



# Sun StorEdge™ 3900 and 6900 Series 2.0 Troubleshooting Guide

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# Preface

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The *Sun StorEdge 3900 and 6900 Series 2.0 Troubleshooting Guide* provides guidelines for isolating problems in supported configurations of the Sun StorEdge™ 3900 and 6900 series. For detailed configuration information, refer to the *Sun StorEdge 3900 and 6900 Series Reference Manual*.

The scope of this troubleshooting guide is limited to information pertaining to the components of the Sun StorEdge 3900 and 6900 series, including the Storage Service Processor, Sun StorEdge 1 Gbit and 2 Gbit switches, Sun StorEdge T3+ arrays, and the virtualization engines in the Sun StorEdge 6900 series. This guide is written for Sun™ personnel who have been fully trained on all the components in the configuration.

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## How This Book Is Organized

This book contains the following topics:

**Chapter 1** introduces the Sun StorEdge 3900 and 6900 series storage subsystems.

**Chapter 2** offers general troubleshooting guidelines, such as manually halting the I/O and returning paths to production.

**Chapter 3** presents information about tools used to troubleshoot. Tools include the Storage Automated Diagnostic Environment, component-specific event grids, command line examples, and QLogic's SANblade Manager.

**Chapter 4** discusses Ethernet hub troubleshooting. Information associated with the 3Com Ethernet hubs is limited in this guide, however, because 3Com does not allow duplication of its information.

**Chapter 5** provides Fibre Channel (FC) link diagrams and troubleshooting procedures.

**Chapter 6** provides information on host device troubleshooting.

**Chapter 7** provides information on troubleshooting a Sun StorEdge Network FC switch-8 and switch-16 switch device.

**Chapter 8** describes how to troubleshoot the Sun StorEdge T3+ array devices. Also included in this chapter is information about the Explorer Data Collection Utility.

**Chapter 9** provides detailed information for troubleshooting the virtualization engines.

**Chapter 10** describes how to troubleshoot using Microsoft Windows 2000. It also explains how to launch the Sun StorEdge T3+ Array Failover Driver GUI and interpret the multipath configurator.

**Chapter 11** provides an example of fault isolation. It begins with how to discover an error and shows the user steps that are necessary for resolution.

**Appendix A** provides virtualization engine references, including Service Request Numbers (SRNs) and Simple Network Management Protocol (SNMP) Reference, an SRN/SNMP single point-of-failure table, and port communication and service code tables.

**Appendix B** provides a list of `SUNWsecfg(1M)` error messages and recommendations for corrective action.

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## Using UNIX Commands

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

See one or more of the following documents for this information:

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



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# Typographic Conventions

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

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# Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

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# Related Documentation

Product	Title	Part Number
<b>Late-breaking News</b>	<ul style="list-style-type: none"><li>• <i>Sun StorEdge 3900 and 6900 Series 2.0 Release Notes</i></li></ul>	816-5254
<b>Sun StorEdge 3900 and 6900 series information</b>	<ul style="list-style-type: none"><li>• <i>Sun StorEdge 3900 and 6900 Series 2.0 Installation Guide</i></li><li>• <i>Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide</i></li><li>• <i>Sun StorEdge 3900 and 6900 Series 2.0 Regulatory and Safety Compliance Manual</i></li><li>• <i>Sun StorEdge 3900 and 6900 Series 2.0 Site Prep Guide</i></li></ul>	816-5252 816-5253 816-5257 816-5256
<b>Sun StorEdge T3 and T3+ array</b>	<ul style="list-style-type: none"><li>• <i>Sun StorEdge T3+ Array Release Notes</i></li><li>• <i>Sun StorEdge T3+ Array Start Here</i></li><li>• <i>Sun StorEdge T3 and T3+ Array Regulatory and Safety Compliance Manual</i></li><li>• <i>Sun StorEdge T3+ Array Installation and Configuration Manual</i></li><li>• <i>Sun StorEdge T3+ Array Administrator's Guide</i></li><li>• <i>Sun StorEdge T3 Array Cabinet Installation Guide</i></li></ul>	816-4771 816-4768 816-0774 816-4769 816-4770 806-7979
<b>Diagnostics</b>	<ul style="list-style-type: none"><li>• <i>Storage Automated Diagnostics Environment User's Guide</i></li></ul>	816-3142
<b>Sun StorEdge SAN 4.0 (1 Gb switches)</b>	<ul style="list-style-type: none"><li>• <i>Sun StorEdge SAN 4.0 Release Guide to Documentation</i></li><li>• <i>Sun StorEdge SAN 4.0 Release Installation Guide</i></li><li>• <i>Sun StorEdge SAN 4.0 Release Configuration Guide</i></li><li>• <i>Sun StorEdge Network 2 Gb FC Switch-16 FRU Installation</i></li><li>• <i>Sun StorEdge SAN 4.0 Release Notes</i></li></ul>	816-4470 816-4469 806-5513 816-5285 816-4472
<b>Sun StorEdge SAN 4.1 (2 Gb switches)</b>	<ul style="list-style-type: none"><li>• <i>Sun StorEdge SAN 4.1 Release Guide to Documentation</i></li><li>• <i>Sun StorEdge SAN 4.1 Release Installation Guide</i></li><li>• <i>Sun StorEdge SAN 4.1 Release Configuration Guide</i></li><li>• <i>Sun StorEdge SAN 4.1 2 Gb Brocade Silkworm Fabric Switch Guide to Documentation</i></li><li>• <i>Sun StorEdge SAN 4.1 2 Gb McData Intrepid Director Switch Guide to Documentation</i></li><li>• <i>Sun StorEdge SAN 4.1 Release Notes</i></li></ul>	817-0061 817-0056 817-0057 817-0062 817-0063 817-0071
<b>3Com Ethernet hubs</b>	<ul style="list-style-type: none"><li>• <i>SuperStack 3 Baseline Hub 12-Port TP User Guide</i></li><li>• <i>SuperStack 3 Baseline Hub 24-Port TP User Guide</i></li></ul>	3C16440A 3C16441A

<b>Product</b>	<b>Title</b>	<b>Part Number</b>
<b>SANbox-8/16 Segmented Loop FC Switch</b>	• <i>SANbox-8/16 Segmented Loop Fibre Channel Switch Management User's Manual</i>	875-3060
	• <i>SANbox-8 Segmented Loop Fibre Channel Switch Installer's/User's Manual</i>	875-1881
	• <i>SANbox-16 Segmented Loop Fibre Channel Switch Installer's/User's Manual</i>	875-3059
<b>Expansion cabinet</b>	• <i>Sun StorEdge Expansion Cabinet Installation and Service Manual</i>	805-3067
<b>Storage Server Processor</b>	• <i>Sun V100 Server User's Guide</i>	806-5980
	• <i>Netra X1 Server User's Guide</i>	806-5980
	• <i>Netra X1 Server Hard Disk Drive Installation Guide</i>	806-7670

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# Introduction

The Sun StorEdge 3900 and 6900 series storage subsystems are complete preconfigured storage solutions. The configurations for each of the storage subsystems are shown in TABLE 1-1.

**TABLE 1-1** Sun StorEdge 3900 and 6900 Series Configurations

Series	System	Sun StorEdge Fibre Channel Switches Supported <sup>1</sup>	Sun StorEdge T3+ Array Partner Groups Supported	Additional Array Partner Groups Supported with Optional Expansion Cabinet	Virtualization Engine
Sun StorEdge 3900 series	Sun StorEdge 3910 system	Two 8-port switches	One to four	N/A	N/A
3900SL <sup>2</sup>	Sun StorEdge 3960 system	Two 16-port switches	One to four	One to five	
Sun StorEdge 6900 series	Sun StorEdge 6910 system	Four 8-port switches	One to three	One to four	One virtualization engine pair
6910SL <sup>3</sup> 6960SL <sup>3</sup>	Sun StorEdge 6960 system	Four 16-port switches	One to three	One to four	Two virtualization engine pairs
<sup>1</sup> 1 Gbit or 2 Gbit switches <sup>2</sup> 3900SL—No switches <sup>3</sup> 6910SL and 6960SL—No front-end switches; two back-end switches					

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# Predictive Failure Analysis (PFA) Capabilities

The Storage Automated Diagnostic Environment software provides the health and monitoring functions for the Sun StorEdge 3900 and 6900 series systems. This software provides the following predictive failure analysis (PFA) capabilities:

- **FC links**—Fibre Channel (FC) links are monitored at all end points using the Fibre Channel-Extended Link Service (FC-ELS) link counters. When link errors surpass the threshold values, an alert is sent. This enables Sun-trained personnel to replace components that are experiencing high transient fault levels before a hard fault occurs.
- **Enclosure status**—Many devices, like the Sun StorEdge FC switch-8 and switch-16 switch and the Sun StorEdge T3+ array, cause the Storage Automated Diagnostic Environment alerts to be sent if the temperature thresholds are exceeded. This enables Sun-trained personnel to address the problem before the component and enclosure fails.
- **Single Point-of-Failure (SPOF) notification**—Storage Automated Diagnostic Environment notification for path failures and failovers (that is, Sun StorEdge Traffic Manager software failover) can be considered a PFA method, since Sun-trained personnel are notified and can repair the primary path. This eliminates the time of exposure to SPOF and helps to preserve customer availability during the repair process.

PFA is not always effective in detecting or isolating failures. The remainder of this document provides guidelines that you can use to troubleshoot problems that occur in supported components of the Sun StorEdge 3900 and 6900 series.

# General Troubleshooting Procedures

---

This chapter contains the following sections:

- “High-Level Troubleshooting Tasks” on page 3
- “Host-Side Troubleshooting” on page 6
- “Storage Service Processor-Side Troubleshooting” on page 6
- “Verifying the Configuration Settings” on page 7
- “Sun StorEdge 6900 Series Multipathing Example” on page 11
- “Multipathing Options in the Sun StorEdge 6900 Series” on page 16

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## High-Level Troubleshooting Tasks

This section lists the high-level steps you can take to isolate and troubleshoot problems in the Sun StorEdge 3900 and 6900 series. It offers a methodical approach, and lists the tools and resources available at each step.

---

**Note** – A single problem can cause various errors throughout the storage area network (SAN). A good practice is to begin by investigating the devices that have experienced “Loss of Communication” events in the Storage Automated Diagnostic Environment. These errors usually indicate more serious problems.

A “Loss of Communication” error on a switch, for example, could cause multiple ports and host bus adapters (HBAs) to go offline. Concentrating on the switch and fixing that failure can help bring the ports and HBAs back online.

---

1. **Discover the error by checking one or more of the following messages or files:**
  - Storage Automated Diagnostic Environment alerts or email messages
    - `/var/adm/messages`
    - Sun StorEdge T3+ array `syslog` file
  - Storage Service Processor messages
    - `/var/adm/messages.t3` messages
    - `/var/adm/log/SEcfglog` file
2. **Determine the extent of the problem by using one or more of the following methods:**
  - Review the Storage Automated Diagnostic Environment topology view.
  - Using the Storage Automated Diagnostic Environment revision checking functionality, determine whether the package or patch is installed.
  - Verify the functionality using one of the following tools:
    - `checkdefaultconfig(1M)`
    - `cfgadm -al` output
    - `luxadm(1M)` output
  - Review the multipathing status using the Sun StorEdge Traffic Manager (MPxIO) software or `vxdmp(1M)` command.
3. **Check the status of a Sun StorEdge T3+ array by using one or more of the following methods:**
  - Review the Storage Automated Diagnostic Environment device monitoring reports.
  - Run the `checkt3config(1M)` and `showt3(1M)` commands, which check and display the Sun StorEdge T3+ array configuration.
  - Manually open a Telnet session to the Sun StorEdge T3+ array.
  - Review the `luxadm(1M)` display output.
  - Review the LED status on the Sun StorEdge T3+ array.
  - Review the Explorer Data Collection Utility output, which is located on the Storage Service Processor.



**4. Check the status of the Sun StorEdge network FC switch-8 and switch-16 switches using the following tools:**

- Review the Storage Automated Diagnostic Environment device monitoring reports.
- Run the `checkswitch(1M)` and `showswitch(1M)` commands, which check and display the Sun StorEdge FC switch configurations.
- Review the online and offline LED status codes and POST error codes, which can be found in the *Sun StorEdge SAN 4.0 and SAN 4.1 Release Installation Guide*.
- Review the Explorer Data Collection Utility output, which is located on the Storage Service Processor.
- Refer to the SANSurfer GUI, which supports the Sun StorEdge 4.0 Release, or the SANbox Manager, which supports the Sun StorEdge 4.1 Release.

---

**Note** – To run the SANSurfer GUI or SANbox Manager from the Storage Service Processor, you must export X-Display.

---

**5. Check the status of the virtualization engine using one or more of the following methods:**

- Review the Storage Automated Diagnostic Environment device monitoring reports.
- Run the `checkvbe(1M)`, `checkvemap(1M)` and `showvemap(1M)` commands, which check and display the virtualization host and LUN configurations.
- Refer to the LED status blink codes “Virtualization Engine LEDs” on page 110.

**6. Quiesce the I/O along the path to be tested using one of the following methods:**

- For installations using VERITAS Dynamic Multi-Pathing (DMP), disable `vxdmpadm(1M)`.
- For installations using the Sun StorEdge Traffic Manager (MPxIO) software, unconfigure the Fabric device.
- Refer to “To Quiesce the I/O” on page 17.
- Halt the application.

**7. Test and isolate field-replaceable units (FRUs) using the following tools:**

- Storage Automated Diagnostic Environment diagnostic tests (this might require a loopback cable for isolation)
- Sun StorEdge T3+ array tests, including `t3test(1M)`, `t3ofdg(1M)`, and `t3volverify(1M)`, which can be found in the *Storage Automated Diagnostic Environment User's Guide*

---

**Note** – These tests isolate the problem to a FRU that must be replaced. Follow the instructions in the *Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide* and the *Sun StorEdge 3900 and 6900 Series 2.0 Installation Guide* for proper FRU replacement procedures.

---

**8. Verify the fix using the following tools:**

- Storage Automated Diagnostic Environment GUI Topology View and Diagnostic Tests
- `/var/adm/messages` on the data host

**9. Return the path to service with one of the following methods:**

- Use the multipathing software
- Restart the application

---

## Host-Side Troubleshooting

*Host-side troubleshooting* refers to the messages and errors that the data host detects. Usually these messages appear in the `/var/adm/messages` file.

---

## Storage Service Processor-Side Troubleshooting

Storage Service Processor-side troubleshooting refers to messages, alerts, and errors that the Storage Automated Diagnostic Environment detects while running on the Storage Service Processor. You can find these messages by monitoring the following Sun StorEdge 3900 series and Sun StorEdge 6900 series components:

- Sun StorEdge network FC switch-8 and switch-16 switches
- Virtualization engine
- Sun StorEdge T3+ array

Combining the host-side messages and errors and the Storage Service Processor-side messages, alerts, and errors into a meaningful context is essential for proper troubleshooting.

---

# Verifying the Configuration Settings

During the course of troubleshooting, you might need to verify configuration settings on the various components in the Sun StorEdge 3900 or 6900 series.

## ▼ To Verify Configuration Settings

### 1. Run one of the following scripts:

- Run the `runsecfg(1M)` script and select the various Verify menu selections for the Sun StorEdge T3+ arrays, the Sun StorEdge network FC switch-8 and switch-16 switches, and the virtualization engine components.
- Run the `checkdefaultconfig(1M)` script to check all accessible components. The output is shown in CODE EXAMPLE 2-1.
- Run the `checkswitch(1M) | checkt3config(1M) | checkve(1M) | checkvemap(1M)` scripts from `/opt/SUNWsecfg/bin` to check the settings on the Sun StorEdge network FC switch-8 and switch-16 switches, the Sun StorEdge T3+ array, and the virtualization engine.

The scripts check the default configuration files in the `/opt/SUNWsecfg/etc` directory and compare the current, live settings to those of the defaults. Any differences are marked with a FAIL.

---

**Note** – For cluster configurations and systems that are attached to Microsoft Windows NT, the default configurations may not match the current installed configuration. Be aware of this when running the verification scripts. Certain items may be flagged as FAIL in these special circumstances.

---

## CODE EXAMPLE 2-1 checkdefaultconfig(1M) Output

```
# /opt/SUNWsecfg/checkdefaultconfig

Checking all accessible components.....

Checking switch: sw1a
Switch sw1a - PASSED
Checking switch: sw1b
Switch sw1b - PASSED
Checking switch: sw2a
Switch sw2a - PASSED
Checking switch: sw2b
Switch sw2b - PASSED
Please enter the Sun StorEdge T3+ array password :

Checking T3+: t3b0

Checking : t3b0 Configuration.....

                Checking command ver           : PASS
                Checking command vol stat       : PASS
                Checking command port list      : PASS
                Checking command port listmap   : PASS
                Checking command sys list       : FAIL  <-- Failure Noted

Checking T3+: t3b2
Checking : t3b2 Configuration.....

                Checking command ver           : PASS
                Checking command vol stat       : PASS
                Checking command port list      : PASS
                Checking command port listmap   : PASS
                Checking command sys list       : PASS

<snip>

Checking Virtualization Engine Pair Parameters: v1a
v1a configuration check passed

Checking Virtualization Engine Pair Parameters: v1b
v1b configuration check passed

Checking Virtualization Engine Pair Configuration: v1
checkvemap: virtualization engine map v1 verification complete: PASS.
```

**2. If anything is marked FAIL, check the /var/adm/log/SECfglog file for the details of the failure.**

```
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : -----
-SAVED CONFIGURATION-----
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : blocksize : 16k.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : cache : auto.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : mirror : auto.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : mp_support : rw.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : rd_ahead : off.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : recon_rate : med.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : sys memsize : 32
MBytes.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : cache memsize :
256 MBytes.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : .
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : -----
-CURRENT CONFIGURATION-----
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : blocksize : 16k.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : cache : auto.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : mirror : off.

Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : mp_support : rw.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : rd_ahead : off.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : recon_rate : med.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : sys memsize : 32
MBytes.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : cache memsize :
256 MBytes.
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : .
Mon Jan 7 18:07:51 PST 2002 checkt3config: t3b0 INFO : -----
```

In this example, the mirror setting in the Sun StorEdge T3+ array system settings is “off.” The saved configuration setting for this parameter, which is the default setting, should be “auto.”

