:00:60:69:10:71:25 "diag164"
port  7: sw  Online        F-Port  21:00:00:e0:8b:03:61:f9
```

This `switchshow` output from the first switch confirms that port 2 has gone offline. No other ports seem to be affected at this point.

5. Use the Link Test to check the FRUs.

In the Switch-to-HBA link there are potentially four FRUs:

- HBA
- Cable
- Switch SFP
- Switch chassis

Note – Before starting the Link Test, you must enter the password for the Brocade switch in the configuration menu.

---

a. Using the Storage Automated Diagnostic Environment version 2.1, right-click on the box on the link that connects the HBA and switch port.

A pop-up menu appears.

b. From the menu, click on Start Link Test.

The Link Test components are displayed on the right side of the window. See FIGURE B-4.

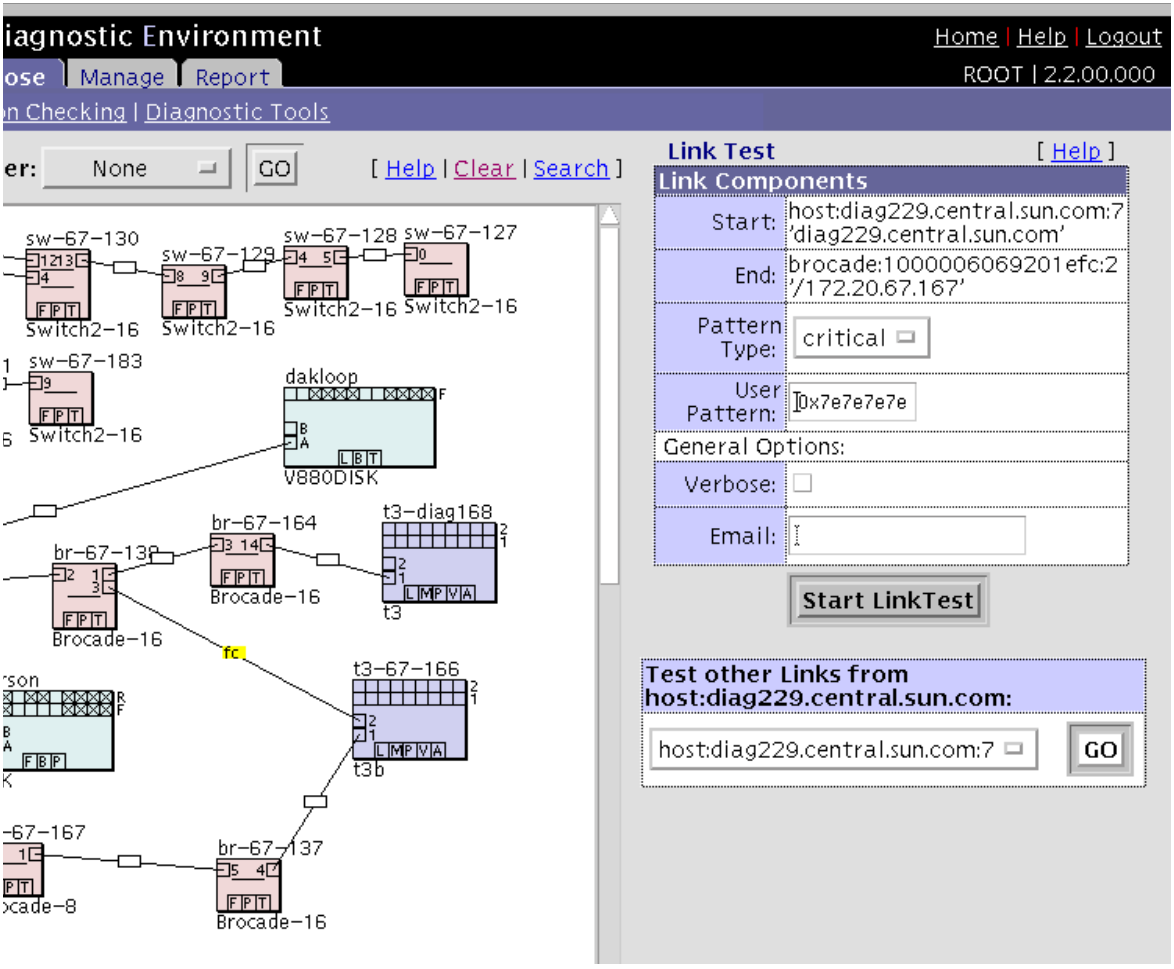


FIGURE B-4 Storage Automated Diagnostic Environment version 2.1 Link Test Display

The Link Test starts by running the HBA Test. In this example, the HBA Test fails. The Link Test then requests you to insert a loopback cable into the HBA. See FIGURE B-5.

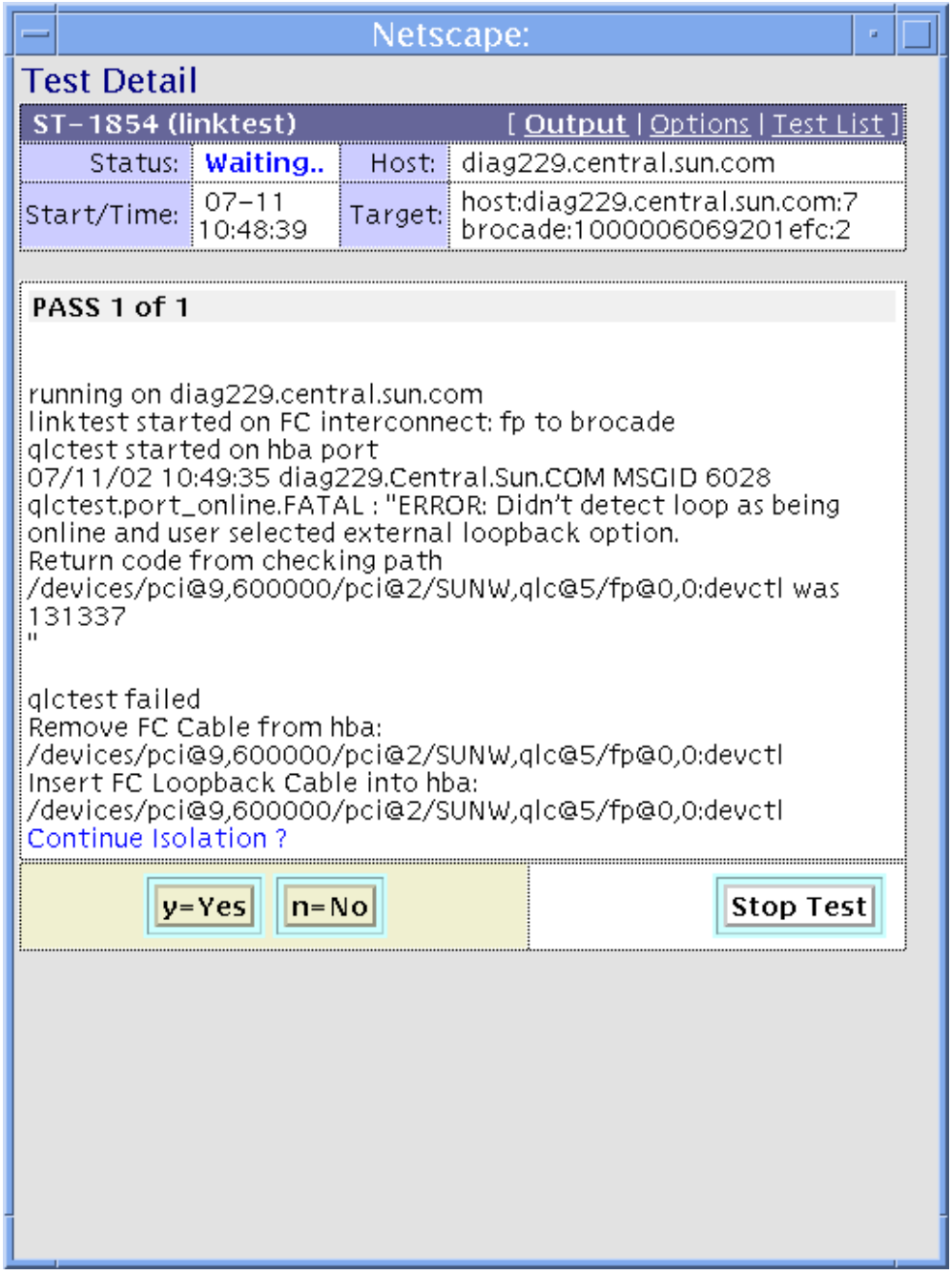


FIGURE B-5 Test Result Details with Remedy Request

The Link Test then runs the HBA Test again. This time the HBA Test succeeds and you are requested to reconnect the loopback cable into the HBA, as shown in FIGURE B-6.