**3. Fix the FAIL condition, and then verify the settings again.**

```
# /opt/SUNWsecfg/bin/checkt3config -n t3b0

Checking : t3b0 Configuration.....

Checking command ver           : PASS
Checking command vol stat      : PASS
Checking command port list     : PASS
Checking command port listmap  : PASS
Checking command sys list      : PASS
```

# Clearing the Lock File

If you interrupt any of the Configuration Utility scripts (by typing **Control-C**, for example), a lock file might remain in the `/opt/SUNWsecfg/etc` directory, causing subsequent commands to fail. Use the following procedure to clear the lock file.

## ▼ To Clear the Lock File

1. Type the following command:

```
# /opt/SUNWsecfg/bin/removelocks

usage : removelocks [-t|-s|-v]
      where:
          -t - remove all T3+ related lock files.
          -s - remove all switch related lock files.
          -v - remove all virtualization engine related lock files.

# /opt/SUNWsecfg/bin/removelocks -v
```

---

**Note** – After making any change to the virtualization engine configuration, the script saves a new copy of the virtualization engine map. This may take a minimum of two minutes, during which time no additional virtualization engine changes are accepted.

---

If a process such as `savevemap(1M)` is running, you cannot remove the lock file using the `removelocks(1M)` command. This process causes a component to be unavailable.

2. Monitor the `/var/adm/log/SEcfglog` file to see when the `savevemap(1M)` process successfully exits.

**CODE EXAMPLE 2-2** `savevemap(1M)` Output

```
Tue Jan 29 16:12:34 MST 2002 savevemap: v1 ENTER.
Tue Jan 29 16:12:34 MST 2002 checkslicd: v1 ENTER.
Tue Jan 29 16:12:42 MST 2002 checkslicd: v1 EXIT.
Tue Jan 29 16:14:01 MST 2002 savevemap: v1 EXIT.
```

When `savevemap: ve-pair EXIT` is displayed, the `savevemap(1M)` process has successfully exited.

# Sun StorEdge 6900 Series Multipathing Example

This Sun StorEdge 6900 series multipathing example contains the following elements:

- One Sun StorEdge T3+ array partner group
- Two total LUNs
- One 500-Gbyte RAID5 LUN per partner group

See FIGURE 2-1 for a logical view of the Sun StorEdge 6900 series.

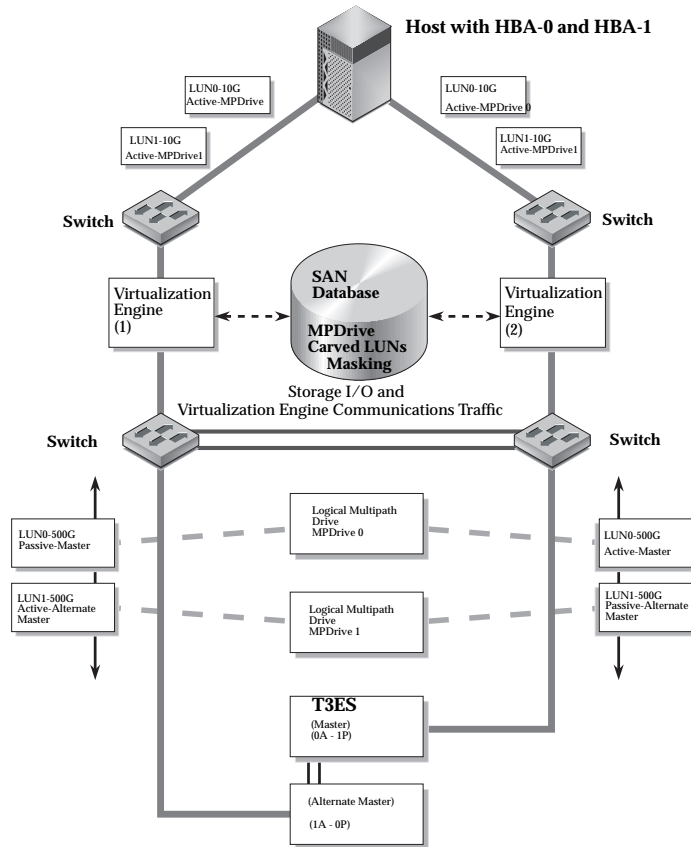


FIGURE 2-1 Sun StorEdge 6900 Series Logical View

Currently, one 10-Gbyte VLUN is created from each physical LUN, for a total of two VLUNs. The Sun StorEdge 6900 series has four possible physical paths to each Sun StorEdge T3+ array volume (LUN).

Refer to FIGURE 2-2, which illustrates primary data paths to the alternate master, and FIGURE 2-3, which illustrates the primary data paths to the master Sun StorEdge T3+ array.

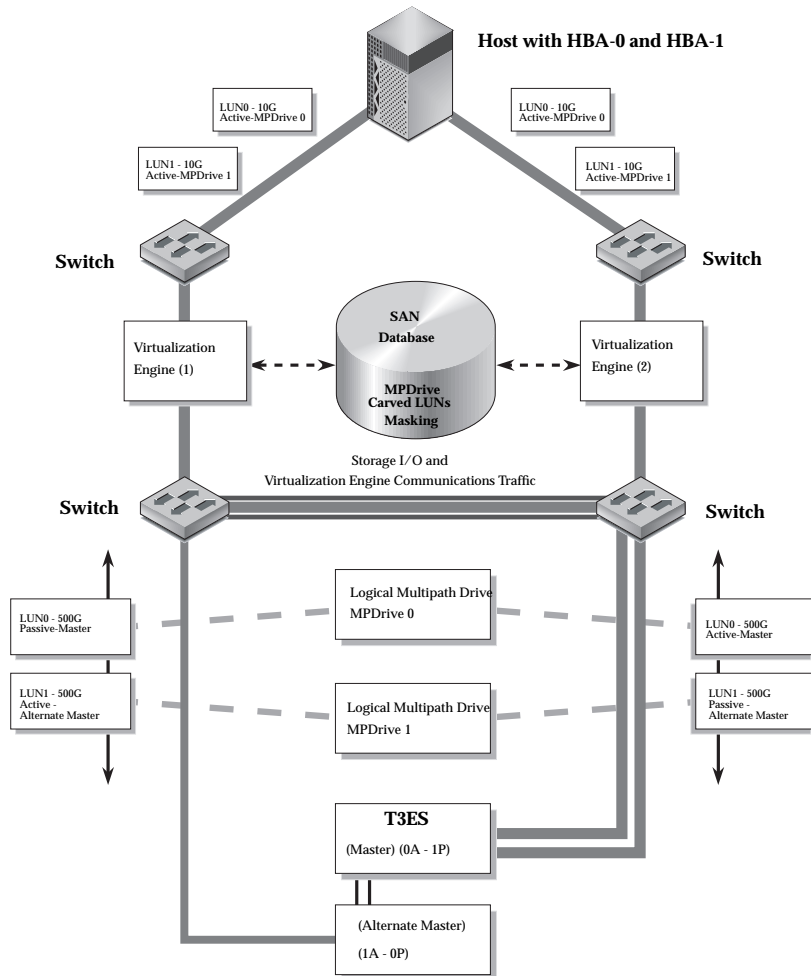
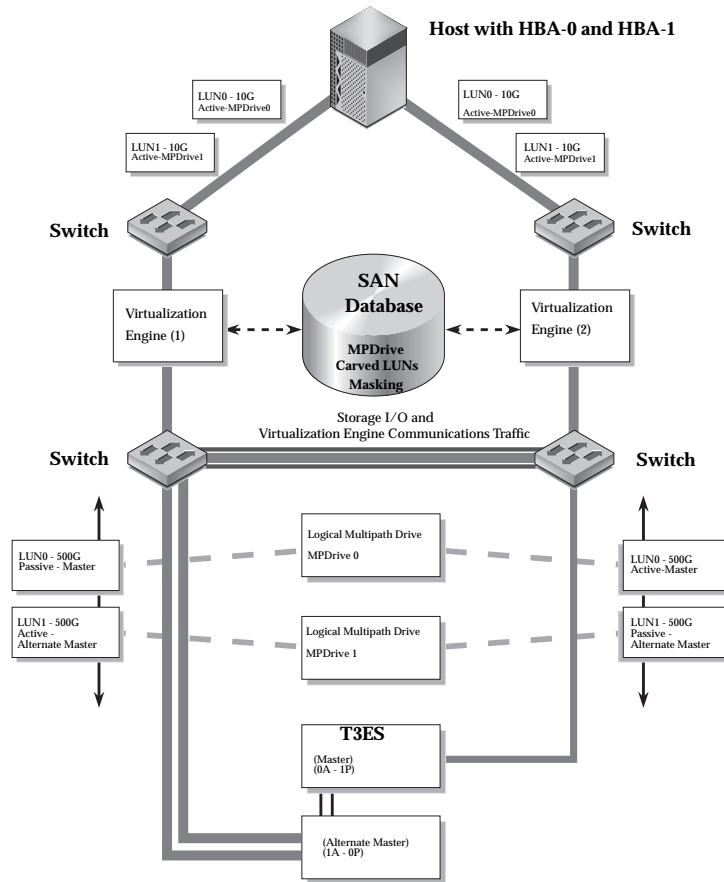


FIGURE 2-2 Primary Data Paths to the Alternate Master





**FIGURE 2-3** Primary Data Paths to the Master Sun StorEdge T3+ Array

To access the LUN on the alternate master, the Sun StorEdge T3+ array I/O could travel:

- From HBA-0 -> switch -> virtualization engine(1) -> switch -> alternate master controller (primary route from HBA-0)
- From HBA-0 -> switch -> virtualization engine(1) -> switch -> switch -> master controller -> backend loop to alternate master (secondary route from HBA-0)
- From HBA-1 -> switch -> virtualization engine(2) -> switch -> switch -> alternate master controller (primary route from HBA-1)
- From HBA-1 -> switch -> virtualization engine(2) -> switch -> master controller -> backend loop to alternate master (secondary route from HBA-1)

The host, using multipathing software, is presented with two primary (active) paths for each LUN, allowing the host to route I/O through either or both HBAs.

If a path failure occurs before the second tier of Sun StorEdge network FC switch-8 and switch-16 switches, one of the paths is disabled—but the other path continues sending I/O as it normally would and takes over the entire load. Refer to FIGURE 2-4, which illustrates a path failure before the second tier of switches.

No Sun StorEdge T3+ array failure is noted because of the redundant path, by way of the Sun StorEdge network FC switch-8 and switch-16 switch T ports.

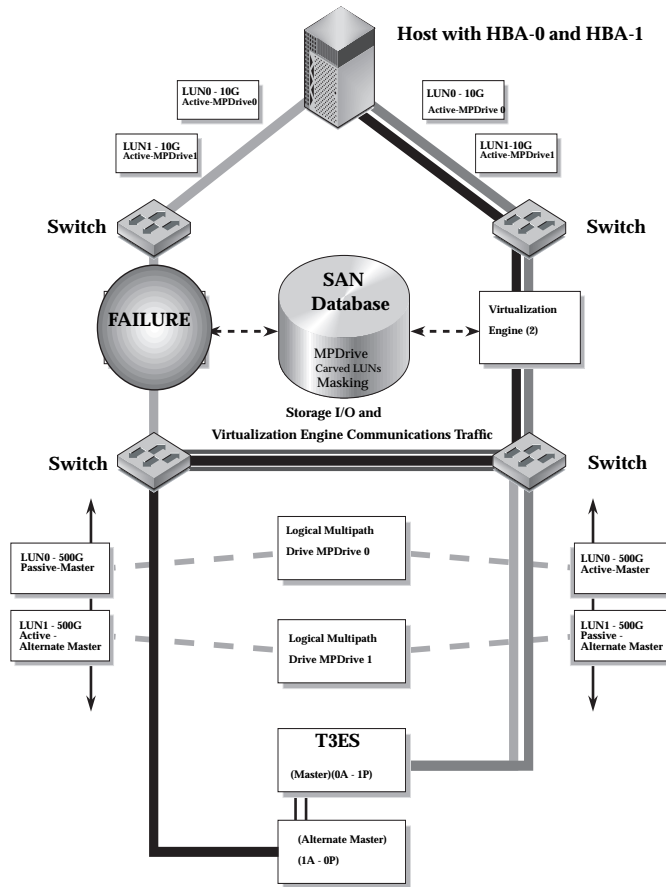
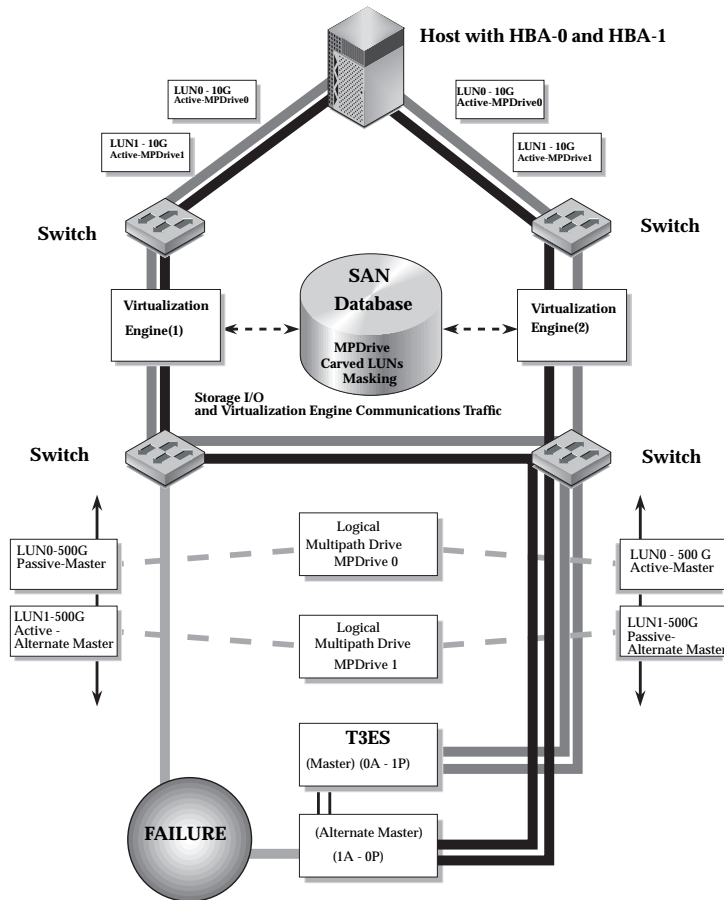


FIGURE 2-4 Path Failure—Before the Second Tier of Switches

The virtualization engine recognizes the primary (active) and secondary (passive) pathing for the LUNs, and routes the I/O to the primary controller—unless there is a path failure to the primary path. In that case, the virtualization engine initiates a LUN failover and routes the I/O through the secondary path (which, in turn, goes through the interconnect cables). Refer to FIGURE 2-5, which illustrates a path failure where I/O is routed through both HBAs.



**FIGURE 2-5** Path Failure—I/O Routed Through Both HBAs

In the event of a path failure after the second tier of Sun StorEdge network FC switch-8 and switch-16 switches (or in the event that both T ports fail between the switches), the virtualization engine forces a LUN failover of the affected Sun StorEdge T3+ array and routes all I/O to its secondary path.

From the host side, nothing has changed: all I/O is routed through both HBAs (refer to FIGURE 2-5).

---

# Multipathing Options in the Sun StorEdge 6900 Series

The presence of the virtualization engine makes multipathing in a Sun StorEdge 6900 series environment challenging.

Unlike Sun StorEdge T3+ array and Sun StorEdge network FC switch-8 and switch-16 switch installations (which present primary and secondary pathing options), the virtualization engines present only primary pathing options to the data host. The virtualization engines handle all failover and failback operations and mask those operations from the multipathing software on the data host.

The following example illustrates a Sun StorEdge Traffic Manager (MPxIO) software problem on a Sun StorEdge 6900 series system.

```
# /usr/sbin/luxadm display

/dev/rdisk/c6t29000060220041F96257354230303052d0s2
DEVICE PROPERTIES for disk: /dev/rdisk/
c6t29000060220041F96257354230303052d0s2
  Status(Port A):      O.K.
  Status(Port B):      O.K.
  Vendor:              SUN
  Product ID:          SESS01
  WWN(Node):           2a000060220041f4
  WWN(Port A):         2b000060220041f4
  WWN(Port B):         2b000060220041f9
  Revision:            080C
  Serial Num:          Unsupported
  Unformatted capacity: 102400.000 MBytes
  Write Cache:         Enabled
  Read Cache:          Enabled
    Minimum prefetch:  0x0
    Maximum prefetch:  0x0
  Device Type:         Disk device
  Path(s):
    /dev/rdisk/c6t29000060220041F96257354230303052d0s2
    /devices/scsi_vhci/ssd@g29000060220041f96257354230303052:c,raw
      Controller      /devices/pci@6,4000/SUNW,qlc@2/fp@0,0
        Device Address 2b000060220041f4,0
        Class          primary
        State          ONLINE
      Controller      /devices/pci@6,4000/SUNW,qlc@3/fp@0,0
        Device Address 2b000060220041f9,0
        Class          primary
        State          ONLINE
```

Note that in the `Class` and `State` fields, the virtualization engines are presented as two primary `ONLINE` devices. The current Sun StorEdge Traffic Manager software design does not enable you to manually halt the I/O (that is, you cannot perform a failover to the secondary path) when only primary devices are present.