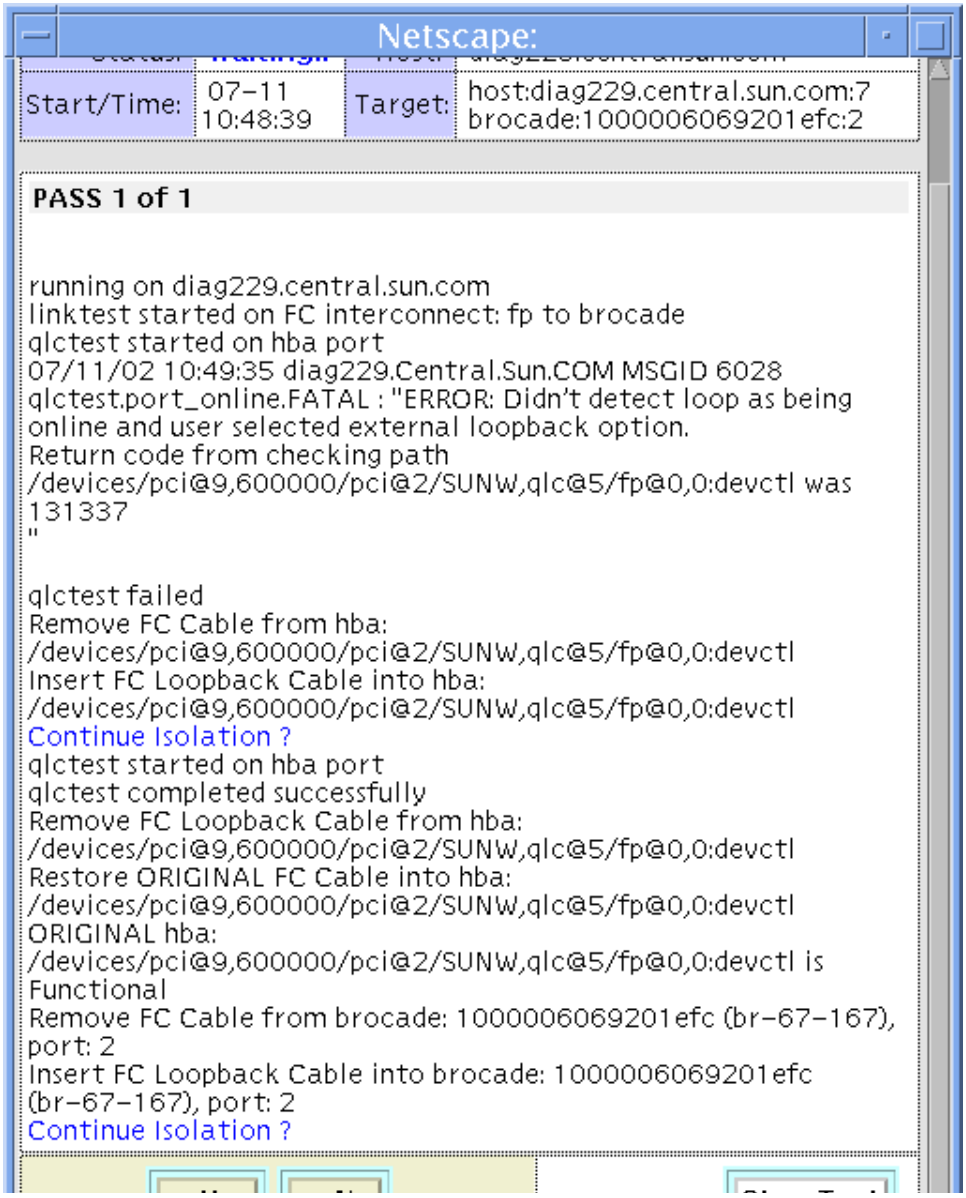


FIGURE B-6 Test Result Details Showing a Successful Test

The Link Test new runs the Switch Port Test. In this example, the Switch Port Test passes. The Link Test then requests you to insert a new fiber cable between the HBA and the Brocade switch port as shown in FIGURE B-7.

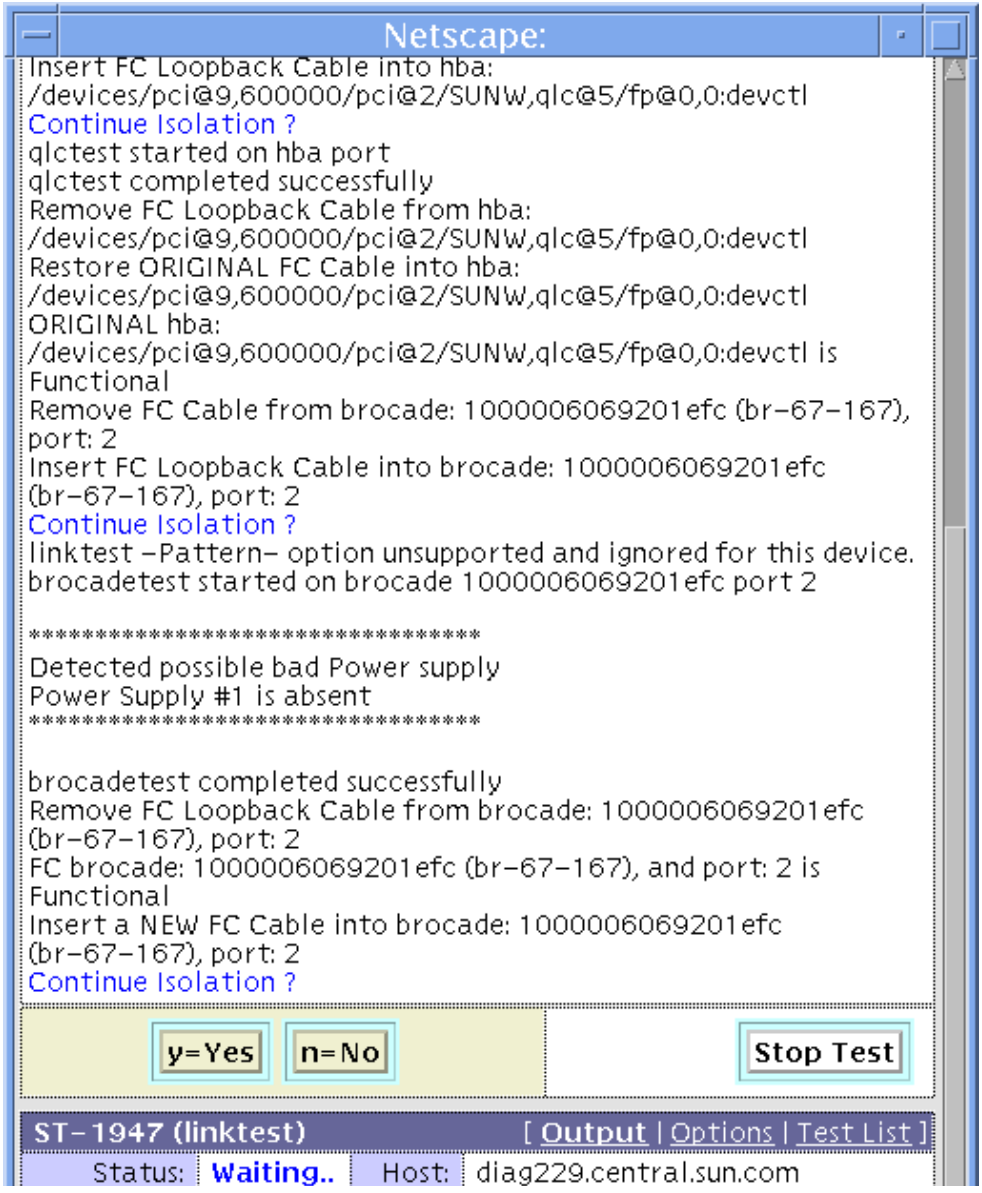


FIGURE B-7 Continued Link Test Example Results

The Link Test then reruns the HBA Test. This time the HBA Test passes and the Link Test indicates that the fiber cable is the suspected failure cause.

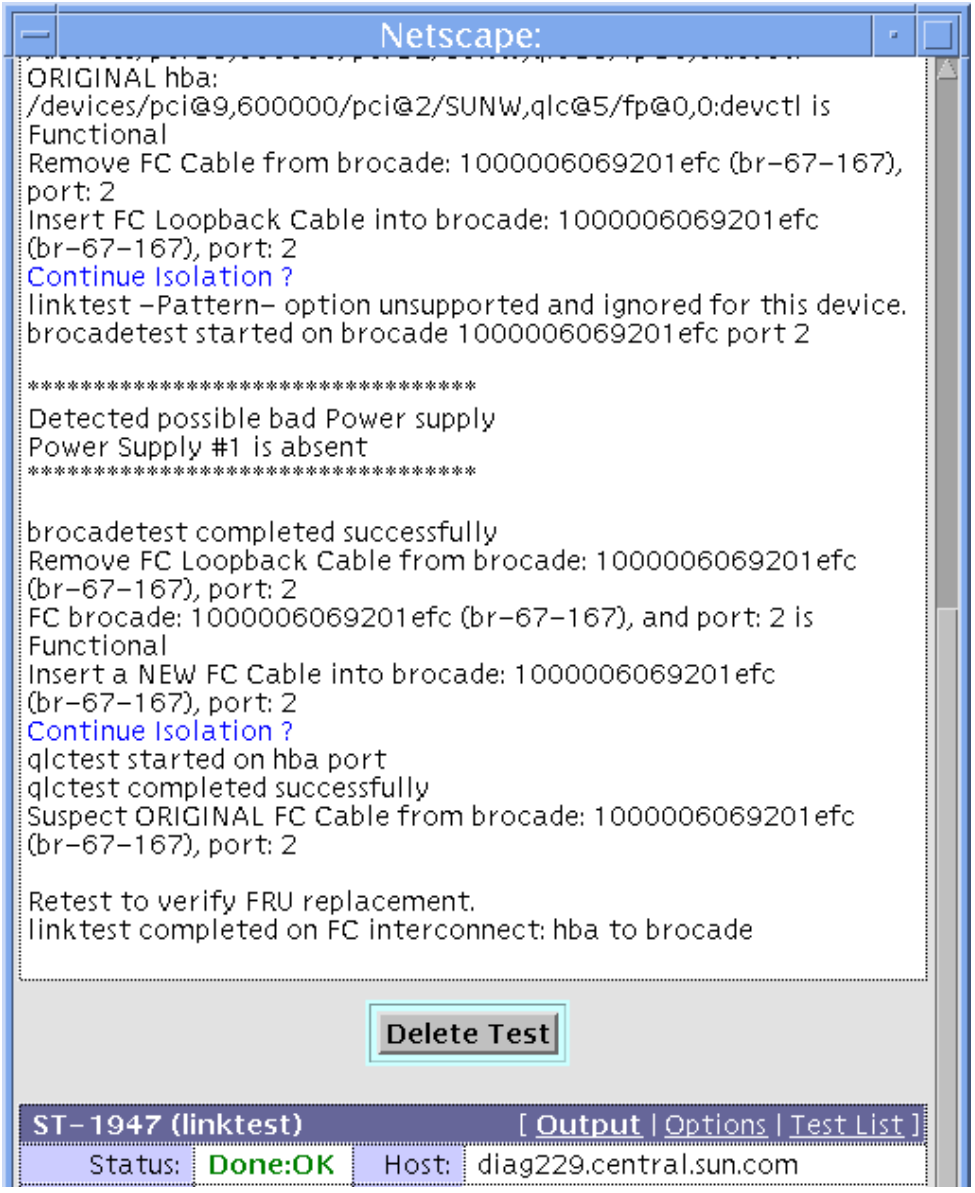


FIGURE B-8 Continued Link Test Example Results

6. **Verify the fix.**

   a. **Check the `cfgadm` output to see if the device appears back in the fabric.**

   CODE EXAMPLE B-10 `cfgadm` Output

```
# cfgadm -al

c3                          fc-fabric     connected      configured     unknown
c3::50020f23000068cc        disk          connected      configured     unusable
c4                          fc-private    connected      unconfigured   unknown
c5                          fc-fabric     connected      configured     unknown
c5::210000e08b05041c        unknown       connected      unconfigured   unknown
c5::50020f2300004331        disk          connected      configured     unknown
```

   The c3 device is connected.

   b. **Check the status of the device with the `luxadm failover` command.**

```
# luxadm failover primary
/home/mckenney/ws/storade2.2/StorTools/tests/discover: luxadm display
50020f23000068cc
DEVICE PROPERTIES for disk: 50020f23000068cc
  Status(Port A):       O.K.
  Vendor:               SUN
  Product ID:           T300
  WWN(Node):            50020f20000068cc
  WWN(Port A):          50020f23000068cc
  Revision:             0200
  Serial Num:           Unsupported
  Unformatted capacity: 119514.500 MBytes
  Write Cache:          Enabled
  Read Cache:           Enabled
    Minimum prefetch:   0x0
    Maximum prefetch:   0x0
  Device Type:          Disk device
  Path(s):
  /dev/rdsk/c3t50020F23000068CCd0s2
  /devices/pci@9,600000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w50020f23000068cc,0:c,raw

DEVICE PROPERTIES for disk: 50020f23000068cc
  Status(Port B):       O.K.