## Manually Halting the I/O

As an alternative to using the Sun StorEdge Traffic Manager (MPxIO) software, you can manually halt the I/O using one of two methods:

- Quiesce the I/O
- Unconfigure the `c2` path

These methods are explained in the following sections.

### ▼ To Quiesce the I/O

1. Determine the path you want to disable.
2. Type:

```
# cfgadm -c unconfigure device
```

### ▼ To Unconfigure the `c2` Path

1. Type:

```
# 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-fabric	connected	configured	unknown
c2::210100e08b23fa25	unknown	connected	unconfigured	unknown
c2::2b000060220041f4	disk	connected	configured	unknown
c3	fc-fabric	connected	configured	unknown
c3::210100e08b230926	unknown	connected	unconfigured	unknown
c3::2b000060220041f9	disk	connected	configured	unknown
c4	fc-private	connected	unconfigured	unknown
c5	fc	connected	unconfigured	unknown

2. Using the Storage Automated Diagnostic Environment GUI Topology, determine which virtualization engine is in the path you need to disable.
3. Use the worldwide name (WWN) of the virtualization engine that is in the unconfigure command, as follows:

```
# cfgadm -c unconfigure c2::2b000060220041f4
# 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-fabric	connected	unconfigured	unknown
c2::210100e08b23fa25	unknown	connected	unconfigured	unknown
c2::2b000060220041f4	disk	connected	unconfigured	unknown
c3	fc-fabric	connected	configured	unknown
c3::210100e08b230926	unknown	connected	unconfigured	unknown
c3::2b000060220041f9	disk	connected	configured	unknown
c4	fc-private	connected	unconfigured	unknown
c5	fc	connected	unconfigured	unknown

#### 4. Verify that the I/O has halted.

Disabling the path halts the I/O only up to the A3 to B3 link (see FIGURE 5-8). I/O continues to move over the T1 and T2 data paths, as well as the A4 to B4 links to the Sun StorEdge T3+ array.

## Suspending the I/O

Use one of the following methods to suspend the I/O while the failover occurs:

- Stop all customer applications that are accessing the Sun StorEdge T3+ array.
- Manually pull the link from the Sun StorEdge T3+ array to the switch and wait for a Sun StorEdge T3+ array logical unit number (LUN) failover.
  - After the failover occurs, replace the cable and proceed with the testing and FRU isolation.
  - After the testing and any FRU replacement are finished, return the Controller state back to the default by using virtualization engine failback. Refer to “To Failback the Virtualization Engine” on page 120.

---

**Note** – To confirm that a failover is occurring, open a Telnet session to the Sun StorEdge T3+ array and check the output of `port listmap`.

Another, but slower, method is to run the `runsecfg` script and verify the virtualization engine maps by polling them against a live system.

---



---

**Caution** – During the failover, small computer systems interface (SCSI) errors will occur on the data host and a brief suspension of I/O will occur.

---

## ▼ To Put the `c2` Path Back into Production

### 1. Type:

```
# cfgadm -c configure c2::2b000060220041f4
```

### 2. Verify that I/O has resumed on all paths.

## ▼ To View the Dynamic Multi-Pathing (DMP) Properties

### 1. Type:

```
# vxdisk list Disk_1

Device:      Disk_1
devicetag:   Disk_1
type:        sliced
hostid:      diag.xxxxx.xxx.COM
disk:        name=t3dg02 id=1010283311.1163.diag.xxxxx.xxx.com
group:       name=t3dg id=1010283312.1166.diag.xxxxx.xxx.com
flags:       online ready private autoconfig nohotuse autoimport imported
pubpaths:    block=/dev/vx/dmp/Disk_1s4 char=/dev/vx/rdmp/Disk_1s4
privpaths:   block=/dev/vx/dmp/Disk_1s3 char=/dev/vx/rdmp/Disk_1s3
version:     2.2
iosize:      min=512 (bytes) max=2048 (blocks)
public:      slice=4 offset=0 len=209698816
private:     slice=3 offset=1 len=4095
update:      time=1010434311 seqno=0.6
headers:     0 248
configs:     count=1 len=3004
logs:        count=1 len=455
Defined regions:
  config  priv 000017-000247[000231]: copy=01 offset=000000 enabled
  config  priv 000249-003021[002773]: copy=01 offset=000231 enabled
  log     priv 003022-003476[000455]: copy=01 offset=000000 enabled
Multipathing information:

numpaths:    2
c20t2B000060220041F4d0s2      state=enabled
c23t2B000060220041F9d0s2      state=enabled

# vxdmadm listctlr all
CTLR-NAME      ENCLR-TYPE      STATE      ENCLR-NAME
=====
c0              OTHER_DISKS      ENABLED     OTHER_DISKS
c2              SENA             ENABLED     SENA0
c3              SENA             ENABLED     SENA0
c20             Disk             ENABLED     Disk
c23             Disk             ENABLED     Disk
```

The `vxdisk` output includes two physical paths to the LUN:

- `c20t2B000060220041F4d0s2`
- `c23t2B000060220041F9d0s2`

Both of these paths are currently enabled with DMP.



**2. Use the luxadm(1M) command to display further information about the underlying LUN.**

```
# /usr/sbin/luxadm display /dev/rdisk/c20t2B000060220041F4d0s2

DEVICE PROPERTIES for disk: /dev/rdisk/c20t2B000060220041F4d0s2
Status(Port A):      O.K.
Vendor:              SUN
Product ID:          SESS01
WWN(Node):           2a000060220041f4
WWN(Port A):         2b000060220041f4
Revision:            080C
Serial Num:          Unsupported
Unformatted capacity: 102400.000 MBytes
Write Cache:         Enabled
Read Cache:          Enabled
  Minimum prefetch:  0x0
  Maximum prefetch:  0x0
Device Type:         Disk device
Path(s):
/dev/rdisk/c20t2B000060220041F4d0s2
/devices/pci@a,2000/pci@2/SUNW,qlc@4/fp@0,0
ssd@w2b000060220041f4,0:c,raw

# luxadm display /dev/rdisk/c23t2B000060220041F9d0s2

DEVICE PROPERTIES for disk: /dev/rdisk/c23t2B000060220041F9d0s2
Status(Port A):      O.K.
Vendor:              SUN
Product ID:          SESS01
WWN(Node):           2a000060220041f9
WWN(Port A):         2b000060220041f9
Revision:            080C
Serial Num:          Unsupported
Unformatted capacity: 102400.000 MBytes
Write Cache:         Enabled
Read Cache:          Enabled
  Minimum prefetch:  0x0
  Maximum prefetch:  0x0
Device Type:         Disk device
Path(s):
/dev/rdisk/c23t2B000060220041F9d0s2
/devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/
ssd@w2b000060220041f9,0:c,raw
```

## ▼ To Put the DMP-Enabled Paths Back into Production

### 1. Type:

```
# vxdmpadm enable ctlr=<cn>
```

### 2. Verify that the path has been reenabled by typing:

```
# vxdmpadm listctlr all
```

## Troubleshooting Tools

---

This chapter contains the following information related to tools used to troubleshoot the Sun StorEdge 3900 or 6900 series components.

- “Storage Automated Diagnostic Environment 2.2” on page 23
- “Microsoft Windows 2000 System Errors” on page 26
- “Command Line Test Examples” on page 27
- “Monitoring Sun StorEdge T3 and T3+ Arrays Using the Explorer Data Collection Utility” on page 29
- “Monitoring Host Bus Adapters (HBAs) Using QLogic SANblade Manager” on page 32

---

## Storage Automated Diagnostic Environment 2.2

Check the internal status of the Sun StorEdge 3900 or 6900 series systems using the Storage Automated Diagnostic Environment utility, version 2.2.

The Storage Automated Diagnostic Environment is installed on every Storage Service Processor that ships with the unit. All that is needed is web browser access to the Storage Service Processor.

In non-Sun host configurations such as Microsoft Windows 2000, the Storage Automated Diagnostic Environment will be able to monitor the internals of the storage unit (switches, virtualization engines, and the Sun StorEdge T3+ arrays), but will *not* be able to completely monitor the host-to-storage unit link (the HBA to switch). Certain conditions will be noted by Storage Automated Diagnostic Environment, however, such as a port going offline, or increasing Fibre Channel errors on the port.

## Example Topology

In the Storage Automated Diagnostic Environment topology shown in FIGURE 3-1, the internal components of a Sun StorEdge 3910 system are shown. There is also a Solaris host (diag221) and the Storage Service Processor (diag156) in the view. What is missing is the Microsoft Windows 2000 host, which is also connected.

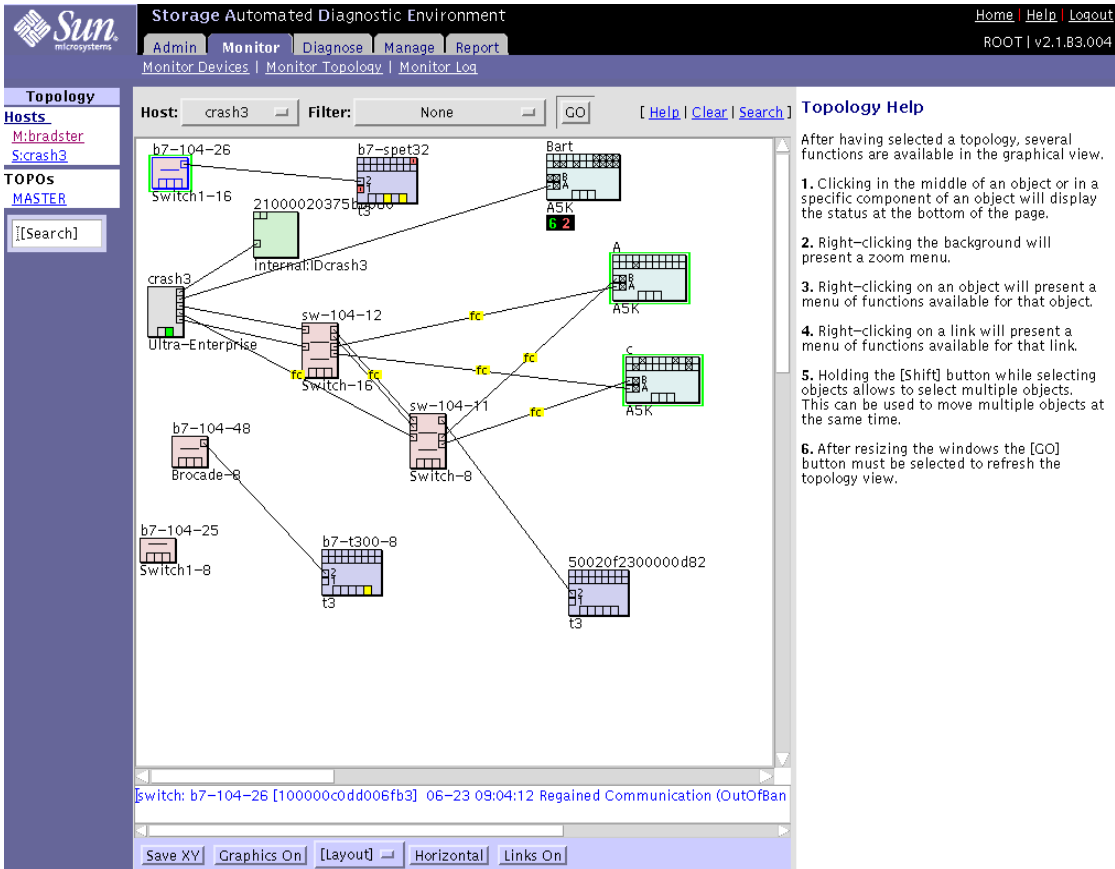


FIGURE 3-1 Storage Automated Diagnostic Environment Example Topology




# Generating Component-Specific Event Grids

The Storage Automated Diagnostic Environment generates component-specific event grids that describe the severity of an event, tell whether action is required, provide a description of the event, and recommended action. Refer to Chapters 5 through 9 of this troubleshooting guide for component-specific event grids.

## ▼ To Customize an Event Report

1. Choose the Event Grid link on the the Storage Automated Diagnostic Environment Help menu.
2. Select the criteria from the Storage Automated Diagnostic Environment event grid, like the one shown in in TABLE 3-1.

TABLE 3-1 Event Grid Sorting Criteria

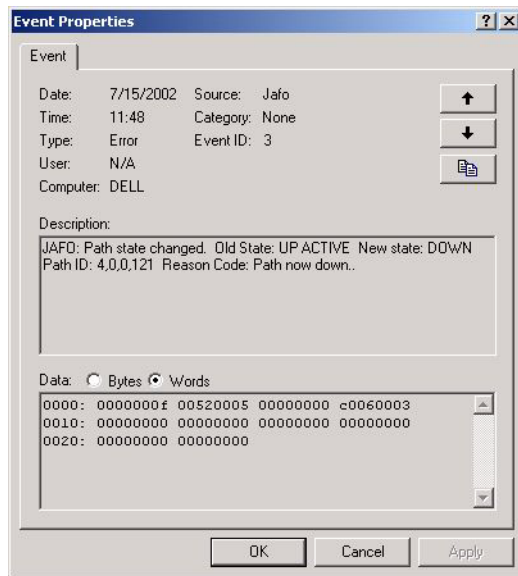
Category	Component	Event Type	Severity	Action
<ul style="list-style-type: none"> <li>• All (default)</li> <li>• Sun StorEdge A3500FC array</li> <li>• Sun StorEdge A5000 array</li> <li>• Agent</li> <li>• Host</li> <li>• Message</li> <li>• Sun Switch</li> <li>• Sun StorEdge T3+ array</li> <li>• Tape</li> <li>• Virtualization engine</li> </ul>	<ul style="list-style-type: none"> <li>• All (default)</li> <li>• Backplane</li> <li>• Controller</li> <li>• Disk</li> <li>• Interface</li> <li>• LUN</li> <li>• Port</li> <li>• Power</li> </ul>	<ul style="list-style-type: none"> <li>• Agent Deinstall</li> <li>• Agent Install</li> <li>• Alarm</li> <li>• FC +</li> <li>• Alternate Master -</li> <li>• Audit</li> <li>• Communication Established</li> <li>• Communication Lost</li> <li>• Discovery</li> <li>• Heartbeat</li> <li>• Insert Component</li> <li>• Location Change</li> <li>• Patch Info</li> <li>• Quiesce End</li> <li>• Quiesce Start</li> <li>• Removal</li> <li>• Remove Component</li> <li>• State Change + (from offline to online)</li> <li>• State Change - (from online to offline)</li> <li>• Statistics</li> <li>• Backup</li> </ul>	<div style="text-align: center;">                       critical (error)                 </div>	<b>Yes</b> —This event is actionable and is sent to the RSS/SRS providers
		<div style="text-align: center;">                       alert (warning)                 </div>	<b>No</b> —This event is nonactionable	
		<div style="text-align: center;">                       system down                 </div>		

---

# Microsoft Windows 2000 System Errors

You can view Microsoft Windows 2000 errors through the Event Properties System Log. The types of errors that would indicate a Sun StorEdge T3+ Array Failover Driver issue have the Source "Jafo". An example is shown in FIGURE 3-2.

You should also look for other events such as any HBA driver-related events (qla2200, for example) or disk-related events.



**FIGURE 3-2** Microsoft Windows 2000 Event Properties System Log

---

# Command Line Test Examples

To run a single Sun StorEdge diagnostic test from the command line rather than through the Storage Automated Diagnostic Environment interface, you must log in to the appropriate host or slave for testing the components.

The following two tests, `qlctest(1M)` and `switchtest(1M)`, are provided as examples.

## `qlctest(1M)`

The `qlctest(1M)` test comprises several subtests that test the functions of the Sun StorEdge PCI dual Fibre Channel (FC) host adapter board. This board is an HBA that has diagnostic support. This diagnostic test is not scalable.

### CODE EXAMPLE 3-1 `qlctest(1M)`

```
# /opt/SUNWstade/Diags/bin/qlctest -v -o "dev=\
/devices/pci@6,4000/SUNW,qlc@3/fp@0,0:devctl|run_connect\
=Yes|mbox=Disable|ilb=Disable|ilb_10=Disable|elb=Enable"

"qlctest: called with options: dev=/devices/pci@6,4000/SUNW,qlc@3/
fp@0,0:devctl|run_connect=Yes|mbox=Disable|ilb=Disable|ilb_10=Disable|el
b=Enable"
"qlctest: Started."
"Program Version is 4.0.1"
"Testing qlc0 device at /devices/pci@6,4000/SUNW,qlc@3/fp@0,0:devctl."
"QLC Adapter Chip Revision = 1, Risc Revision = 3,
Frame Buffer Revision = 1029, Riscrom Revision = 4,
Driver Revision = 5.a-2-1.15 "
"Running ECHO command test with pattern 0x7e7e7e7e"
"Running ECHO command test with pattern 0x1e1e1e1e"
"Running ECHO command test with pattern 0xf1f1f1f1"

...

"Running ECHO command test with pattern 0x4a4a4a4a"
"Running ECHO command test with pattern 0x78787878"
"Running ECHO command test with pattern 0x25252525"
"FCODE revision is ISP2200 FC-AL Host Adapter Driver: 1.12 01/01/16"
"Firmware revision is 2.1.7f"
"Running CHECKSUM check"
"Running diag selftest"
"qlctest: Stopped successfully."
```

## switchtest(1M)

switchtest(1M) diagnoses the Sun StorEdge network FC switch-8 and switch-16 switch devices. The switchtest process also provides command-line access to switch diagnostics. switchtest supports testing on local and remote switches.

switchtest runs the port diagnostic on connected switch ports. While switchtest is running, the switch ports monitor the port statistics and check the chassis status.