  Vendor:               SUN
  Product ID:           T300
  WWN(Node):            50020f20000068cc
  WWN(Port B):          50020f23000068cc
  Revision:             0200
  Serial Num:           Unsupported
  Unformatted capacity: 119514.500 MBytes
  Write Cache:          Enabled
  Read Cache:           Enabled
    Minimum prefetch:   0x0
    Maximum prefetch:   0x0
  Device Type:          Disk device
  Path(s):
  /dev/rdsk/c3t50020F23000068CCd1s2
  /devices/pci@9,600000/pci@2/SUNW,qlc@5/fp@0,0/ssd@w50020f23000068cc,1:c,raw
```

The primary path is now restored as the ONLINE path and I/O is again using this path. As a final check, look to the Storage Automated Diagnostic Environment version 2.1 topology. The ports that were in error are now green and the [mpx] error is green as well, as shown in FIGURE B-9.

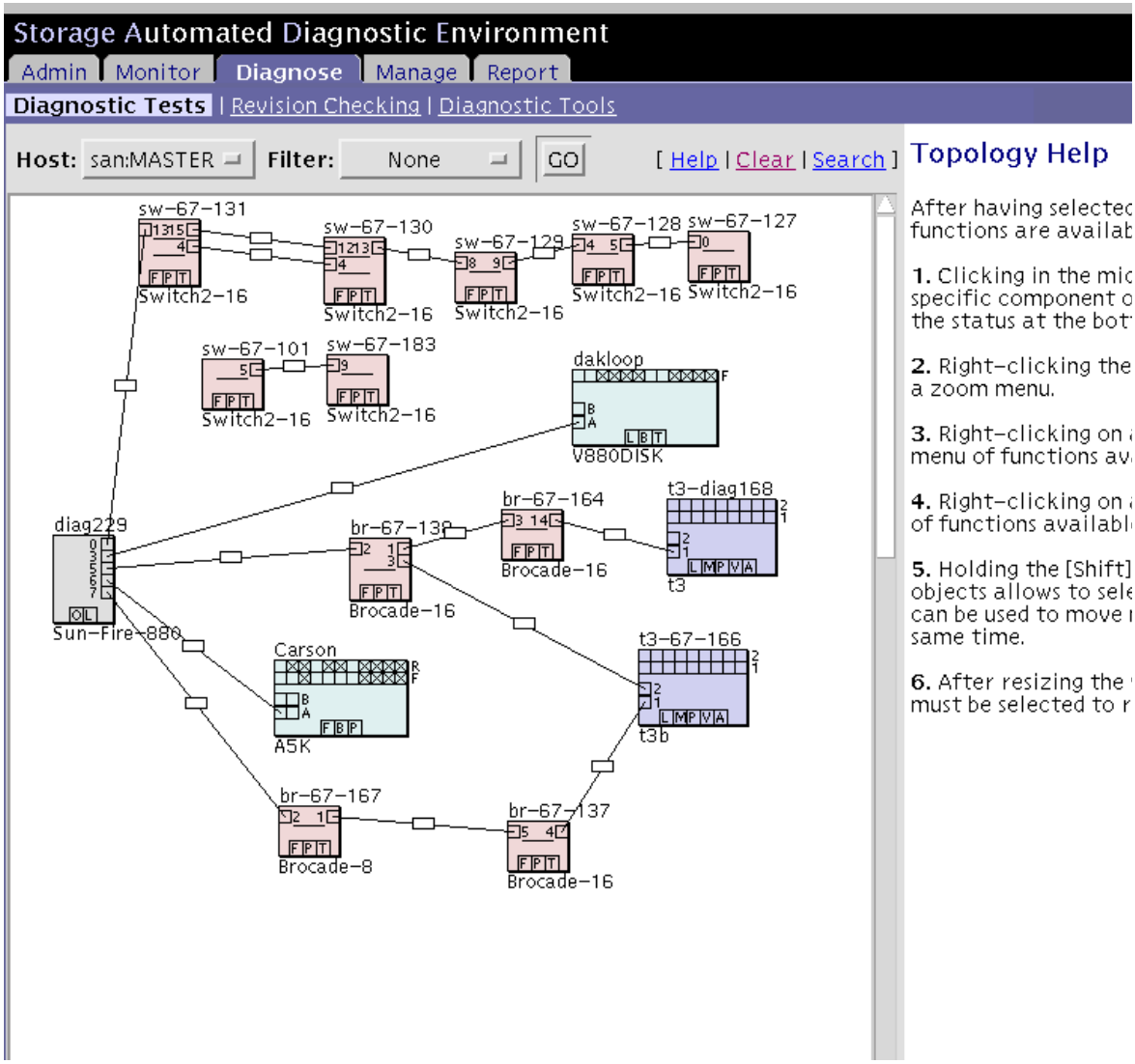


FIGURE B-9 Storage Automated Diagnostic Environment Version 2.1—Test from Topology Window

APPENDIX **C**

Brocade Communications Systems Error Messages

This appendix explains the error message format and possible errors and contains the following topics:

Error Message Formats

There are two error message formats depending on whether you are gathering information from the front panel or via Telnet. The front panel shows an abbreviated message and by way of Telnet displays the entire error message.

In all cases, the last error encountered is the first error displayed. Up to 32 messages are held in a buffer. If the 32 message limit is exceeded, the messages are overwritten in a first in, first out sequence.

Note – Error messages are stored in volatile RAM and are lost whenever power is removed from the switch. Access the error message log to view error messages before removing power.

Front Panel Message Formats

The Brocade Silkworm switch's front panel displays error messages. The first line includes the error's date and time. The beginning of each second line on the front panel display starts with the module name, error name, and the severity level (1).

The possible values are:

- 1—critical
- 2—error
- 3—warning
- 4—informational
- 5—debug

Note – If the same error occurs within the same module but on different ports, the number of occurrences for that message is incremented in brackets (up to 999), and the error number is not incremented (that is, this error, though it may occur 999 times, occupies one message in the 32-message buffer).

▼ To Display Error Messages from the Front Panel

1. **From the front panel, select the Status menu.**
2. **Select Error Log.**
3. **Scroll through the error log. If no errors are encountered, the panel displays `No Error`.**

Diagnostic Error Message Formats

If any port fails during a diagnostic test, it is marked BAD in the status display.

To retest a port that has been marked BAD, clear the port and set to OK using the `diagClearError` (`port#`) command. This command clears the port status only and does not clear the logs or change the port's condition. The `diagClearError` (`port#`) command should only be used during diagnostic procedures to reset a bad port for retest.

Some messages contain the following abbreviations:

- sb = Should Be
- er = Bits in error

Note – If you run the `portStateShow` or the `diagShow` command prior to running a test, errors may appear as a result of the normal synchronization process. These errors should be addressed if the number of errors found increases when running the `portStateShow` command again.

TABLE C-1 Probable Failure Actions

Failed Test	Action
ramTest	replace DRAM module or mainboard assembly
portRegTest	replace mainboard assembly
centralMemoryTest	replace mainboard assembly
cmiTest	replace mainboard assembly
cmemRetentionTest	replace mainboard assembly
sramRetentionTest	replace mainboard assembly
camTest	replace mainboard assembly

TABLE C-1 Probable Failure Actions *(Continued)*

Failed Test	Action
portLoopbackTest	replace mainboard assembly
crossPortTest	replace mainboard assembly, SFP, or fiber cable
spinSilk	replace mainboard assembly, SFP, or fibre cable

Error Message Numbers

An error number ERR#xxxx appears at the end of an error message. TABLE C-2 matches each error number with the test that caused the error and the name of the error. Look up the complete definition of the error name and the actions that will correct the error in TABLE C-3.

TABLE C-2 Error Message Codes Defined

Error Number	Test Name	Error Name
0001	n/a	DIAG-CLEAR_ERR
0004	n/a	DIAG-POST_SKIPPED
0B15	`sramRetentionTest`	DIAG-REGERR
0B16		DIAG-REGERR_UNRST
0B0F		DIAG-BUS_TIMEOUT
1F25	`cmemRetentionTest`	DIAG-LCMRS
1F26		DIAG-LCMTO
1F27		DIAG-LCMEM
0110	`ramTest`	DIAG-MEMORY
0111		DIAG-MEMSZ
0112		DIAG-MEMNULL
0415	`portRegTest`	DIAG-REGERR
0416		DIAG-REGERR_UNRST
040F		DIAG-BUS_TIMEOUT

TABLE C-2 Error Message Codes Defined *(Continued)*

Error Number	Test Name	Error Name
1020	`centralMemoryTest`	DIAG-CMBISRTO
1021		DIAG-CMBISRF
1025		DIAG-LCMRS
1026		DIAG-LCMTO
1027		DIAG-LCMEM
1028		DIAG-LCMEMTX
1029		DIAG-CMNOBUF
102A		DIAG-CMERRTYPE
102B		DIAG-CMERRPTN
102C		DIAG-INTNOTCLR
103O		DIAG-BADINT
106F		DIAG-TIMEOUT
2030	`cmiTest`	DIAG-BADINT
2031		DIAG-INTNIL
2032		DIAG-CMISA1
2033		DIAG-CMINOCAP
2034		DIAG-CMIINVCAP
2035		DIAG-CMIDATA
2036		DIAG-CMICKSUM
223B	`camTest`	DIAG-CAMINIT
223C		DIAG-CAMSID

TABLE C-2 Error Message Codes Defined *(Continued)*

Error Number	Test Name	Error Name
2640	`portLoopbackTest`	DIAG-ERRSTAT (ENCIN)
2641		DIAG-ERRSTAT (CRC)
2642		DIAG-ERRSTAT (TRUNC)
2643		DIAG-ERRSTAT (2LONG)
2644		DIAG-ERRSTAT (BADEOF)
2645		DIAG-ERRSTAT (ENCOUT)
2646		DIAG-ERRSTAT (BADORD)
2647		DIAG-ERRSTAT (DISCC3)
264F		DIAG-INIT
265F		DIAG-PORT_DIED
266E		DIAG-DATA
266F		DIAG-TIMEOUT
2660		DIAG-STATS(FTX)
2661		DIAG-STATS(FRX)
2662		DIAG-STATS(C3FRX)
2670		DIAG-PORTABSENT
2671		DIAG-XMIT

TABLE C-2 Error Message Codes Defined *(Continued)*

Error Number	Test Name	Error Name
3040	`crossPortTest`	DIAG-ERRSTAT(ENCIN)
3041		DIAG-ERRSTAT(CTL)
3042		DIAG-ERRSTAT(TRUNC)
3043		DIAG-ERRSTAT(2LONG)
3044		DIAG-ERRSTAT(BADEOF)
3045		DIAG-ERRSTATENCOUT)
3046		DIAG-ERRSTAT(BADORD)
3047		DIAG-ERRSTAT(DISC3)
304F		DIAG-INIT
305F		DIAG-PORTDIED
3060		DIAG-STATS(FTX)
3061		DIAG-STATS(FRX)
3062		DIAG-STATS(C3FRX)
306E		DIAG-DATA
306F		DIAG-TIMEOUT
3070		DIAG-PORTABSENT
3071		DIAG-XMIT
3078		DIAG-PORTWRONG

TABLE C-2 Error Message Codes Defined *(Continued)*

Error Number	Test Name	Error Name
384F	spinSilk	DIAG-INIT
385F		DIAG-PORTDIED
3840		DIAG-ERRSTAT (ENCIN)
3841		DIAG-ERRSTAT (CRC)
3842		DIAG-ERRSTAT (TRUNC)
3843		DIAG-ERRSTAT (2LONG)
3844		DIAG-ERRSTAT (BADEOF)
3845		DIAG-ERRSTAT (ENCOUT)
3846		DIAG-ERRSTAT (BADORD)
3847		DIAG-ERRSTAT (DISCC3)
3870		DIAG-PORTABSENT
3871		DIAG-XMIT
3874		DIAG-PORTSTOPPED

TABLE C-3 Diagnostic Error Messages

Message	Description	Probable Cause	Action
DIAG-BADINT Err#1030, 2030 [centralMemoryTest, cmiTest]	Port received an interrupt when not expecting one	ASIC failure	Replace mainboard assembly
DIAG-BUS_TIMEOUT Err#0BOF, 4040F [portRegTest, sramRetentionTest]	ASIC register or ASIC SRAM did not respond to an ASIC data access	ASIC failure	Replace mainboard assembly
DIAG-CAMINIT Err#223B [camTest]	Port failed to initialize due to one of the following reasons: • Switch not disabled • Diagnostic queue absent • Malloc failed • Chip is not present • Port is not in loopback mode • Port is not active	Software operational setup error or mainboard failure	Retry, reboot, or replace mainboard assembly

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
DIAG-CAMSID `Err#223C` [camTest]	ASIC failed SID NO translation test	ASIC failure	Replace mainboard assembly
DIAG-CLEAR_ERR `Err#0001`	Port's diag error flag (OK or BAD) is cleared	Information only	None required
DIAG-CMBISRF `Err#1021` [centralMemoryTest]	ASIC's Central Memory SRAMs did not complete the BISR within the timeout period	ASIC failure	Replace mainboard assembly
DIAG-CMBISRTO `Err#1020` [centralMemoryTest]	ASIC's Central Memory SRAMs did not complete the BISR within the timeout period	ASIC failure	Replace mainboard assembly
DIAG-CMERRPTN `Err#102B` [centralMemoryTest]	Error detected at the wrong port	ASIC failure	Replace mainboard assembly
DIAG-CMERRTYPE `Err#102A` [centralMemoryTest]	Port got the wrong CMEM error type	ASIC failure	Replace mainboard assembly
DIAG-CMICKSUM `Err#2036` [cmiTest]	CMI message received failed bad checksum test.	ASIC or mainboard failure	Replace mainboard assembly
DIAG-CMIDATA `Err#2035` [cmiTest]	CMI data received but did not match data transmitted	ASIC or mainboard failure	Replace mainboard assembly
DIAG-CMIINVCAP `Err#2034` [cmiTest]	Unintended ASIC erroneously got CMI capture flag	ASIC or mainboard failure	Replace mainboard assembly
DIAG-CMINOCAP `Err#2033` [cmiTest]	CMI intended receiver ASIC failed to get CMI capture flag.	ASIC or mainboard failure.	Replace mainboard assembly
DIAG-CMISA1 `Err#2032` [cmiTest]	An attempt to send a CMI message from ASIC to ASIC failed.	ASIC failure	Replace mainboard assembly
DIAG-CMNOBUF `Err #1029` [centralMemoryTest]	Port could not get any buffer	ASIC failure	Replace mainboard assembly

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
DIAG-DATA `Err#266E, 306E` [portLoopbackTest, crossPortTest]	Payload received by port did not match payload transmitted.	mainboard, SFP module or fiber cable failure	Replace mainboard assembly, SFP module or fiber cable
DIAG-ERRSTAT `Err#2640-2647, 3040-3047, 3840-3847` [portLoobackTest, crossPortTest, spinSilk]	Port Error Statistics counter is non-zero, meaning an error was detected when receiving frames. One of the following status errors occurred. • **Enc_in**—Encoding error, inside frame • **CRC-err**—Cyclic redundancy check on frame failed • **TruncFrm**—Truncated frame • **FrmTooLong**—Frame too long • **BadEOF**—Bad end of file • **Enc_out**—Encoding error, outside frame • **BadOrdSet**—Bad symbol on fiber optic cable • **DiscC3**—Discarded Class 3 frames	ASIC, mainboard, SFP module or fiber cable failure	Replace mainboard assembly, SFP module, or fiber cable
DIAG-INIT `Err#264F, 304F, 384F` [portLoopbackTest, crossPortTest, spinSilk]	Port failed to go active in the loopback mode requested.	ASIC, mainboard, SFP module or fiber cable failure	Replace mainboard assembly, SFP module, or fiber cable.