### CODE EXAMPLE 3-2 switchtest(1M)

```
# /opt/SUNWstade/Diags/bin/switchtest -v -o "dev=\
2:192.168.0.30:0x0|xfersize=200"\
"switchtest: called with options: dev=2:192.168.0.30:0x0|xfersize=200"

"switchtest: Started."
"Testing port: 2"
"Using ip_addr: 192.168.0.30, fcaddr: 0x0 to access this port."
"Chassis Status for Device: Switch Power: OK Temp: OK 23.0c Fan 1: OK Fan
2: OK"
"Testing Device: Switch Port: 2 Pattern: 0x7e7e7e7e"
"Testing Device: Switch Port: 2 Pattern: 0x1e1e1e1e"
"Testing Device: Switch Port: 2 Pattern: 0xf1f1f1f1"
"Testing Device: Switch Port: 2 Pattern: 0xb5b5b5b5"
"Testing Device: Switch Port: 2 Pattern: 0x4a4a4a4a"
"Testing Device: Switch Port: 2 Pattern: 0x78787878"
"Testing Device: Switch Port: 2 Pattern: 0xe7e7e7e7"
"Testing Device: Switch Port: 2 Pattern: 0xaa55aa55"
"Testing Device: Switch Port: 2 Pattern: 0x7f7f7f7f"
"Testing Device: Switch Port: 2 Pattern: 0x0f0f0f0f"
"Testing Device: Switch Port: 2 Pattern: 0x00ff00ff"
"Testing Device: Switch Port: 2 Pattern: 0x25252525"
"Port: 2 passed all tests on Switch"
"switchtest: Stopped successfully."
```

All Storage Automated Diagnostic Environment diagnostic tests are located in /opt/SUNWstade/Diags/bin. Refer to the *Storage Automated Diagnostic Environment User's Guide* for a complete list of tests, subtests, options, and restrictions.



---

# Monitoring Sun StorEdge T3 and T3+ Arrays Using the Explorer Data Collection Utility

The Explorer Data Collection Utility script is included on the Storage Service Processor in the `/export/packages` directory.

The Explorer Data Collection Utility is not installed by default, but can be installed during rack setup. Customer-specific site information can be entered at that time.

To find out more about the Explorer Data Collection Utility, you can access the web site with the following URL:

<http://webhome.eng.mdeSW/Project/Explorer.html>

## ▼ To Install the Explorer Data Collection Utility on the Storage Service Processor

### 1. Type:

```
# cd /export/packages
# pkgadd -d . SUNWexplo
```

### 2. When you are prompted for site-specific information during the installation process, you can optionally click Return to accept the blank defaults.

---

**Caution** – Do not accept automatic emailing of the Explorer Data Collection Utility output unless the Storage Service Processor is set up to handle mail correctly.

---

```
Automatic Email Submission

Would you like all explorer output to be sent to:
    explorer-database-americas@sun.com
at the completion of explorer when -mail or -e is specified?
[y,n] n
```

3. Before running the Explorer Data Collection Utility, make sure that the switch and Sun StorEdge T3+ array information is added to the proper `/opt/SUNWexplo/etc` files.

### Example

Type switch information in the `/opt/SUNWexplo/etc/saninput.txt` file. Edit the file and add the switch information, as shown in CODE EXAMPLE 3-3.

**CODE EXAMPLE 3-3** Editing Switch Information Using `vi`

```
# vi 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

sw1a   ancor
sw1b   ancor
sw2a   ancor
sw2b   ancor

:wq!
```

4. Type Sun StorEdge T3+ array information in the `/opt/SUNWexplo/etc/t3input.txt` file.
5. Type the password for your specific site.

**CODE EXAMPLE 3-4** Editing Sun StorEdge T3+ Array Information Using `vi`

```
# vi t3input.txt

# Input file for extended data collection
# Format is HOST PASSWORD

t3b0 xxxx
t3b2 xxxx
t3b3 xxxx

:wq!
```

---

**Note** – xxxx represents Sun StorEdge T3+ array passwords.

---

- You can now run `/opt/SUNWexplo/bin/explorer` for information about the Storage Service Processor operating system, the Sun StorEdge network FC switch-8 or switch-16 switch, and Sun StorEdge T3+ array information that you can use for troubleshooting purposes.
- A `tar/gzip` file is put in the `/opt/SUNWexplo/output/tar/gzip` file directory. You can send the `tar/gzip` file to Sun Solution Center for evaluation.
- The Sun StorEdge network FC switch-8 and switch-16 switch information is placed in the `san` directory of the tar file.
- Sun StorEdge T3+ array information is placed in the `disk's/t3` directory.

---

# Monitoring Host Bus Adapters (HBAs) Using QLogic SANblade Manager

The most effective way to retrieve HBA status and information is by using the HBA manufacturer's utility, such as the Qlogic SANblade Manager software provided by Qlogic for their HBAs. This software is freely downloadable from Qlogic's website (<http://www.qlogic.com>).

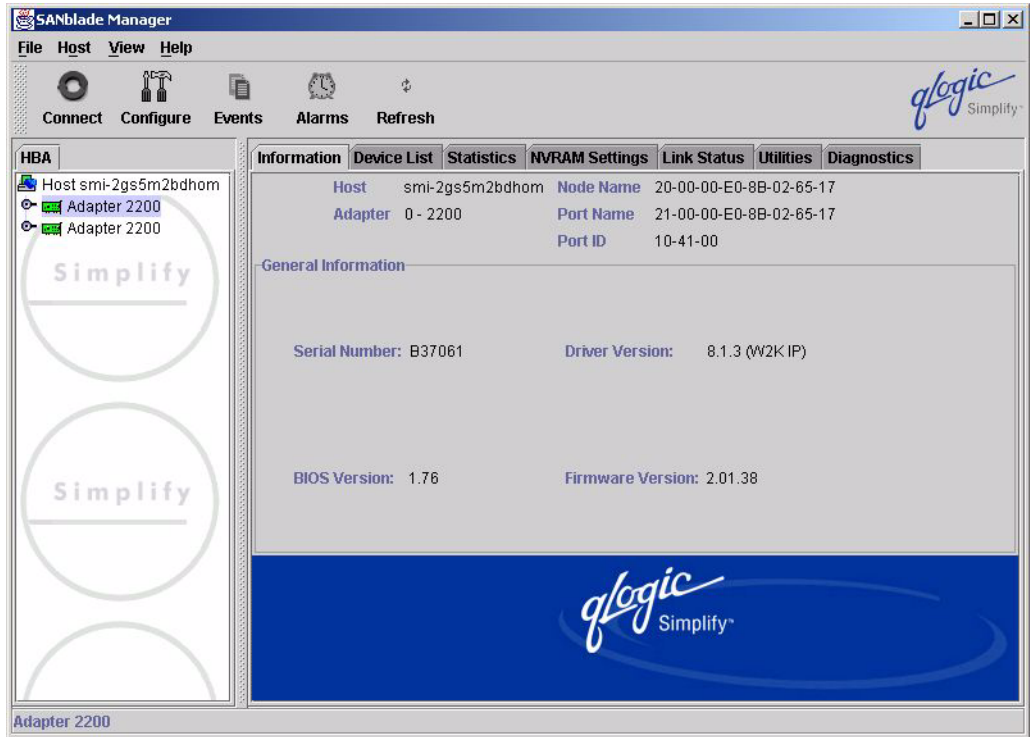
---

**Note** – Other manufacturer's utilities, such as LightPulse's Emulex, are needed for other HBA's, such as Emulex HBAs.

---

Use the Qlogic SANblade Manager to extract information about:

- HBA Driver versions
- Firmware versions
- A primitive topology view
- A LUN listing
- Diagnostics on the HBA



**FIGURE 3-3** Qlogic SANblade Manager HBA Driver and Firmware Versions

QLogic SANblade Manager is also useful for viewing a primitive topology and a LUN listing.

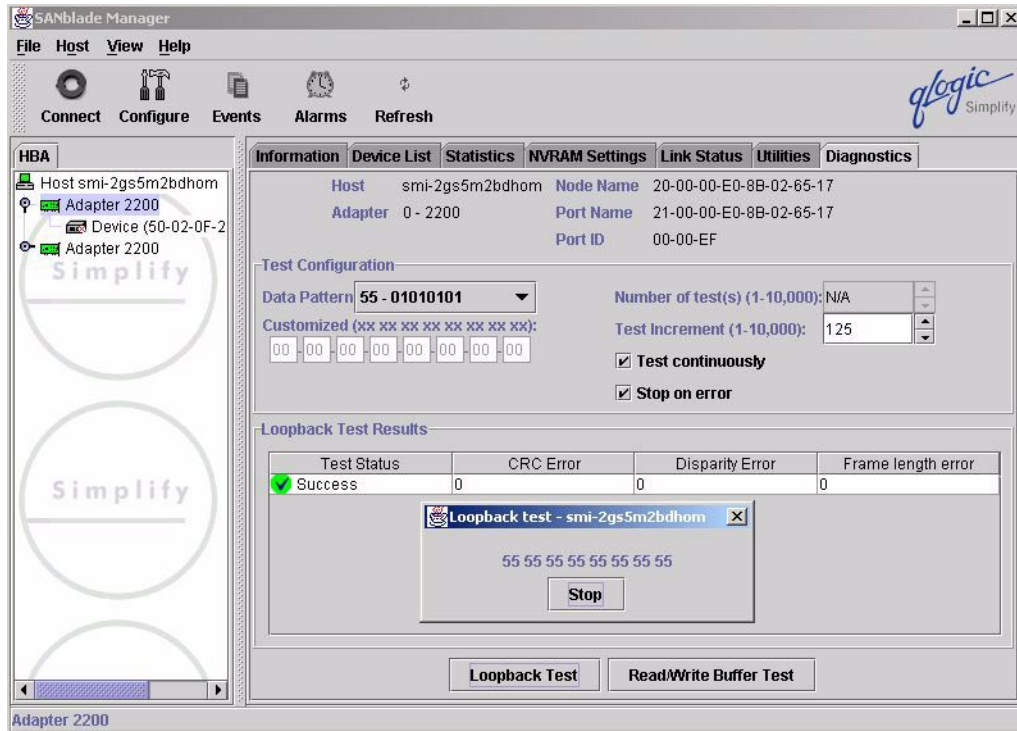


FIGURE 3-4 QLogic SANblade Manager Diagnostics

---

**Note** – Differing HBA manufacturer’s may bundle different features with their tools. The information in this guide is written with the assumption of Qlogic software usage.

---

## Troubleshooting Ethernet Hubs

---

The Sun StorEdge 3900 and 6900 series uses an Ethernet hub as the backbone for the internal service network. The allocation of Ethernet ports is as follows:

- One for the Storage Service Processor (per subsystem)
- One for each FC switch
- One for each virtualization engine
- Two for each Sun StorEdge T3+ array partner group
- One for the Ethernet hub that is installed on the second Sun StorEdge Expansion Cabinet in the Sun StorEdge 3960 and 6960 series systems

---

**Note** – Information about LED status lights, power information, and front panel settings can be found in the 3Com document *SuperStack 3 Baseline Hub 12-Port TP User Guide* or *SuperStack 3 Baseline Hub 24-Port TP User Guide*, available at <http://www.3com.com>.

---

For repair and replacement procedures, refer to the *Sun StorEdge 3900 and 6900 Series Reference and Service Guide*.





# Troubleshooting the Fibre Channel (FC) Links

---

FC links diagnose Sun StorEdge network FC components in a SAN or a direct attached storage (DAS) environment. `linktest(IM)`, which tests the health of the FC links, is available only from the Test from Topology view of the Storage Automated Diagnostic Environment GUI.

---

**Note** – `linktest` tests both ends of the link segment and enters a guided isolation when a fault is detected.

Faults can be detected in one of two ways: when `linktest` sends an alert on a bad or intermittent link, or when a red link appears on the topology graph, indicating a failure.

---

This chapter contains the following sections:

- “FC Links” on page 38
- “Troubleshooting the A1 or B1 FC Link” on page 42
- “Troubleshooting the A2 or B2 FC Link” on page 49
- “Troubleshooting the A3 or B3 FC Link” on page 54
- “Troubleshooting the A4 or B4 FC Link” on page 60

---

# FC Links

The following sections provide troubleshooting information for the basic components and FC links, listed in TABLE 5-1.

TABLE 5-1 FC Links

Link	Provides FC Link Between These Components
A1 to B1	Data host, sw1a, and sw1b
A2	sw1a and v1a*
B2	sw1b and v1b*
A3	v1a and sw2a*
B3	v1b and sw2b*
A4	Master Sun StorEdge T3+ array and the "A" path switch
B4	Alternate master Sun StorEdge T3+ array and the "B" path switch
T1 to T2	sw2a and sw2b*

\* Sun StorEdge 6900 1.1 Series only

By using the Storage Automated Diagnostic Environment, you should be able to isolate the problem to one particular segment of the configuration.

---

**Note** – The information found in this section is based on the assumption that the Storage Automated Diagnostic Environment is running on the data host, and that it is configured to monitor host errors.

---

The following diagrams provide troubleshooting information for the basic components and FC links specific to the Sun StorEdge 3900 1.1 series (shown in FIGURE 5-1), and the Sun StorEdge 6900 1.1 series (shown in FIGURE 5-2).

---

**Note** – An actual Sun StorEdge 3900 or 6900 series configuration could have more Sun StorEdge T3+ arrays than are shown in FIGURE 5-1 and FIGURE 5-2.

---

# FC Link Diagrams

FIGURE 5-1 shows the basic components and the FC links for a Sun StorEdge 3900 series system:

- **A1 to B1**—HBA to Sun StorEdge network FC switch-8 and switch-16 switch link
- **A4 to B4**—Sun StorEdge network FC switch-8 and switch-16 switch to Sun StorEdge T3+ array link

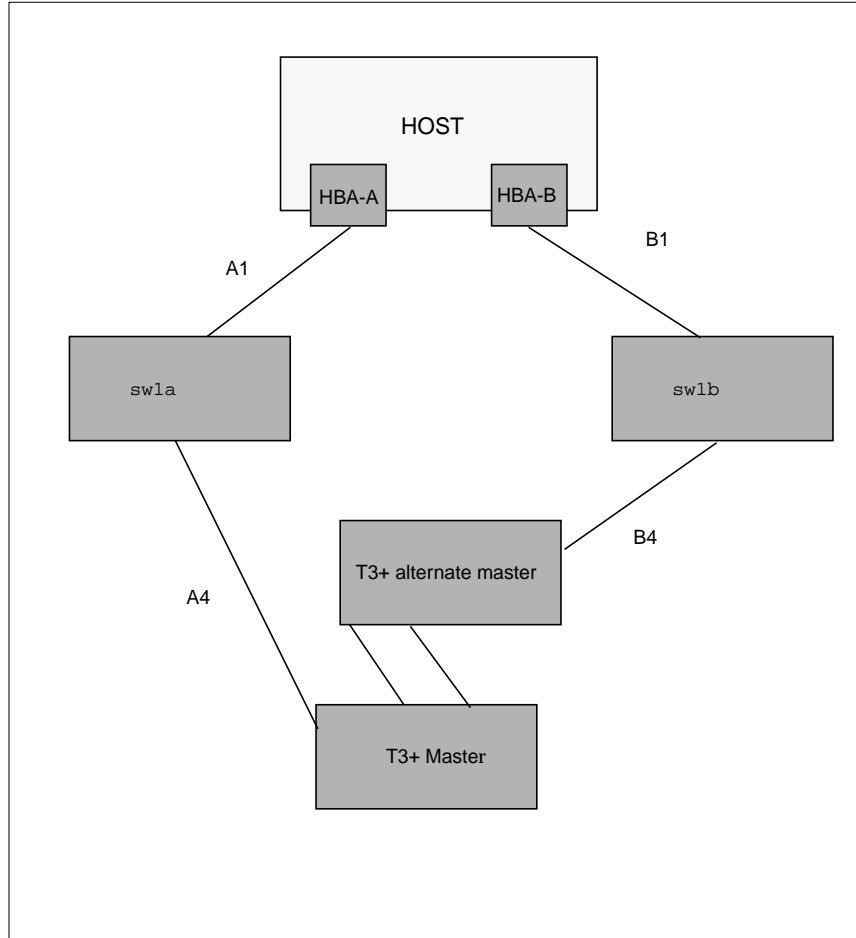
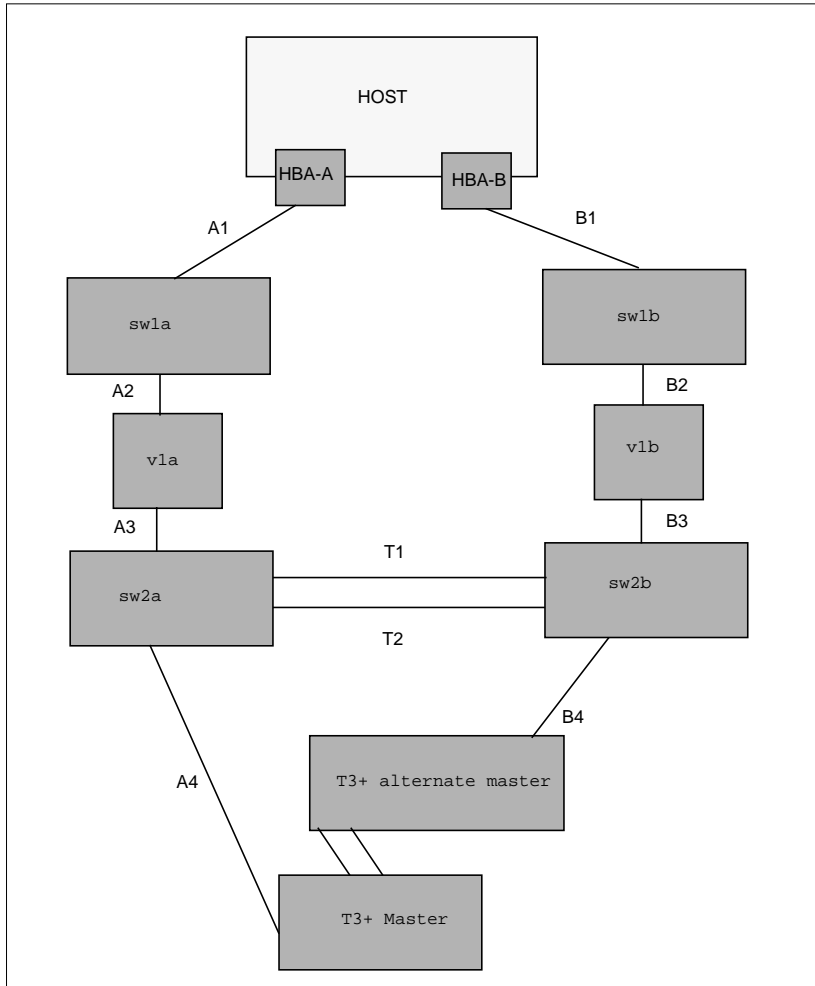


FIGURE 5-1 Sun StorEdge 3900 Series FC Link Diagram

TABLE 5-2 and FIGURE 5-2 shows the basic components and the FC links for a Sun StorEdge 6900 series system:

**TABLE 5-2** Ax to Bx FC Links.

Link	Provides FC Link Between These Components
A1 to B1	HBA to Sun StorEdge network FC switch-8 and switch-16 switch link
A2 to B2	Sun StorEdge network FC switch-8 and switch-16 switch to virtualization engine link on the host side
A3 to B3	Sun StorEdge network FC switch-8 and switch-16 switch to the virtualization engine link on the device side
A4 to B4	Sun StorEdge network FC switch-8 and switch-16 switch to Sun StorEdge T3+ array link
T1 to T2	T port switch-to-switch link



**FIGURE 5-2** Sun StorEdge 6900 Series FC Link Diagram

---

# Troubleshooting the A1 or B1 FC Link

The A1 or B1 link is the FC link from the HBA to the switch.