DIAG-INTNIL `Err#2031` [cmiTest]	ASIC failed to get a CMI error (interrupt)	ASIC failure	Replace mainboard assembly
DIAG-INTNOTCLR `Err#102C` [centralMemoryTest]	The interrupt bit could not be cleared.	ASIC failure	Replace mainboard assembly
DIAG-LCMEM `Err#1027` [centralMemoryTest, cmemRetentionTest]	Data read from the Central Memory location did not match data previously written into the same location	ASIC failure	Replace mainboard assembly

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
DIAG-LCMEMTX `Err#1F27, 1028` [centralMemoryTest]	Central Memory transmit path failure: ASIC 1 failed to read ASIC 2 via the transmit path	mainboard failure	Replace mainboard assembly
DIAG-LCMRS `Err#1F25, 1025` [centralMemoryTest cmemRetentionTest]	Central Memory Read Short: M bytes requested but got less than M bytes	ASIC failure	Replace mainboard assembly
DIAG-LCMTO `Err#1F267, 1026` [centralMemoryTest, cmemRetentionTest]	Central Memory Timeout: Data transfer initiated, did not complete within the timeout period.	ASIC failure	Replace mainboard assembly
DIAG-MEMNULL `Err#0112` [ramTest]	Test failed to malloc.	mainboard failure	Replace mainboard assembly
DIAG-MEMSZ `Err#0111` [ramTest]	Memory size to be tested is less than or equal to zero	mainboard failure	Replace mainboard assembly
DIAG-MEMORY `Err#0110` [ramTest]	Data read from RAM location did not match previously-written data into same location.	CPU RAM failure	Replace mainboard assembly or DRAM module
DIAG-PORTABSENT `Err#2670, 3070, 3870` [portLoopbackTest, crossPortTest, spinSilk]	Port is not present	ASIC or mainboard failure	Replace mainboard assembly
DIAG-PORTDIED `Err#265F, 305F, 385F` [portLoopbackTest, crossPortTest, spinSilk]	Port was in loopback mode and then went inactive	ASIC, SFP module or fiber cable failure	Replace mainboard assembly, SFP module, or fiber cable
DIAG-PORTSTOPPED `Err#3874` [spinSilk]	Port is no longer transmitting, as indicated by the Number Of Frames Transmitted counter being stuck at N frames.	ASIC, SFP module, or fiber cable failure.	Replace mainboard assembly, SFP module, or fiber cable.
DIAG-PORTWRONG `Err#3078` [crossPortTest]	Frame erroneously received by port M instead of the intended port N	ASIC failure	Replace mainboard assembly

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
DIAG-POST-SKIPPED `Err #0004` [switch initialization]	POST is skipped. Its message recommended that POST be executed.	Informational only	None required
DIAG-REGERR `Err#0B15, 0415` [portRegTest, sramRetentionTest]	Data read from ASIC register or ASIC SRAM did not match data previously written into same location	ASIC failure	Replace mainboard assembly
DIAG-REGERR_URST `Err#0B16, 0416` [portRegTest, sramRetentionTest]	Port failed to unreset	ASIC failure	Replace mainboard assembly
DIAG-STATS `Err#2660-2662-, 3060-3062` [portLoopback Test, crossPortTest]	Port counter value did not match the number of frames actually transmitted. Possible counters reporting: • **FramesTx**—number of frames transmitted • **FramesRx**—number of frames received • **CI3FrmRx**—number of Class 3 frames received	ASIC, SFP module or fiber cable failure	Replace mainboard assembly, SFP module or fiber cable
DIAG-TIMEOUT `Err#266F, 306F, 386F` [portLoopbackTest, crossPortTest, centralMemoryTest]	For portLoopbackTest and crossPortTest: Port failed to receive frame within timeout period For centralMemoryTest: Port failed to detect an interrupt within the timeout period.	ASIC, SFP module or fiber cable failure	Replace mainboard assembly, SFP module, or fiber cable
DIAG-XMIT `Err#2271, 2671, 3071, 3871` [portLoopbackTest, crossPortTest, spinSilk, camTest]	Port failed to transmit frame	ASIC failure	Replace mainboard assembly
CONFIG CORRUPT	The switch configuration information has become irrevocably corrupted.	OS error	The system automatically resorts to the default configuration settings.

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
CONFIG OVERFLOW	The switch configuration information has grown too large to be saved or has an invalid size.	OS error	Contact customer support
CONFIG VERSION	The switch has encountered an unrecognized version of the switch configuration.	OS error	The system automatically resorts to the default configuration settings.
FABRIC, SEGMENTED, LOG_WARNING	Fabric segmented	• Incompatible fabric parameters and switches • Conflict zones	Reconfigure fabric or zones
FABRIC, NO_ALIASID, LOG_WARNING	No free multicast alias	Too many multicast groups in use	Remove some of the groups
FABRIC, BADILS, LOG_WARNING	Bad ISL-ELS size	The ISL-ELS payload is wrong	Contact customer support
FLASH, BAD_MIRROR, LOG_WARNING	The system's flash memory has encountered an error	OS error	The system attempts to recover from its mirrored backup. Contact customer support.