What happens when a FC link fails depends on the system. If a problem occurs with the A1 or B1 FC link:

- In a Sun StorEdge 3900 series system, the Sun StorEdge T3+ array will fail over.
- In a Sun StorEdge 6900 series system, no Sun StorEdge T3+ array will fail over, but an error with the FC link can cause a path to go offline.

FIGURE 5-3, FIGURE 5-4, and FIGURE 5-5 are examples of A1 or B1 link notification events.

```
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Message      Key: message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.LOOP_OFFLINE
EventTime: 01/08/2002 14:34:45

Found 1 'driver.LOOP_OFFLINE' error(s) in logfile: /var/adm/messages on
diag.xxxxx.xxx.com (id=80fee746):
info: Loop Offline

Jan 8 14:34:25 WWN:      Received 2 'Loop Offline' message(s) [threshold is 1
in 5mins] Last-Message: 'diag.xxxxx.xxx.com qlc: [ID 686697 kern.info] NOTICE:
Qlogic qlc(0): Loop OFFLINE '
```

**FIGURE 5-3** Data Host Notification of Intermittent Problems

```
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Message      Key: message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.MPXIO_offline
EventTime: 01/08/2002 14:48:02

Found 2 'driver.MPXIO_offline' warning(s) in logfile: /var/adm/messages on
diag.xxxxx.xxx.com (id=80fee746):

Jan 8 14:47:07 WWN:2b000060220041f9      diag.xxxxx.xxx.com mpxio: [ID
779286 kern.info] /scsi_vhci/ssd@g29000060220041f96257354230303053
(ssd19) multipath status: degraded, path /pci@6,4000/SUNW,qlc@3/fp@0,0
(fp1) to target address: 2b000060220041f9,1 is offline

Jan 8 14:47:07 WWN:2b000060220041f9      diag.xxxxx.xxx.com mpxio: [ID
779286 kern.info] /scsi_vhci/ssd@g29000060220041f96257354230303052
(ssd18) multipath status: degraded, path /pci@6,4000/SUNW,qlc@3/fp@0,0
(fp1) to target address: 2b000060220041f9,0 is offline
```

**FIGURE 5-4** Data Host Notification of Severe Link Error

```
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Switch      Key: switch:100000c0dd0057bd
EventType: StateChangeEvent.X.port.6
EventTime: 01/08/2002 14:54:20

'port.6' in SWITCH diag-sw1a (ip=192.168.0.30) is now Unknown (status-
state changed from 'Online' to 'Admin'):
```

**FIGURE 5-5** Storage Service Processor Notification

---

**Note** – An A1 or B1 FC link error can cause a port in sw1a or sw1b to change state.

---



# Verifying the Data Host

The following example shows an error in the A1 or B1 FC link, which can cause a path to go offline in the multipathing software.

## CODE EXAMPLE 5-1 luxadm(1M) Display

```
# /usr/sbin/luxadm display

/dev/rdisk/c6t29000060220041F96257354230303052d0s2
DEVICE PROPERTIES for disk: /dev/rdisk/
c6t29000060220041F96257354230303052d0s2
  Status(Port A):      O.K.
  Status(Port B):      O.K.
  Vendor:              SUN
  Product ID:          SESS01
  WWN(Node):           2a000060220041f4
  WWN(Port A):         2b000060220041f4
  WWN(Port B):         2b000060220041f9
  Revision:            080C
  Serial Num:          Unsupported
  Unformatted capacity: 102400.000 MBytes
  Write Cache:         Enabled
  Read Cache:          Enabled
    Minimum prefetch:  0x0
    Maximum prefetch:  0x0
  Device Type:         Disk device
  Path(s):
    /dev/rdisk/c6t29000060220041F96257354230303052d0s2
    /devices/scsi_vhci/ssd@g29000060220041f96257354230303052:c,raw
      Controller      /devices/pci@6,4000/SUNW,qlc@3/fp@0,0
        Device Address 2b000060220041f9,0
        Class           primary
        State          OFFLINE
      Controller      /devices/pci@6,4000/SUNW,qlc@2/fp@0,0
        Device Address 2b000060220041f4,0
        Class           primary
        State           ONLINE

...

```

An error in the A1 or B1 FC link can also cause a device to enter the “unusable” state in `cfgadm -al`, as shown in CODE EXAMPLE 5-2.

**CODE EXAMPLE 5-2** `cfgadm -al` Display

```
# /usr/sbin/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-fabric    connected   configured  unknown
c2::210100e08b23fa25 unknown      connected   unconfigured unknown
c2::2b000060220041f4 disk         connected   configured  unknown
c3                   fc-fabric    connected   configured  unknown
c3::2b000060220041f9 disk       connected   configured unusable
c4                   fc-private   connected   unconfigured unknown
c5                   fc           connected   unconfigured unknown
```

## FRU Tests Available for the A1 or B1 FC Link Segment

The following FRU tests are available for the A1 or B1 FC link segment. All diagnostics are located in `/opt/SUNWstade/Diags/bin`. Refer to the man pages for more details.

- `HBA—qlctest(1M)`
  - Available only if the Storage Automated Diagnostic Environment is installed on a data host
  - Causes HBA to go offline and online during tests
- `Switch —switchtest(1M)`
  - Can be run while the link is still cabled and online (connected to HBA)
  - Can be run only from the Storage Service Processor.
  - The `dev` option to `switchtest` is in the following format:  
Port:IP-Address:FCAddress  
The FCAddress can be set to 0x0.

---

**Note** – If you are testing an A1 or B1 FC link that is connected to an HBA, you must specify a payload of 200 bytes or less. This is a limitation in the HBA application-specific integrated circuit (ASIC).

---

**CODE EXAMPLE 5-3** switchtest(1M) Called With Options

```
# /opt/SUNWstade/Diags/bin/switchtest -v -o "dev=2:192.168.0.30:0"

"switchtest: called with options: dev=2:192.168.0.30:0"
"switchtest: Started."
"Testing port: 2"
"Using ip_addr: 192.168.0.30, fcaddr: 0x0 to access this port."
"Chassis Status for Device: Switch Power: OK Temp: OK 23.0c Fan 1: OK
Fan 2: OK "
02/06/02 15:09:45 diag Storage Automated Diagnostic Environment MSGID 4001
switchtest.WARNING
switch0: "Maximum transfer size for a FABRIC port is 200. Changing
transfer size 2000 to 200"
"Testing Device: Switch Port: 2 Pattern: 0x7e7e7e7e"
"Testing Device: Switch Port: 2 Pattern: 0x1e1e1e1e"
```

---

**Note** – The Storage Automated Diagnostic Environment automatically resets the transfer size if it notes that it is about to test a switch to the HBA connection. This is done both in the Storage Automated Diagnostic Environment GUI and from the command-line interface (CLI).

---

## ▼ To Isolate the A1 or B1 FC Link

To isolate the A1 or B1 link, which is the FC link from the HBA to the switch, follow these steps:

1. **Quiesce the I/O on the A1 or B1 FC link path.**
2. **Run `switchtest(1M)` or `qlctest(1M)` to test the entire link.**
3. **Break the connection by uncabling the link.**
4. **Insert a loopback connector into the switch port.**
5. **Rerun `switchtest`.**
  - a. **If `switchtest` fails, replace the gigabit interface converter (GBIC) and rerun `switchtest`.**
  - b. **If `switchtest` fails again, replace the switch.**
6. **Insert a loopback connector into the HBA.**
7. **Run `qlctest`.**
  - a. **If the `qlctest` test fails, replace the HBA.**
  - b. **If the `qlctest` test passes, replace the cable.**
8. **Recable the entire link.**
9. **Run `switchtest` or `qlctest` to validate the fix.**
10. **Put the path back into production.**

---

# Troubleshooting the A2 or B2 FC Link

The A2 or B2 link is the FC link from the first switch to the virtualization engine. This link exists in the Sun StorEdge 6900 Series only. An error with the FC link can cause a path to go offline.

FIGURE 5-6 and FIGURE 5-7 are examples of A2 or B2 Link Notification Events.

```
From root Tue Jan  8 18:39:48 2002
Date: Tue, 8 Jan 2002 18:39:47 -0700 (MST)
Message-Id: <200201090139.g091dlg07015@diag.xxxxx.xxx.com>
From: Storage Automated Diagnostic Environment.Agent
Subject: Message from 'diag.xxxxx.xxx.com' (2.0.B2.002)
Content-Length: 2742
You requested the following events be forwarded to you from
'diag.xxxxx.xxx.com'.

Site      : FSDE LAB Broomfield CO
Source    : diag226.xxxxx.xxx.com
Severity  : Normal
Category  : Message      Key: message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.Fabric_Warning
EventTime: 01/08/2002 17:34:47

Found 1 'driver.Fabric_Warning' warning(s) in logfile: /var/adm/messages
on diag.xxxxx.xxx.com (id=80fee746):
Info: Fabric warning

Jan 8 17:34:36 WWN:2b000060220041f4   diag.xxxxx.xxx.com fp: [ID 517869
kern.warning] WARNING: fp(0): N_x Port with D_ID=108000,
PWWN=2b000060220041f4 disappeared from fabric

<snip>

multipath status: degraded, path /pci@6,4000/SUNW,qlc@2/fp@0,0 (fp0) to
target address: 2b000060220041f4,1 is offline
Jan 8 17:34:55 WWN:2b000060220041f4   diag.xxxxx.xxx.com

mpxio: [ID 779286 kern.info] /scsi_vhci/
ssd@g29000060220041f96257354230303052 (ssd18)

multipath status: degraded, path /pci@6,4000/SUNW,qlc@2/fp@0,0 (fp0) to
target address: 2b000060220041f4,0 is offline
```

FIGURE 5-6 A2 or B2 FC Link Host-Side Event

```

Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Switch      Key: switch:100000c0dd0061bb
EventType: StateChangeEvent.X.port.1
EventTime: 01/08/2002 17:38:32

'port.1' in SWITCH diag-sw1b (ip=192.168.0.31) is now Unknown (status-
state changed from 'Online' to 'Admin'):
-----

Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : San         Key: switch:100000c0dd0061bb:1
EventType: LinkEvent.ITW.switch|ve
EventTime: 01/08/2002 17:39:47

ITW-ERROR (765 in 11 mins): Origin: port 1 on 'switch 'sw1b/192.168.0.31'.
Destination: port 1 on ve 'diag-v1b/29000060220041f4':
Info:
An invalid transmission word (ITW) was detected between two components.
This could indicate a potential problem.
Cause:
Likely Causes are: GBIC, FC Cable and device optical connections.
Action:
To isolate further please run the Storage Automated Diagnostic Environment
tests associated with this link segment.

```

**FIGURE 5-7** A2 or B2 FC Link Storage Service Processor-Side Event

# Verifying the Data Host

An error in the A2 or B2 FC link can result in a device being listed as in an “unusable” state in `cfgadm`, but no HBAs being listed in the “unconnected” state in the `luxadm` output. The multipathing software will note an offline path, as shown in CODE EXAMPLE 5-4.

**CODE EXAMPLE 5-4** `cfgadm -al`

```
# /usr/sbin/cfgadm -al

Ap_Id                Type                Receptacle  Occupant  Condition
c0                   scsi-bus           connected   configured unknown
...

# /usr/sbin/luxadm -e port

Found path to 2 HBA ports

/devices/pci@6,4000/SUNW,qlc@2/fp@0,0:devctl          CONNECTED
/devices/pci@6,4000/SUNW,qlc@3/fp@0,0:devctl          CONNECTED

# /usr/sbin/luxadm display /dev/rdisk/c6t29000060220041F962573542303052d0s2

DEVICE PROPERTIES for disk: /dev/rdisk/c6t29000060220041F962573542303052d0s2
Status(Port A):      O.K.
Status(Port B):      O.K.
Vendor:              SUN
Product ID:          SESS01
WWN(Node):           2a000060220041f9
WWN(Port A):         2b000060220041f9
WWN(Port B):         2b000060220041f4
Revision:            080C
Serial Num:          Unsupported
Unformatted capacity: 102400.000 MBytes
Write Cache:         Enabled
Read Cache:          Enabled
  Minimum prefetch:  0x0
  Maximum prefetch:  0x0
Device Type:         Disk device
Path(s):
/dev/rdisk/c6t29000060220041F962573542303052d0s2
/devices/scsi_vhci/ssd@g29000060220041f962573542303052:c,raw
Controller           /devices/pci@6,4000/SUNW,qlc@3/fp@0,0
  Device Address      2b000060220041f9,0
  Class               primary
  State               ONLINE
Controller           /devices/pci@6,4000/SUNW,qlc@2/fp@0,0
  Device Address      2b000060220041f4,0
  Class               primary
  State               OFFLINE
```

---

**Note** – You can find procedures for restoring virtualization engine settings in the *Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide*.

---

## Verifying the A2 or B2 FC Link

You can check the A2 or B2 FC link using the Storage Automated Diagnostic Environment, Diagnose—Test from Topology functionality. The Storage Automated Diagnostic Environment's implementation of diagnostic tests verifies the operation of user-selected components. Using the Topology view, you can select specific tests, subtests, and test options.

## FRU Tests Available for the A2 or B2 FC Link Segment

- The `linktest` is not available.
- Both the switch and the GBIC are tested using the `switchtest` test. The `switchtest` test:
  - Can be used only in conjunction with the loopback connector
  - Cannot be cabled to the virtualization engine while `switchtest` runs
- No virtualization engine tests are available.

### ▼ To Isolate the A2 or B2 FC Link

To isolate the A2 or B2 link, which is the FC link from the first switch to the virtualization engine (only in the Sun StorEdge 6900 Series), follow these steps.

---

**Note** – The A2 or B2 FC link exists in a Sun StorEdge 6900 series only.

---

1. Quiesce the I/O on the A2 or B2 FC link path.
2. Break the connection by uncabling the link.
3. Insert the loopback connector in to the switch port.
4. Run `switchtest`:
  - a. If the test fails, replace the GBIC and rerun `switchtest`.
  - b. If the test fails again, replace the switch.



5. If the switch and the GBIC show no errors, replace the remaining components in the following order:
  - a. Replace the virtualization engine-side GBIC, recable the link, and monitor the link for errors.
  - b. Replace the cable, recable the link, and monitor the link for errors.
  - c. Replace the virtualization engine, restore the virtualization engine settings, recable the link, and monitor the link for errors.

---

**Note** – The procedures for restoring virtualization engine settings are in the *Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide*.

---

6. Return the path to production.

---

# Troubleshooting the A3 or B3 FC Link

The A3 or B3 link is the FC link from the virtualization engine to the backend switch. The A3 or B3 FC link exists in a Sun StorEdge 6900 Series only. An error with the FC link can cause a path to go offline.