RPC, SVC_EXIT	An RPC service daemon has terminated prematurely or unexpectedly.	OS error	Contact customer support
RPC, SVC_REG	An RPC service daemon could not establish service for a particular protocol handler.	OS error	Contact customer support
TEMP, 1_FAILED, LOG_WARNING	Switch overheated	Fan failure	Contact customer support
TEMP, 2_FAILED, LOG_ERROR	Switch overheated	Fan failure	Contact customer support
TEMP, 3_FAILED, LOG_CRITICAL	Switch overheated	Fan failure	Contact customer support
TEMP, 4_FAILED, LOG_CRITICAL	Switch overheated	Fan failure	Contact customer support
TEMP, 5_FAILED, LOG_CRITICAL	Switch overheated	Fan failure	Contact customer support
FANS, 1_FAILED, LOG_WARNING	Switch overheated	Fan failure	Contact customer support

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
FANS, 2_FAILED, LOG_ERROR	Switch overheated	Fan failure	Contact customer support
FANS, 3_FAILED, LOG_CRITICAL	Switch overheated	Fan failure	Contact customer support
FANS, 4_FAILED, LOG_CRITICAL	Switch overheated	Fan failure	Contact customer support
FANS, 5_FAILED, LOG_CRITICAL	Switch overheated	Fan failure	Contact customer support
FANS, 6_FAILED, LOG_CRITICAL	Switch overheated	Fan failure	Contact customer support
POWER, 1_FAILED, LOG_CRITICAL	Switch power failure	Power supply failure	Contact customer support
POWER, 2_FAILED, LOG_CRITICAL	Switch power failure	Power supply failure	Contact customer support
FCIU, IUBAD, L, S	Invalid IU	OS error	Contact customer support
FCIU, IUCOUNT, L, S	Total number of IUs Count < 0	OS error	Contact customer support
FCPH, EXCHBAD, L, S	Bad exchange	OS error	Contact customer support
FCPH, EXCHFREE, L, S	Unable to free an exchange	OS error	Contact customer support
MQ, QWRITE, L, M	Message queue overflow	Task blocked	Contact customer support
MQ, QREAD, L, M	Message queue unread	OS error	Contact customer support
MQ, MSGTYPE, E, M	Unknown message type	OS error	Contact customer support
SEMA, SEMGIVE, L, M	Unable to give a semaphore	OS error	Contact customer support
SEMA, SEMTAKE, L, M	Unable to take a semaphore	OS error	Contact customer support
SEMA, SEMFLUSH, L, M	Unable to flush a semaphore	OS error	Contact customer support
PANIC, TASKSPAWN, LOG_PANIC	Task creation failed	OS error	Contact customer support

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
PANIC, SEMCREATE, LOG_PANIC	Semaphore creation failed	OS error	Contact customer support
PANIC, SEMDELETE, LOG_PANIC	Semaphore	OS error	Contact customer support
PANIC, QCREATE, LOG_PANIC	Message queuer failed	OS error	Contact customer support
PANIC, QDELETE, LOG_PANIC	Message queuer deletion failed	OS error	Contact customer support
PANIC, MALLOC, LOG_PANIC	Memory allocation failed	OS error	Contact customer support
PANIC, FREE, LOG_PANIC	Memory free failed	OS error	Contact customer support
PANIC, INCONSISTENT, LOG_PANIC	Data out of sync	OS error	Contact customer support
PANIC, INTCONTEXT, LOG_PANIC	Data out of sync	OS error	Contact customer support
PANIC, ZOMTIMSET, LOG_PANIC	Attempt to set a zombie timer	OS error	Contact customer support
PANIC, ZOMTIMKILL, LOG_PANIC	Zombie timer destroyed	OS error	Contact customer support
PANIC, FREETIMRLSD, LOG_PANIC	Free timer released	OS error	Contact customer support
PANIC, TIMEUSECNT, LOG_PANIC	Timer use count exceeded	OS error	Contact customer support
PANIC, LSDB_CKSUM, LOG_PANIC	Link State Database checksum failed	OS error	Contact customer support
SYS, NOMEM, LOG_CRITICAL	No memory	OS error	Contact customer support
SYS, SYSCALL, LOG_ERROR	System call failed	OS error	Contact customer support
SYS, BADPTR, LOG_ERROR	Bad system pointer	OS error	Contact customer support
SYS, INTRPT, LOG_CRITICAL	Bad system interrupt	OS error	Contact customer support
SYS, FLASHRD, LOG_ERROR	FLASH memory read error	OS error	Contact customer support

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
SYS, FLASHWR, LOG_ERROR	FLASH memory write error	OS error	Contact customer support
TIMERS, ENQFAIL, LOG_CRITICAL	Invalid timeout value	OS error	Contact customer support
TIMERS, MSG, LOG_WARNING	Invalid message	OS error	Contact customer support
FLANNEL, PHANTOM, LOG_WARNING	Port's PLT limit exceeded	OS error	Contact customer support
ASIC, MINI_BUFFER, LOG_WARNING	ASIC Failure	Bad mainboard	Contact customer support
LSDB, LSID, LOG_ERROR	Link State ID'd out of range	OS error	Contact customer support
LSDB, NOLOCALENTRY, LOG_CRITICAL	No database entry for local link state record	OS error	Contact customer support
LSDB, NOLSR, LOG_WARNING	No link state record for domain	OS error	Contact customer support
LSDB, MAXINCARN, LOG_WARNING	Local link state record reached max incarnation	OS error	Contact customer support
FLOOD, INVLSU, LOG_WARNING	Discard received LSU	OS error	Contact customer support
FLOOD, INVLSR, LOG_WARNING	Unknown LSR type	OS error	Contact customer support
FLOOD, LSRLEN, LOG_ERROR	Excessive LSU length	OS error	Contact customer support
HLO, INVHLO, LOG_ERROR	Invalid Hello received from port	OS error	Contact customer support
HLO, HLOTIMEOUT, LOG_ERROR	Incompatible Hello timeout from port	OS error	Contact customer support
HLO, DEADTIMEOUT, LOG_ERROR	Incompatible inactivity timeout from port	OS error	Contact customer support
FSPF, SCN, LOG_WARNING	Illegal SCN	OS error	Contact customer support
FSPF, NBRCHANGE, LOG_WARNING	Wrong neighbor ID in Hello message from port	OS error	Contact customer support
FSPF, INPORT, LOG_ERROR	Input port out of range	OS error	Contact customer support

TABLE C-3 Diagnostic Error Messages *(Continued)*

Message	Description	Probable Cause	Action
FSPF, VERSION, LOG_ERROR	FSPF version not supported	OS error	Contact customer support
FSPF, SECTION, LOG_ERROR	Wrong section ID	OS error	Contact customer support
FSPF, REMDOMAIN, LOG_ERROR	Remote Domain ID out of range	OS error	Contact customer support
NBFSM, NGBRSTATE, LOG_ERROR	Wrong input to neighbor FSM	OS error	Contact customer support
MCAST, ADDPORT, LOG_WARNING	Add port failed	OS error	Contact customer support
MCCAST, REMPORT, LOG_WARNING	Remove port failed	OS error	Contact customer support
MCAST, ADDBRANCH, LOG_ERROR	Add branch failed	OS error	Contact customer support
MCAST, REMBRANCH, LOG_ERROR	Remove branch failed	OS error	Contact customer support
MCAST, NOPARENT, LOG_ERROR	Null parent	OS error	Contact customer support
MCAST, NOPARENTLSR, LOG_ERROR	Null IsrP	OS error	Contact customer support
UCAST, ADDPATH, LOG_CRITICAL	Add path failed	OS error	Contact customer support
UCAST, ADDPORT, LOG_WARNING	Add port failed	OS error	Contact customer support
UCAST, REMPORT, LOG_WARNING	Remove port failed	OS error	Contact customer support
UCAST, RRTIM, LOG_CRITICAL	Invalid reroute timer ID	OS error	Contact customer support
UCAST, SPFCOST, LOG_WARNING	No minimum cost path in candidate	OS error	Contact customer support
UCAST, RELICPDB, LOG_WARNING	Relic PDB to Domain	OS error	Contact customer support

APPENDIX **D**

Converting Sun FC Switches Fibre Channel Addresses

This appendix explains how the Sun FC switch encodes Fibre Channel addresses.

Note – This information only applies to the Sun FC switches.

This appendix contains the following topics:

Converting a Fabric Address into Fabric ID, Chassis ID, ASIC, Port, and AL_PA

You will occasionally see messages like the following in `/var/adm/messages`:

```
Mar 7 10:06:18 vikings genunix: [ID 936769 kern.info] ssd6 is /pci@8,700000/pci
@3/SUNW,qlc@4/fp@0,0/ssd@w50020f2300009697,1

Mar 7 10:06:18 vikings scsi: [ID 365881 kern.info]     <SUN-T300-0117 cyl 34145
 alt 2 hd 72 sec 128>

Mar 7 10:06:18 vikings genunix: [ID 408114 kern.info] /pci@8,700000/pci@3/SUNW,
qlc@4/fp@0,0/ssd@w50020f2300009697,1 (ssd6) online

Mar 7 10:06:18 vikings scsi: [ID 799468 kern.info] ssd7 at fp0: name w50020f230
0009697,0, bus address 1084e4

Mar 7 10:06:18 vikings genunix: [ID 936769 kern.info] ssd7 is /pci@8,700000/pci
@3/SUNW,qlc@4/fp@0,0/ssd@w50020f2300009697,0

Mar 7 10:06:18 vikings scsi: [ID 365881 kern.info]     <SUN-T300-0117 cyl 34145
 alt 2 hd 56 sec 128>

Mar 7 10:06:18 vikings genunix: [ID 408114 kern.info] /pci@8,700000/pci@3/SUNW,
qlc@4/fp@0,0/ssd@w50020f2300009697,0 (ssd7) online

Mar 7 10:06:20 vikings scsi: [ID 799468 kern.info] ssd8 at fp1: name w50020f230
0000457,1, bus address 1044e8
```

Or, you may see a `luxadm -e dump_map` output like the following:

```
# luxadm -e dump_map /devices/pci@8,700000/pci@3/SUNW,qlc@4/fp@0,0:devctl

Pos    Port_ID   Hard_Addr   Port WWN          Node WWN            Type
0      1084e4    1000e4      50020f2300009697  50020f2000009697    0x0  (Disk
device)
1      108000    0           210100e08b2366f9  200100e08b2366f9    0x1f
(Unknown Type,Host Bus Adapter)
#
```

In both of these outputs, a Fibre Channel (FC) address appears (the six-digit number, **1084e4** for example). The FC address potentially provides useful troubleshooting information. The key to this is knowing how the Sun FC switch encodes the addresses.

For a Qlogic switch, the address must first be changed from Hex to a 24-bit binary number.

Example

1084e4 translates into hexadecimal as 100001000010011100100. (The calculator removes the first 3 bits because they were zeros. The number is actually 000100001000010011100100, which is the number used in this example). 000100001000010011100100 is the 24-bit binary representation of 1084e4.

Qlogic encodes this number in the following way:

Bits 0-3	Fabric ID
Bits 4-9	Chassis ID
Bits 10-13	ASIC
Bits 14-15	Port
Bits 16-23	AL_PA

- The AL_PA will be zero if the device is a full fabric device, otherwise, it will be the AL_PA of the loop device.
- StorEdge Network Fibre Channel Switches have 2 or 4 ASICS (2 on the 8port switch, 4 on the 16port switch). These ASICs are numbered from 0-3.
- Each ASIC has 4 ports, numbered 0-3.
- The numbering on the switch faceplate goes from 1-8 or 1-16.
- So, ASIC 0, port 0 is actually Port 1 if you were looking at the switch. ASIC 3, port 3 would be Port 16 if you were looking at the switch.

`000100001000010011100100` is broken down as follows:

`0001`	Fabric ID
`000010`	Chassis ID
`0001`	ASIC ID
`00`	Port ID
`11100100`	AL_PA

You can convert these back into usable numbers. Binary -> Decimal (except for AL_PA, change it to Hex)

`Fabric ID`	1
`Chassis ID`	2
`ASIC ID`	1
`Port ID`	0
`AL_PA`	E4

From this information, you can conclude the following:

- The Fabric ID of the switch is 1
- The Chassis ID of the switch is 2
- The port in question is port 0 of ASIC 1.
- Port 0 of ASIC 1 is Port 5, if you were to look at the switch faceplate. (Refer to TABLE D-1 to see the ASIC/Port breakdown.)
- The AL_PA of the device is E4.

Knowing this information, you can easily determine where this device is located in the SAN. See TABLE D-1.

TABLE D-1 ASIC and Port Values

Switch Port	ASIC ID	Port ID
1	0	0
2	0	1
3	0	2
4	0	3

TABLE D-1 ASIC and Port Values *(Continued)*

5	1	0
6	1	1
7	1	2
8	1	3
9	2	0
10	2	1
11	2	2
12	2	3
13	3	0
14	3	1
15	3	2
16	3	3

Acronyms & Glossary

This glossary contains definitions for terms used in this guide.

Acronyms

AL_PA Arbitrated Loop Physical Address; 8-bit value used to identify a device.

E_Port An expansion or inter-switch port that can be connected to an E_Port of another switch to create a cascading interswitch link (ISL).

F_Port On a Fibre Channel switch, a port that supports an N_Port. A Fibre Channel port in a point-to-point or Fabric connection.

FL_Port On a Fibre Channel switch, a port that supports Arbitrated Loop devices.

G_Port A generic port that can automatically configure as either an E_Port or a F_Port

GL_Port A generic loop port can automatically configure as an E_Port, F_Port, or a FL_Port.

L_Port A loop port that enables private devices to communicate with fabric or public devices .

NAS Network Attached Storage

SNDR Sun StorEdge Network Data Replicator (formerly “Sun StorEdge Remote Dual Copy”)

TL_Port A Translated Loop Port on the Sun StorEdge T3 array that enables private devices to communicate with fabric or public devices.

U_Port A universal port that can operate as an E_Port, F_Port, or FL_Port.

Glossary

Broadcast Zone Zone type used to filter broadcast traffic away from end nodes that cannot use or interpret it. A port will broadcast to all ports in the same Broadcast Zone(s) in which the port is defined. Broadcast zoning is primarily used for doing IP over Fibre Channel or when mixing IP and SCSI traffic on the switch. These zones are not yet useful or interesting in Suns current SAN implementations.

Cascade Connection of two or more switches together to increase the number of available ports or to allow for increased distances between components of the SAN.

Fabric Fibre channel network built around one or more switches. It is also common to refer to something as a "Fabric device" or being in "Fabric mode". When used in this context, it simply means a public device, capable of logging into a Fabric and having public loop characteristics (as opposed to a private loop legacy device).

Hard Zones Hard Zones allow the division of the Fabric (one or more Switch chassis) into as many as 16 Fabric-wide zones that define the ports that can communicate with each other. A particular port may be placed in only one Hard Zone (no overlapping Hard Zones). If Hard Zones are enabled, Name Server Zones and SL Zones will not communicate across defined Hard Zone boundaries.

Name Server Zones allow the division of the Fabric (one or more Switch chassis) into as many as 256 Fabric-wide zones that define which ports or devices receive Name Server information. If Hard Zones are enabled, Name Server Zones will not communicate across defined Hard Zone boundaries.

Private Loop An Arbitrated Loop without a Fabric switch

Public Loop An Arbitrated Loop attached to a Fabric switch.

Segmented Loop A set of ports that behave as one private loop.

Zone A set of ports and their connected devices (zone) that behave as a single private loop. SL Zones on the switch allow the division of the Fabric (one or more Switch chassis) into Fabric-wide zones that define the ports that can communicate with each other.

Zoning Zoning allows the user to divide the Fabric ports into zones for more efficient and secure communication among functionally grouped nodes. There are several types of zones and a port may be defined in any. No port can be in all zone types simultaneously.

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