FIGURE 5-8, FIGURE 5-9, and FIGURE 5-10 are examples of A3 or B3 link notification events.

```
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Message      Key: message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.MPXIO_offline
EventTime: 01/08/2002 18:25:18

Found 2 'driver.MPXIO_offline' warning(s) in logfile: /var/adm/messages on
diag.xxxxx.xxx.com (id=80fee746):

Jan 8 18:24:24 WWN:2b000060220041f9   diag.xxxxx.xxx.com mpxio: [ID 779286
kern.info] /scsi_vhci/ssd@g29000060220041f96257354230303053 (ssd19) multipath
status: degraded, path /pci@6,4000/SUNW,qlc@3/fp@0,0 (fp1) to target address:
2b000060220041f9,1 is offline
Jan 8 18:24:24 WWN:2b000060220041f9   diag.xxxxx.xxx.com mpxio: [ID 779286
kern.info] /scsi_vhci/ssd@g29000060220041f96257354230303052 (ssd18) multipath
status: degraded, path /pci@6,4000/SUNW,qlc@3/fp@0,0 (fp1) to target address:
2b000060220041f9,0 is offline
-----
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Message      Key: message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.Fabric_Warning

EventTime: 01/08/2002 18:25:18

Found 1 'driver.Fabric_Warning' warning(s) in logfile: /var/adm/messages on
diag.xxxxx.xxx.com (id=80fee746):
Info:
Fabric warning

Jan 8 18:24:04 WWN:2b000060220041f9   diag.xxxxx.xxx.com fp: [ID 517869
kern.warning] WARNING: fp(1): N_x Port with D_ID=104000, PWWN=2b000060220041f9
disappeared from fabric
```

**FIGURE 5-8** A3 or B3 FC Link Host-Side Event

```
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Switch      Key: switch:100000c0dd0057bd
EventType: StateChangeEvent.M.port.1
EventTime: 01/08/2002 18:28:38
```

'port.1' in SWITCH diag-sw1a (ip=192.168.0.30) is now Not-Available  
(status-state changed from 'Online' to 'Offline'):

Info:

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

Action:

1. Verify cables, GBICs and connections along FC path
2. Check Storage Automated Diagnostic Environment SAN Topology GUI to identify failing segment of the data path
3. Verify correct FC switch configuration

**FIGURE 5-9** A3 or B3 FC Link Storage Service Processor-Side Event

```
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Normal
Category  : Switch      Key: switch:100000c0dd00cbfe
EventType: StateChangeEvent.M.port.1
EventTime: 01/08/2002 18:28:40
```

'port.1' in SWITCH diag-sw2a (ip=192.168.0.32) is now Not-Available  
(status-state changed from 'Online' to 'Offline'):

Info:

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

Action:

1. Verify cables, GBICs and connections along FC path
2. Check Storage Automated Diagnostic Environment SAN Topology GUI to identify failing segment of the data path
3. Verify correct FC switch configuration

**FIGURE 5-10** A3 or B3 FC Link Storage Service Processor-Side Event

# Verifying the Data Host

An error in the A3 or B3 FC link results in a device being listed as in an “unusable” state in `cfgadm`, but no HBAs are listed as in the “unconnected” state in `luxadm` output. The multipathing software will note an offline path.

## CODE EXAMPLE 5-5 Devices in the “Connected” State

```
# 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-fabric     connected   configured  unknown
c2::210100e08b23fa25 unknown       connected   unconfigured unknown
c2::2b000060220041f4 disk          connected   configured  unknown
c3                   fc-fabric     connected   configured  unknown
c3::2b000060220041f9 disk          connected   configured  unusable
c3::210100e08b230926 unknown       connected   unconfigured unknown
c4                   fc-private    connected   unconfigured unknown
c5                   fc            connected   unconfigured unknown

# /usr/sbin/luxadm -e port

Found path to 2 HBA ports

/devices/pci@6,4000/SUNW,qlc@2/fp@0,0:devctl    CONNECTED
/devices/pci@6,4000/SUNW,qlc@3/fp@0,0:devctl    CONNECTED

# /usr/sbin/luxadm display

/dev/rdisk/c6t29000060220041F96257354230303052d0s2
DEVICE PROPERTIES for disk: /dev/rdisk/
c6t29000060220041F96257354230303052d0s2

...

/devices/scsi_vhci/ssd@g29000060220041f96257354230303052:c,raw
Controller          /devices/pci@6,4000/SUNW,qlc@3/fp@0,0
Device Address      2b000060220041f9,0
Class                primary
State                OFFLINE
Controller          /devices/pci@6,4000/SUNW,qlc@2/fp@0,0
Device Address      2b000060220041f4,0
Class                primary
State                ONLINE
```

## CODE EXAMPLE 5-6 DMP Error Message

```
Jul 8 18:26:38 diag.xxxxx.xxx.com vxdmp: [ID 619769 kern.notice] NOTICE:  
dmp: Path failure on 118/0x1f8  
  
Jul 8 18:26:38 diag.xxxxx.xxx.com vxdmp: [ID 997040 kern.notice] NOTICE:  
vxvm:vxdmp: disabled path 118/0x1f8 belonging to the dmpnode 231/0xd0
```

## Verifying the Storage Service Processor-Side

You can check the A3 or B3 FC link using the Storage Automated Diagnostic Environment's Test from Topology functionality.

The Storage Automated Diagnostic Environment's implementation of diagnostic tests verifies the operation of user-selected components. Using the Topology view, you can select specific tests, subtests, and test options.

Refer to the *Storage Automated Diagnostic Environment User's Guide* for more information.

## FRU Tests Available for the A3 or B3 FC Link Segment

- The `linktest` is not available.
- Both the switch and the GBIC are tested using the `switchtest` test. The `switchtest` test:
  - Can be used only in conjunction with the loopback connector
  - Cannot be cabled to the virtualization engine while `switchtest` runs
- No virtualization engine tests are available at this time.

## ▼ To Isolate the A3 or B3 FC Link

To isolate the A3 or B3 link, which is the FC link from the virtualization engine to the back-end switch, follow these steps:

---

**Note** – The A3 or B3 FC link exists in a Sun StorEdge 6900 series only.

---

1. **Quiesce the I/O on the A3 or B3 FC link path** (refer to “Quiescing the I/O on the A3 or B3 Link” on page 59).
2. **Break the connection by uncabling the link.**
3. **Insert the loopback connector in to the switch port.**
4. **Run `switchtest`:**
  - a. **If the test fails, replace the GBIC and rerun `switchtest`.**
  - b. **If the test fails again, replace the switch.**
5. **If the switch or the GBIC shows no errors, replace the remaining components in the following order:**
  - a. **Replace the virtualization engine-side GBIC, recable the link, and monitor the link for errors.**
  - b. **Replace the cable, recable the link, and monitor the link for errors.**
  - c. **Replace the virtualization engine, restore the virtualization engine settings, recable the link, and monitor the link for errors.**

---

**Note** – The procedures for restoring virtualization engine settings are in the *Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide*.

---

6. **Return the path to production.**

## Quiescing the I/O on the A3 or B3 Link

1. Determine the path you want to disable.
2. Disable the path by typing the following:

```
# /usr/bin/vxdmpadm disable ctrl=<cn>
```

3. Verify that the path is disabled:

```
# /usr/bin/vxdmpadm listctrl all
```

Steps 1 and 2 halt I/O only up to the A3 to B3 link. I/O continues to move over the T1 and T2 paths, as well as the A4 to B4 links to the Sun StorEdge T3+ array.

## Suspending the I/O on the A3 to B3 Link

Use one of the following methods to suspend I/O while the failover occurs:

- Stop all customer applications that are accessing the Sun StorEdge T3+ array.
- Manually pull the link from the Sun StorEdge T3+ array to the switch and wait for a Sun StorEdge T3+ array LUN failover.
  - After the failover occurs, replace the cable and proceed with testing and FRU isolation.
  - After testing is complete and any FRU replacement is finished, return the controller state back to the default by using the virtualization engine failback command.



---

**Caution** – This action will cause SCSI errors on the data host and a brief suspension of I/O while the failover occurs.

---

---

# Troubleshooting the A4 or B4 FC Link

The A4 or B4 link is the FC link from the switch to the Sun StorEdge T3+ array.

If a problem occurs with the A4 or B4 FC link:

- In a Sun StorEdge 3900 series system, the Sun StorEdge T3+ array will fail over.
- In a Sun StorEdge 6900 series system, no Sun StorEdge T3+ array will fail over, but an error with the FC link can cause a path to go offline.

FIGURE 5-11 and FIGURE 5-12 are examples of A4 or B4 Link Notification Events.

```
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Warning
Category  : Message
DeviceId  : message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.MPXIO_offline
EventTime: 01/29/2002 14:28:06

Found 2 'driver.MPXIO_offline' warning(s) in logfile: /var/adm/messages on
diag.xxxxx.xxx.com (id=80e4aa60):

<snip>

-----
Site      : FSDE LAB Broomfield CO
Source    : diag.xxxxx.xxx.com
Severity  : Warning
Category  : Message
DeviceId  : message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.Fabric_Warning
EventTime: 01/29/2002 14:28:06

Found 1 'driver.Fabric_Warning' warning(s) in logfile: /var/adm/messages on
diag.xxxxx.xxx.com (id=80e4aa60):
INFORMATION:
  Fabric warning

<snip>

status of hba /devices/pci@a,2000/pci@2/SUNW,qlc@5/fp@0,0:devctl on
diag.xxxxx.xxx.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
```

**FIGURE 5-11** A4 or B4 FC Link Data-Host Notification



```
Site      : FSDE LAB Broomfield CO
Source    : diag
Severity  : Warning
Category  : Switch
DeviceId  : switch:100000c0dd0061bb
EventType: LogEvent.MessageLog
EventTime: 01/29/2002 14:25:05

Change in Port Statistics on switch diag-sw1b (ip=192.168.0.31):

Port-1: Received 16289 'InvalidTxWds' in 0 mins (value=365972 )
-----
Site      : FSDE LAB Broomfield CO
Source    : diag
Severity  : Warning
Category  : T3message
DeviceId  : t3message:83060c0c
EventType: LogEvent.MessageLog
EventTime: 01/29/2002 14:25:06

Warning(s) found in logfile: /var/adm/messages.t3 on diag (id=83060c0c):

Jan 29 14:12:58 t3b0 ISR1[2]: W: u2ctr ISP2100[2] Received LOOP DOWN async
event
Jan 29 14:13:32 t3b0 MNXT[1]: W: ulctr starting lun 1 failover
-----
Site      : FSDE LAB Broomfield CO
Source    : diag
Severity  : Warning
Category  : T3message
DeviceId  : t3message:83060c0c
EventType: LogEvent.MessageLog
EventTime: 01/29/2002 14:11:14

Warning(s) found in logfile: /var/adm/messages.t3 on diag (id=83060c0c):

Jan 29 14:05:18 t3b0 ISR1[1]: W: u2d4 SVD_PATH_FAILOVER: path_id = 0
Jan 29 14:05:18 t3b0 ISR1[1]: W: u2d5 SVD_PATH_FAILOVER: path_id = 0
Jan 29 14:05:18 t3b0 ISR1[1]: W: u2d6 SVD_PATH_FAILOVER: path_id = 0
Jan 29 14:05:18 t3b0 ISR1[1]: W: u2d7 SVD_PATH_FAILOVER: path_id = 0
Jan 29 14:05:18 t3b0 ISR1[1]: W: u2d8 SVD_PATH_FAILOVER: path_id = 0
Jan 29 14:05:18 t3b0 ISR1[1]: W: u2d9 SVD_PATH_FAILOVER: path_id = 0
```

**FIGURE 5-12** Storage Service Processor-Side Notification

# Verifying the Data Host

A problem in the A4 or B4 FC Link appears differently on the data host, depending on whether the array is a Sun StorEdge 3900 series or a Sun StorEdge 6900 series device.

## Sun StorEdge 3900 Series

In a Sun StorEdge 3900 series device, the data host multipathing software is responsible for initiating the failover and reports it in `/var/adm/messages`, such as those reported by the Storage Automated Diagnostic Environment email notifications.

The `luxadm failover` command is used to fail the Sun StorEdge T3+ array LUNs back to the proper configuration after the failing FRU is replaced. This command is issued from the data host.

## Sun StorEdge 6900 Series

In a Sun StorEdge 6900 series device, the virtualization engine pairs handle the failover and the failover is not noted on the data host. All paths remain online and active.

The `failbackt3path` command is used, and is issued from the Storage Service Processor.

---

**Note** – In the event of a complete `sw1b` or `sw2b` failure in a Sun StorEdge 6900 series configuration, the virtualization engine pairs handle the failover. In addition, the multipathing software notes a path failure on the data host, the Sun StorEdge Traffic Manager or DMP software takes the entire path that was connected to the failed switch offline, and the Inter-Switch Link (ISL) ports on the surviving switch go offline as well.

---

To verify that the failover luxadm display can be used, the failed path is marked "offline," as shown in CODE EXAMPLE 5-7.

**CODE EXAMPLE 5-7** Failed Path Marked Offline

```
# /usr/sbin/luxadm display /dev/rdisk/c26t60020F200000644>

DEVICE PROPERTIES for disk: /dev/rdisk/
c26t60020F20000064433C3352A60003E82Fd0s2
  Status(Port A):      O.K.
  Status(Port B):      O.K.
  Vendor:              SUN
  Product ID:          T300
  WWN(Node):           50020f2000006443
  WWN(Port A):         50020f2300006355
  WWN(Port B):         50020f2300006443
  Revision:            0118
  Serial Num:          Unsupported
  Unformatted capacity: 488642.000 MBytes
  Write Cache:         Enabled
  Read Cache:          Enabled
    Minimum prefetch:  0x0
    Maximum prefetch:  0x0
  Device Type:         Disk device
  Path(s):
    /dev/rdisk/c26t60020F20000064433C3352A60003E82Fd0s2
    /devices/scsi_vhci/ssd@g60020f20000064433c3352a60003e82f:c,raw
  Controller           /devices/pci@a,2000/pci@2/SUNW,qlc@5/fp@0,0
    Device Address     50020f2300006355,1
    Class              primary
    State              OFFLINE
  Controller           /devices/pci@e,2000/pci@2/SUNW,qlc@5/fp@0,0
    Device Address     50020f2300006443,1
    Class              secondary
    State              ONLINE
```

---

**Note** – This type of error may also cause the device to show up as "unusable" in cfigadm, as shown in CODE EXAMPLE 5-8.

---

## CODE EXAMPLE 5-8 Failed Path Marked Unusable

```
# cfigadm -a1
Ap_Id          Type          Receptacle  Occupant    Condition
ac0:bank0      memory        connected   configured  ok
ac0:bank1      memory        empty       unconfigured unknown
c1             scsi-bus      connected   configured  unknown
c16            scsi-bus      connected   unconfigured unknown
c18            scsi-bus      connected   unconfigured unknown
c19            scsi-bus      connected   unconfigured unknown
c1::dsk/c1t6d0 CD-ROM        connected   configured  unknown
c20            fc-private    connected   unconfigured unknown
c21            fc-fabric     connected   configured  unknown
c21::50020f2300006355 disk          connected   configured  unusable
```

## FRU Tests Available for the A4 or B4 FC Link Segment

- The `switchtest` can only be run from the Storage Service Processor.
- The `linktest` can isolate the switch and the GBIC on the switch. It cannot isolate the cable or the Sun StorEdge T3+ array controller.

### ▼ To Isolate the A4 or B4 FC Link

To isolate the A4 or B4 link, which is the FC link from the switch to the Sun StorEdge T3+ array, follow these steps.

1. Quiesce the I/O on the A4 or B4 FC link path.
2. Run `linktest(1M)` from the Storage Automated Diagnostic Environment GUI to isolate suspected failing components.

Alternatively, follow these steps:

1. Quiesce the I/O on the A4 or B4 FC link path.
2. Run `switchtest(1M)` to test the entire link (re-create the problem).
3. Break the connection by uncabling the link.
4. Insert the loopback connector in to the switch port.

5. **Rerun `switchtest`.**
  - a. **If `switchtest` fails, replace the GBIC and rerun `switchtest`.**
  - b. **If the test fails again, replace the switch.**
6. **If `switchtest` passes, assume that the suspect components are the cable and the Sun StorEdge T3+ array controller.**
  - a. **Replace the cable.**
  - b. **Rerun `switchtest`.**
7. **If the test fails again, replace the Sun StorEdge T3+ array controller.**
8. **Return the path to production.**
9. **Return the Sun StorEdge T3+ array LUNs to the correct controllers, if a failover occurred. (Determine if failovers occur using the `luxadm failover` or `failbackt3path` commands.)**



## Troubleshooting Host Devices

---

This chapter describes how to troubleshoot components associated with a Sun StorEdge 3900 or 6900 series host.

This chapter contains the following sections:

- “To Access the Host Event Grid” on page 67
- “To Replace the Master Host” on page 71
- “To Replace the Alternate Master or Slave Monitoring Host” on page 72

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### Using the Host Event Grid

The Storage Automated Diagnostic Environment Event Grid enables you to sort host events by component, category, or event type. The Storage Automated Diagnostic Environment GUI displays an event grid that describes the severity of the event, tells whether action is required, provides a description of the event, and gives the recommended action. Refer to the *Storage Automated Diagnostic Environment User's Guide* for more information.

#### ▼ To Access the Host Event Grid

1. From the Storage Automated Diagnostic Environment Help menu, choose the Event Grid link.
2. FIGURE 6-1 shows the Host Event Grid, from which you can select related criteria for the event you are troubleshooting.

- Help
- Help Page
- ▶ Event Grid
- Event Grid (pdf)
- Architecture
- Diagnostics
- Diag. Strategy
- Utilities
- Release Notes
- User's Guide (pdf)
- Abbreviations
- Copyrights

## Event Grid [ Help ]

Select a Category/Component/EventType and type [GO] to limit the report. Click on the Columns headers to change the sort. Check [ReportFormat] to display a Report format. Click Info/Action to Review.

<b>Category:</b> host <input type="text"/>	<b>Component:</b> All <input type="text"/>	<b>Event Type:</b> All <input type="text"/>	<b>ReportFormat</b> <input type="checkbox"/>	<b>GO</b>
---	---	--	--	-----------

+ Cat	Comp.	EventType	Sev.	Action	Description
host	hba	Alarm+	✔		[ Info ] status of hba /devices/sbus@9,0/SUNW,qlc@0,30000/fp@0,0:devctl on diag245.central.sun.com changed from NOT CONNECTED to CONNECTED
host	hba	Alarm-	❗	Y	[ Info ] status of hba /devices/sbus@9,0/SUNW,qlc@0,30000/fp@0,0:devctl on diag245.central.sun.com changed from CONNECTED to NOT CONNECTED
host	lun.T300	Alarm-	❗	Y	[ Info ] The state of lun.T300.c14t50020F2300003EE5d0s2.statusA on diag245.central.sun.com changed from 'O.K.' to 'ERROR' (target=t3:diag244-t3b0/90.0.0.40)
host	lun.VE	Alarm-	❗	Y	[ Info ] The state of lun.VE.c14t50020F2300003EE5d0s2.statusA on diag245.central.sun.com changed from 'O.K.' to 'ERROR' (target=ve:diag244-ve0/90.0.0.40)
host	ifptest	DiagnosticTest-	❗		ifptest (diag240) on host failed
host	qlctest	DiagnosticTest-	❗		qlctest (diag240) on host failed
host	socaltest	DiagnosticTest-	❗		socaltest (diag240) on host failed
host	enclosure	PatchInfo			[ Info ] New Patch and Package Information generated
host	enclosure	backup			[ Info ] Agent Backup

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- 8 events.
- Sev: Severity of the event (Warning → Error → Down)
- Action: This event is Actionable and will be sent to RSS/SRS.
- SubComp: SubComponent

**FIGURE 6-1** Sample Host Event Grid



TABLE 6-1 lists all the host events in the Storage Automated Diagnostic Environment.

**TABLE 6-1** Storage Automated Diagnostic Environment Event Grid for the Host

Component	Event type	Severity	Action	Description	Information
HBA	Alarm+	Yellow		The status of hba / devices/sbus@9,0/SUNW,qlc@0,30000/ fp@0,0:devctl on diag.xxxx.xxx.com. The status changed from not connected to connected.	Monitors changes in the output of the luxadm -e port.
HBA	Alarm-	Red	Y	The status of hba /devices/sbus@9,0/SUNW,qlc@0,30000/ fp@0,0:devctl on diag.xxxx.xxx.com. The status changed from connected to not connected.	<ul style="list-style-type: none"> <li>Monitors changes in the output of the luxadm -e port.</li> <li>Finds the path to 20 HBA ports.</li> </ul>
LUN.t300	Alarm-	Red	Y	The state of LUN.t300.c14t50020F2300003EE5d0s2.statusA on diag.xxxx.xxx.com. The status changed from OK to error (target=t3:diag244-t3b0/90.0.0.40).	The luxadm display reported a change in the port status of one of its paths. The Storage Automated Diagnostic Environment tries to find the enclosure corresponding to this path by reviewing its database of Sun StorEdge T3+ arrays and virtualization engines.
LUN.VE	Alarm-	Red	Y	The state of LUN.VE.c14t50020F2300003EE5d0s2.statusA on diag.xxxx.xxx.com. The Status changed from OK to error (target=ve:diag244-ve0/90.0.0.40).	The luxadm display reported a change in the port status of one of its paths. The Storage Automated Diagnostic Environment tries to find the enclosure corresponding to this path by reviewing its database of Sun StorEdge T3+ arrays and virtualization engines.

**TABLE 6-1** Storage Automated Diagnostic Environment Event Grid for the Host (Continued)

Component	Event Type	Severity	Action	Description	Information
ifptest	Diagnostic Test-	Red	Y	ifptest (diag240) on the host failed.	Check Test Manager for failure details.
qlctest	Diagnostic Test-	Red		qlctest (diag240) on the host failed.	Check Test Manager for failure details.
socaltest	Diagnostic Test-	Red		socaltest (diag240) on the host failed.	Check Test Manager for failure details.
enclosure	PatchInfo			New patch and package information were generated.	Send changes to the output of <code>showrev -p</code> and <code>pkginfo - </code> .
enclosure	backup			The Agent was backed up.	Backs up the configuration file of the Agent.
disk_capacity	Alarm	Yellow	Y	Detected that <code>/var/opt/SUNWstade</code> is at or above 98% capacity by typing: <code>/usr/sbin/df -k /var/opt/SUNWstade</code>	Remove unused files and directories to free up space. Use a larger disk for <code>/var/opt/SUNWstade</code>
disk_capacity_okay	Alarm			Detected that <code>/var/opt/SUNWstade</code> is now below 98% capacity by typing: <code>/usr/sbin/df -k /var/opt/SUNWstade</code>	No action is required.

---

# Replacing the Master, Alternate Master, and Slave Monitoring Host

The following procedures are a high-level overview of the procedures that are detailed in the *Storage Automated Diagnostic Environment User's Guide*. Follow these procedures when replacing a master, alternate master, or slave monitoring host.

---

**Note** – The procedures for replacing the master host are different from the procedures for replacing an alternate master or slave monitoring host.

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## ▼ To Replace the Master Host

Refer to Chapter 2 of the *Storage Automated Diagnostic Environment User's Guide* for detailed instructions for the next four steps.

1. **Install the `SUNWstade` package on a new master host.**
2. **Run `/opt/SUNWstade/bin/ras_install` on the new master host.**
3. **Configure the host as the master host.**

4. **Connect to the master server's GUI at**

`http://<servername>:7654`

5. **Choose System Utilities -> Recover Config.**

Refer to Chapter 3 of the *Storage Automated Diagnostic Environment User's Guide* for detailed instructions.

- a. **In the Recover Config window, enter the IP address of any alternate master or slave monitoring host. (All hosts keep a copy of the configuration.)**
  - b. **Make sure the checkboxes for Recover config and Reset slave to this master are checked.**
  - c. **Click Recover.**
6. **Choose Maintenance -> General Maintenance.**
    - a. **Ensure that all host and device settings are recovered correctly.**
    - b. **Refer to Chapter 3 of the *Storage Automated Diagnostic Environment User's Guide* for detailed instructions.**

7. **Choose Maintenance -> General Maintenance -> Start/Stop Agent to start the agent on the master host.**

## ▼ To Replace the Alternate Master or Slave Monitoring Host

1. **Choose Maintenance -> General Maintenance -> Maintain Hosts.**

Refer to the maintenance section in Chapter 3 of the *Storage Automated Diagnostic Environment User's Guide*.

2. **In the Maintain Hosts window, from the Existing Hosts list, select the host to be replaced and click Delete.**

3. **Install the new host.**

Refer to Chapter 2 of the *Storage Automated Diagnostic Environment User's Guide* for detailed instructions for the next four steps.

4. **Install the SUNWstade package on the new host.**

5. **Run `/opt/SUNWstade/bin/ras_install`.**

6. **Configure the host as a slave.**

7. **Choose Maintenance -> General Maintenance -> Maintain Hosts.**

Refer to the maintenance section in Chapter 3 of the *Storage Automated Diagnostic User's Guide* for detailed instructions.

8. **In the Maintain Hosts window, select the new host.**

9. **Configure the options as needed.**

10. **Choose Maintenance -> Topology Maintenance -> Topology Snapshot.**

- a. **In the Topology Snapshot window, select the new host.**

- b. **Click the Create and Retrieve Selected Topologies button.**

- c. **Click the Merge and Push Master Topology button.**

---

**Note** – Any time you replace a master, alternate master, or slave monitoring host, you must recover the configuration using the procedures described in this section. This is especially important when the Storage Service Processor is replaced as a FRU— whether the Storage Service Processor is the master or the slave.

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# Troubleshooting Switches

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This chapter describes how to troubleshoot the 1 Gbit and 2 Gbit switch components associated with a Sun StorEdge 3900 or 6900 series system.

This chapter contains the following sections:

- “About the Switches” on page 73
- “Using the Switch Event Grid” on page 77
- “setupswitch Exit Values” on page 85

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## About the Switches

The Sun StorEdge network FC switch-8 and switch-16 switches provide cable consolidation and increased connectivity for the internal data interconnection infrastructure.

The switches are paired to provide redundancy. Two switches are used in each Sun StorEdge 3900 series, and four switches are used in each Sun StorEdge 6900 series. Each Sun StorEdge network FC switch-8 and switch-16 switch is connected by way of an Ethernet to the service network for management and service from the Storage Service Processor.

These switches can be monitored through the SANSurfer GUI (for SAN Release 4.0) or the SANbox Manager (for SAN Release 4.1), which is available on the Storage Service Processor. You configure and modify the switches using the Configuration Utilities.



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**Caution** – Do not configure or modify the switches using any method other than the Configuration Utilities included in the `SUNWsecEg` package.

---

The Sun StorEdge network FC switches in a Sun StorEdge 3900 or 6900 configuration now support the Sun StorEdge SAN 4.1 Release. You can upgrade the switches to support the 402xx 2 Gbit-compatible firmware.



---

**Caution** – Use caution when upgrading back-end switches to the 2 Gbit-compatible firmware. Use only the `setswitchflash` command, which performs the upgrade and creates the zone configuration in a controlled manner (refer to the *Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide* for the procedures).

---

## Zone Modifications

You should not modify the shared zone set on the back-end switches—doing so can cause an error (Error State 50) on the virtualization engine. If you determine, however, that you *must* modify the shared zone set, follow these steps:

1. **Offline the T ports (interswitch links).**
2. **Offline the virtualization engine ports.**
3. **Modify the zone on one switch while the other switch continues to run.**
4. **Online the T ports (interswitch links).**
5. **Allow the zone database to merge.**
6. **Online the virtualization engine ports.**

You can use the `sanbox2(1M)` command to offline the ports. For example:

```
# /opt/SUNWsecfg/flib/sanbox2 -x switch-ip-addr port -state  
offline
```

By default:

- T ports are 6 7 14 15
- Virtualization engine ports are 0 8

# Switchless Configurations

In a switchless configuration (Sun StorEdge 3900SL, 6910SL, or 6960SL series system) you can upgrade the switches that are connected to the Solaris server to the Sun StorEdge SAN 4.1 Release firmware. For a list of the supported switches visit the <http://www.sun.com> web site.

Direct attachment to the StorEdge 3900 and 6900 Series arrays with 1 Gbit or 2 Gbit HBAs require no changes.

Before making any changes to the Sun StorEdge 3900 or 6900 series, you must have a Sun StorEdge SAN 4.1 infrastructure already in place and functional. This includes at a minimum:

- A Solaris host on the SAN management network loaded with SANbox2 Manager.
- Sun StorEdge 2 Gbit 16-port switch network configured in desired topology (ring, star, mesh, or cascade) with healthy ISL links.

## ▼ Diagnosing and Troubleshooting Switch Hardware Problems

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**Note** – Whereas 1 Gbit switch port numbers are numbered starting with 1 (one), 2 Gbit switch port numbers are numbered starting with 0 (zero).

---

1. To compare the current configuration to the default configuration, type:

```
# checkswitch -s switch -v
```

2. To compare the current switch configuration to the most recently saved map file, type:

```
# checkswitch -s switch -p -v
```

3. To display the current switch configuration, type:

```
# showswitch -s switch
```

4. To restore the configuration from the saved map file back to the default switch configuration, type:

```
# restoreswitch -s switch
```

For detailed diagnostic and troubleshooting procedures for the Sun StorEdge network FC switch-8 and switch-16 switch hardware, refer to the *Sun StorEdge SAN 4.1 Release Field Troubleshooting Guide*.

This document covers the Sun StorEdge network FC switch-8 and switch-16 switch and the interconnections (HBA, GBIC, and cables) on either side of the switch. The *Sun StorEdge SAN 4.1 Release Field Troubleshooting Guide* also includes an appendix on the Brocade SilkWorm switch troubleshooting.



# Using the Switch Event Grid

The Storage Automated Diagnostic Environment Switch Event Grid enables you to sort switch events by component, category, or event type. The Storage Automated Diagnostic Environment GUI displays an event grid that describes the severity of the event, tells whether action is required, provides a description of the event, and gives the recommended action. Refer to the *Storage Automated Diagnostic Environment User's Guide* for more information.

## ▼ To Use the Switch Event Grid

1. From the Storage Automated Diagnostic Environment Help menu, select the Event Grid link.
2. FIGURE 7-1 shows the Switch Event Grid, from which you can select related criteria for the event you are troubleshooting.

**Storage Automated Diagnostic Environment** Maintenance | Monitor | Diagnose | Report | Utilities | Help  
2.0.06.010 diag176.central.sun.com Help SiteMap

**Event Grid** [ Help ]

Select a Category/Component/EventType and type [GO] to limit the report. Click on the Columns headers to change the sort. Check [ReportFormat] to display a Report format. Click Info/Action to Review.

Category:  Component:  Event Type:  ReportFormat

+ Cat	Comp.	EventType	Sev.	Action	Description
switch	PortStatistics	Log	✓	Y	[ Info/Action ] Change in Port Statistics on switch diag156-sw1b (ip=192.168.0.31):
switch	chassis.fan	Alarm	✓	Y	chassis.fan.1 status changed from OK to Invalid
switch	chassis.power	Alarm	✓	Y	[ Info ] chassis.power.1 status changed from OK to Invalid
switch	chassis.temp	Alarm	✓	Y	[ Info ] chassis.temp.1 status changed from OK to Invalid
switch	chassis.zone	Alarm	✓		[ Info ] Switch sw1a was rezoned: [ new zones ..]
switch	enclosure	Audit			Auditing a new switch called ras d2-swb1 (ip=xxx.0.0.41) 10002000007a609
switch	oob	Comm_Established			Communication regained with sw1a (ip=xxx.20.67.213)
switch	oob	Comm_Lost	✘	Y	[ Info/Action ] Lost communication with sw1a (ip=xxx.20.67.213)
switch	switchtest	DiagnosticTest-	✘		switchtest (diag240) on d2-swb1 (ip=xxx.0.0.41) 10002000007a609
switch	enclosure	Discovery			[ Info ] Discovered a new switch called ras d2-swb1 (ip=xxx.0.0.41) 10002000007a609
switch	enclosure	LocationChange			Location of switch rasd2-swb0 (ip=xxx.0.0.40) was changed
switch	port	StateChange+			[ Info/Action ] 'port.1' in SWITCH diag185 (ip=xxx.20.67.185) is now Available (status=state changed from 'Offline' to 'Online')
switch	port	StateChange-	✘	Y	[ Info/Action ] 'port.1' in SWITCH diag185 (ip=xxx.20.67.185) is now Not-Available (status=state changed from 'Online' to 'Offline')
switch	enclosure	Statistics			[ Info ] Statistics about switch d2-swb1 (ip=xxx.0.0.41) 10002000007a609

Page: 1 of 1

- 13 events.
- Sev: Severity of the event (Warning -> Error -> Down)
- Action: This event is Actionable and will be sent to RSS/SRS.
- SubComp: SubComponent

FIGURE 7-1 Switch Event Grid

TABLE 7-1 lists the switch events for Sun StorEdge network FC switch-8 and switch-16 1 Gbit switches.

TABLE 7-1 Storage Automated Diagnostic Environment Event Grid for 1 Gbit Switches

Component	Event Type	Severity	Action	Description  Note: Text within quotation marks (" ") is exactly as it appears on the Event Grid.	Action Required
port statistics	Log	Yellow	Y	<p>"Change in port statistics on switch diag156-sw1b (ip=192.168.0.31)"</p> <p>The switch has reported a change in an error counter. This could indicate a failing component in the link.</p>	<ol style="list-style-type: none"> <li>1. Check the Topology GUI for any link errors.</li> <li>2. Quiesce I/O on the link</li> <li>3. Run linktest on the link to isolate the failing FRU.</li> </ol>
chassis.fan	Alarm	Yellow	Y	<p>"chassis.fan.1 status changed from OK"</p>	None.
system_reboot	Alarm	Yellow	Y	<p>The uptime of the switch was less than the previous uptime of the switch. This could indicate that the switch has been reset either by a user or by the loss of power.</p>	<ol style="list-style-type: none"> <li>1. Check to see if the switch has been reset.</li> <li>2. Check the power going to the switch.</li> </ol>
chassis.power	Alarm	Yellow		<p>"chassis.power.1 status changed from OK"</p> <p>This event monitors changes in the status of the chassis' power supply, as reported by the SANbox chassis status.</p>	None.
chassis.temp	Alarm	Yellow		<p>"chassis.temp.1 status changed from OK"</p> <p>This event monitors changes in the status of the chassis' temperature supply, as reported by SANbox chassis status.</p>	None.

**TABLE 7-1** Storage Automated Diagnostic Environment Event Grid for 1 Gbit Switches (*Continued*)

Component	EventType	Severity	Action	Description Note: Text within quotation marks (" ") is exactly as it appears on the Event Grid.	Action Required
chassis. zone	Alarm	Yellow		<p>“Switch sw1a was rezoned”</p> <p>This event reports changes in the zoning of a switch.</p>	
enclosure	Audit			<p>“Auditing a new switch called ras d2-swb1 (ip=xxx.0.0.41) 10002000007a609”</p>	
oob	Comm_ Established			<p>“Communication regained with sw1a (ip=xxx.20.67.213)”</p>	
oob	Comm_ Lost	Down	Y	<p>“Lost communication with sw1a (ip=xxx.20.67.213)”</p> <p>Ethernet connectivity to the switch has been lost.</p>	<ol style="list-style-type: none"> <li>1. Check Ethernet connectivity to the switch.</li> <li>2. Verify that the switch is booted correctly with no POST errors.</li> <li>3. Verify that the switch Test Mode is set for normal operations.</li> <li>4. Verify the TCP/IP settings on switch by way of Forced PROM Mode access.</li> <li>5. Replace switch, if needed.</li> </ol>
switch test	Diagnostic Test-	Red			<p>Check Test Manager for failure details.</p>

**TABLE 7-1** Storage Automated Diagnostic Environment Event Grid for 1 Gbit Switches *(Continued)*

Component	EventType	Severity	Action	Description Note: Text within quotation marks (" ") is exactly as it appears on the Event Grid.	Action Required
enclosure	Discovery			<p>“Discovered a new switch called ras d2-swb1 (ip=xxx.0.0.41) 10002000007a609”</p> <p>Discovery events occur the very first time the agent probes a storage device. It creates a detailed description of the device monitored and sends it using any active notifier such as the Sun™ Remote Services (SRS) Net Connect service or email.</p>	
enclosure	Location Change			<p>“Location of switch rasd2-swb0 (ip xxx.0.0.40) was changed”</p>	

**TABLE 7-1** Storage Automated Diagnostic Environment Event Grid for 1 Gbit Switches (*Continued*)

Component	EventType	Severity	Action	Description Note: Text within quotation marks (" ") is exactly as it appears on the Event Grid.	Action Required
port	State Change+			<p>"port.1 in SWITCH diag185 (ip=xxx.20.67.185) is now Available (status-state changed from offline to online)"</p> <p>The port on the switch is now available.</p>	
port	State Change-	Red	Y	<p>"port.1 in SWITCH diag185 (ip=xxx.20.67.185) is now Not-Available (status state changed from online to offline)"</p> <p>A port on the switch has logged out of the Fabric connection and has gone offline.</p>	<ol style="list-style-type: none"> <li>1. Verify cables, GBICs, and connections along the FC path.</li> <li>2. Check the Storage Automated Diagnostic Environment SAN Topology GUI to identify failing segment of the data path.</li> <li>3. Verify the correct FC switch configuration.</li> </ol>
enclosure	Statistics			<p>"Statistics about switch d2-swb1 (ipxxx.0.0.41) 10002000007a609"</p>	

TABLE 7-2 lists the switch events for Sun StorEdge network FC switch-8 and switch-16 2 Gbit switches.

TABLE 7-2 Storage Automated Diagnostic Environment Event Grid for 2 GBit Switches

Component	EventType	Severity	Action	Description Note: Text within quotation marks (“ ”) is exactly as it appears on the Event Grid.	Action Required
chassis.fan	Alarm-	Yellow	Y	“chassis.fan.1 status changed from OK”	None.
chassis.board	Alarm-	Yellow	Y	The uptime of the switch was less than the previous uptime of the switch. This could indicate that the switch has been reset either by a user or by the loss of power.	<ol style="list-style-type: none"> <li>1. Check to see if the switch has been reset.</li> <li>2. Check the power going to the switch.</li> </ol>
chassis.power	Alarm	Yellow		<p>“chassis.power.1 status changed from OK”</p> <p>This event monitors changes in the status of the chassis’ power supply, as reported by the SANbox chassis status.</p>	None.
system_reboot	Alarm	Yellow		<p>“Switch sw1a was rezoned”</p> <p>This event reports changes in the zoning of a switch.</p>	
enclosure	Audit			<p>“Auditing a new switch called ras d2-swb1 (ip=xxx.0.0.41) 10002000007a609”</p>	
oob	Comm_ Established			<p>“Communication regained with sw1a (ip=xxx.20.67.213)”</p>	

**TABLE 7-2** Storage Automated Diagnostic Environment Event Grid for 2 GBit Switches (Continued)

Component	EventType	Severity	Action	Description Note: Text within quotation marks (" ") is exactly as it appears on the Event Grid.	Action Required
oob	Comm_ Lost	Down	Y	<p>“Lost communication with sw1a (ip=xxx.20.67.213)”</p> <p>Ethernet connectivity to the switch has been lost.</p>	<ol style="list-style-type: none"> <li>1. Check Ethernet connectivity to the switch.</li> <li>2. Verify that the switch is booted correctly with no POST errors.</li> <li>3. Verify that the switch Test Mode is set for normal operations.</li> <li>4. Verify the TCP/IP settings on switch by way of Forced PROM Mode access.</li> <li>5. Replace switch, if needed.</li> </ol>
switch2 test	Diagnostic Test-	Red			Check Test Manager for failure details.
enclosure	Discovery			<p>“Discovered a new switch called ras d2-swb1 (ip=xxx.0.0.41) 1000200007a609”</p> <p>Discovery events occur the very first time the agent probes a storage device. It creates a detailed description of the device monitored and sends it using any active notifier such as the Sun™ Remote Services (SRS) Net Connect service or email.</p>	
enclosure	Location Change			<p>“Location of switch rasd2-swb0 (ip xxx.0.0.40) was changed”</p>	

**TABLE 7-2** Storage Automated Diagnostic Environment Event Grid for 2 GBit Switches (Continued)

Component	EventType	Severity	Action	Description  Note: Text within quotation marks (" ") is exactly as it appears on the Event Grid.	Action Required
port	State Change+			<p>“port.1 in SWITCH diag185 (ip=xxx.20.67.185) is now Available (status-state changed from offline to online)”</p> <p>The port on the switch is now available.</p>	
port	State Change-	Red	Y	A port on switch2 has logged out of the Fabric connection and has gone offline.	<ol style="list-style-type: none"> <li>1. Verify cables, GBICs, and connections along the FC path.</li> <li>2. Check the Storage Automated Diagnostic Environment SAN Topology GUI to identify failing segment of the data path.</li> <li>3. Verify the correct FC switch configuration.</li> </ol>
enclosure	Statistics			<p>“Statistics about switch d2-swb1 (ipxxx.0.0.41) 10002000007a609”</p>	



---

# setupswitch Exit Values

TABLE 0-1 lists the setupswitch exit values. The associated messages are logged in the `/var/adm/log/SEcfglog` file.

TABLE 0-1 setupswitch Exit Values

Severity Level	Message Type	Message Meaning
0	INFO	All switch settings are properly set. The switch setting matches the default configuration.
1	ERROR	Errors occurred while you tried to set the proper switch settings. The switch setting does not match the default configuration or any valid alternatives.
2	WARNING	Errors occurred while you tried to set the proper switch settings. The ports did not self-configure properly. A cable connection might not be working properly. T ports self-configure (that is, the configuration tool cannot control the configuration) from F ports when they are cabled properly. Specifically, these are the ports on the back-end switches in Sun StorEdge 6900 series configurations only. The ports support the ISL connections.
3	WARNING	The Flash code is different from the release level. The switch Flash code does not match the current release version. The Sun StorEdge network FC switch-8 and switch-16 switches periodically releases new versions of the switch Flash code and the new version will not match the default version.
4	WARNING	<p>The configuration is not set to the default, but the differences are likely supported alternatives. The default switch configurations were overridden with valid alternatives, which are also supported by the <code>SUNWsecfg</code> configuration tools. It should still be flagged as “not the default.” The exit value can imply any of the following alternatives (these messages are printed to the screen and to the Storage Automated Diagnostic Environment GUI):</p> <ul style="list-style-type: none"><li>• Some ports have been set to SL, TL, or F mode, but should have been set using the <code>setswitchtl</code> or <code>setswitchf</code> commands. View and verify this nonstandard configuration setup as required, using the <code>showswitch</code> command. Refer to the <i>Sun StorEdge 3900 and 6900 Series Version 1.1 Reference and Service Guide</i> for detailed configuration information.</li><li>• The chassis ID on the switch is not set to the default value. This could be caused by unique ID settings or by conflicts in a SAN environment.</li><li>• Ports are identified that are not in the default hard zone. This could be because the port is set to the same hard zone as the cascaded switch in a SAN environment or the user has run the <code>modifyswitch(1M)</code> command on a Sun StorEdge 3900 Series system</li></ul>

---

**Note** – If multiple systems are connected to a switch, the switch settings might not match the default settings.

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# Troubleshooting the Sun StorEdge T3+ Array Devices

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The Sun StorEdge T3+ array is a high-performance, modular, scalable storage device that contains an internal RAID controller and disk drives with FC connectivity to the data host.

In the Sun StorEdge 3900 and 6900 series, the Sun StorEdge T3+ array is used as a building block, configured in various ways to provide a storage solution optimized to the host application. The array is sometimes called a *controller unit*, which refers to the internal RAID controller on the controller card. Arrays without the controller card are called *expansion units*. When connected to a controller unit, the expansion unit enables the user to increase storage capacity.

This chapter contains the following sections:

- “Troubleshooting the T1 or T2 Data Path” on page 88
- “Sun StorEdge T3+ Array Event Grid” on page 95

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# Troubleshooting the T1 or T2 Data Path

When you are troubleshooting the T1 or T2 data path, note the following:

- Two T port links provide redundancy.
- If one of the two links is lost, no Sun StorEdge T3+ array LUN failover occurs and no pathing failures are detected.
- If both T port links fail, a Sun StorEdge T3+ array LUN failover occurs, as one of the virtualization engines takes control of the I/O operations. One of the Sun StorEdge T3+ array LUNs fail over, as all I/O is routed to the controlling virtualization engine.
- The host detects a pathing failure in its multipathing software.

# Notification Events

FIGURE 8-1 shows a typical port failure event.

```
Site      : Lab 3286 - DSQA1 Broomfield
Source    : diag.xxxxx.xxx.com
Severity  : Error (Actionable)
Category  : Switch
DeviceId  : switch:100000c0dd00b682
EventType : StateChangeEvent.M.port.8
EventTime : 01/30/2002 11:17:22

'port.8' in SWITCH diag209-sw2a (ip=192.168.0.32) is now Not-Available
(status-state changed from 'Online' to 'Offline'):
```

**INFORMATION:**

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

**PROBABLE-CAUSE:**

1. Verify cables, GBICs and connections along Fibre Channel path
2. Check Storage Automated Diagnostic Environment SAN Topology GUI to identify failing segment of the data path
3. Verify correct FC switch configuration

-----

```
Site      : Lab 3286 - DSQA1 Broomfield
Source    : diag.xxxxx.xxx.com
Severity  : Warning
Category  : Switch
DeviceId  : switch:100000c0dd00b682
EventType : LogEvent.MessageLog
EventTime : 01/30/2002 11:17:22

Change in Port Statistics on switch diag209-sw2a (ip=192.168.0.32):
Port-8: Received 9746 'InvalidTxWds' in 0 mins (value=9805 )
```

**FIGURE 8-1** Storage Service Processor Event

If both T ports go offline, you might see a message like the following. The virtualization engine event is alerting the LUN failover.

```
Site      : Lab 3286 - DSQA1 Broomfield
Source    : diag.xxxxx.xxx.com
Severity  : Warning (Actionable)
Category  : Ve
DeviceId  : ve:6257335A-30303142
EventType: AlarmEvent.volume
EventTime: 01/30/2002 11:49:05

Volume T49152 on diag209-v1a changed from 6257335A-30303142(active=50020F23-
00006DFA,passive=) to 6257335A-30303142(active=50020F23-
00006DFA,passive=50020F23-0000725B)

INFORMATION:

This event occurs when the virtualization engine has detected a change in
status for a Multipath Drive or VLUN, usually meaning a pathing problem to a
Sun StorEdge T3+ array controller for changes in Active/Passive paths.

1. Check Sun StorEdge T3+ array for current LUN ownership. ('port listmap')
2. Use 'mpdrive failback' if needed to fail LUNs back to correct the
controller if needed

-----
Site      : Lab 3286 - DSQA1 Broomfield
Source    : diag.xxxxx.xxx.com
Severity  : Warning
Category  : Message
DeviceId  : message:diag.xxxxx.xxx.com
EventType: LogEvent.driver.SSD_WARN
EventTime: 01/30/2002 11:50:07

Found 1 'driver.SSD_WARN' warning(s) in logfile: /var/adm/messages on
diag.xxxxx.xxx.com (id=809f76b4):

INFORMATION:
  SSD warnings

Jan 30 11:49:48 WWN:   Received 7 'SSD Warning' message(s) on 'ssd56' in 8
mins [threshold is 5 in 24hours] Last-Message: 'diag.xxxxx.xxx.com scsi:
[ID 243001 kern.warning] WARNING: /scsi_vhci/
ssd@g29000060220041956257335a30303145 (ssd56): '

...continued on next page...
```

FIGURE 8-2 Virtualization Engine Alert

...continued from previous page...

```
-----  
Site      : Lab 3286 - DSQA1 Broomfield  
Source    : diag.xxxxx.xxx.com  
Severity  : Warning  
Category  : Message  
DeviceId  : message:diag.xxxxx.xxx.com  
EventType: LogEvent.driver.Fabric_Warning  
EventTime: 01/30/2002 11:50:07
```

Found 1 'driver.Fabric\_Warning' warning(s) in logfile: /var/adm/messages on  
diag.xxxxx.xxx.com (id=809f76b4):

```
INFORMATION:  
    Fabric warning
```

```
Jan 30 11:46:37 WWN:2b00006022004186    diag.xxxxx.xxx.com fp: [ID 517869  
kern.warning] WARNING: fp(2): N_x Port with D_ID=108000,  
PWVN=2b00006022004186 reappeared in fabric  ( in backup:diag.xxxxx.xxx.com)
```

```
-----  
Site      : Lab 3286 - DSQA1 Broomfield  
Source    : diag.xxxxx.xxx.com  
Severity  : Warning (Actionable)  
Category  : Host  
DeviceId  : host:diag.xxxxx.xxx.com  
EventType: AlarmEvent.P.hba  
EventTime: 01/30/2002 11:50:10
```

status of hba /devices/pci@1f,4000/pci@2/SUNW,qlc@5/fp@0,0:devctl on  
diag.xxxxx.xxx.com changed from NOT CONNECTED to CONNECTED

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

## ▼ To Verify the Storage Service Processor

1. Run the Sun StorEdge T3+ array `port listmap` command to see the failover event.

```
# t3b0:/:<1>port listmap

port   targetid  addr_type  lun  volume  owner  access
ulp1   0          hard       0    vol1    ul     primary
ulp1   0          hard       1    vol2    ul     failover
u2p1   1          hard       0    vol1    ul     failover
u2p1   1          hard       1    vol2    ul     primary
```

2. Compare the virtualization engine configuration to a saved configuration by running `runsecfg(1M)`.
3. Choose Verify Virtualization Engine Map.

The output is from the `diff(1)` command, which shows the lines that have been added, changed, or deleted. Notice that the active Sun StorEdge T3+ array controller WWN for one of the Sun StorEdge T3+ arrays has changed, indicating it is using its alternate path.

```
MANAGE CONFIGURATION FILES MENU

1) Display Virtualization Engine Map
2) Save Virtualization Engine Map
3) Verify Virtualization Engine Map
4) Help
5) Return
Select configuration option above:> 3

Verifying Virtualization Engine map for vl.....
ERROR: virtualization engine map for vl has changed.
18c18
< t3b01      5      T49153  116.7    0.7      50020F230000725B      1
> t3b01      5      T49153  116.7    0.7      50020F2300006DFA      1
28c28
< t3b01      T49153  50020F230000725B  60020F2000006DFA
> t3b01      T49153  50020F2300006DFA  60020F2000006DFA
37c37
< I00002     2900006022004186  vlb      Yes      08.14      0
> I00002     2900006022004186  Unknown  No       Unknown    0
46d45
< Undefined          210000E08B026C0F  I00002   Yes      0
checkvemap: virtualization engine map vl verification complete: FAIL.
```

FIGURE 8-3 Manage Configuration Files Menu



## FRU Tests Available for the T1 or T2 Data Path FRU

Running the tests from the Storage Automated Diagnostic Environment GUI guides you in discovering the failed FRU. Refer to Chapter 5 of the *Storage Automated Diagnostic Environment User's Guide* for instructions on how to run tests.

- Run the `switchtest` to test the switches.
- Run the `linktest` to test the T1 or T2 connections.

After a test has completed its run, an email message similar to the message in FIGURE 8-4 is sent to the specified email recipient.

```
running on diag.xxxxx.xxx.com
linktest started on FC interconnect: switch to switch
switchtest started on switch 100000c0dd00b682 port 8
Estimated test time 14 minute(s)
01/30/02 11:21:26 diag209 Storage Automated Diagnostic Environment: MSGID
6013 switchtest.FATAL
switch0: "Device: Switch Port: 8 is Offline"

switchtest failed
Remove FC Cable from switch: 100000c0dd00b682, port: 8
Insert FC loopback cable into switch: 100000c0dd00b682, port: 8
Continue Isolation ?
switchtest started on switch 100000c0dd00b682 port 8
Estimated test time 14 minute(s)
01/30/02 11:22:11 diag209 Storage Automated Diagnostic Environment: MSGID
6013 switchtest.FATAL
switch0: "Device: Switch Port: 8 is Offline"

switchtest failed
Remove FC loopback cable from switch: 100000c0dd00b682, port: 8
Insert a NEW FC GBIC into switch: 100000c0dd00b682, port: 8
Insert FC loopback cable into switch: 100000c0dd00b682, port: 8
Continue Isolation ?
switchtest started on switch 100000c0dd00b682 port 8
Estimated test time 14 minute(s)
01/30/02 11:25:12 diag209 Storage Automated Diagnostic Environment: MSGID
4001 switchtest.WARNING
switch0: "Maximum transfer size for a FABRIC port is 200. Changing transfer
size 200 to 200"
switchtest completed successfully
Remove FC loopback cable from switch: 100000c0dd00b682, port: 8
Restore ORIGINAL FC Cable into switch: 100000c0dd00b682, port: 8
Suspect ORIGINAL FC GBIC in switch: 100000c0dd00b682, port: 8

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

**FIGURE 8-4** Example Link Test Text Output from the Storage Automated Diagnostic Environment

- When you insert a loopback connector in to the T port, *no* green light appears to indicate a proper insertion. However, the test will run and be valid.
- If only one of the links has failed and the I/O is traveling over the remaining link, I/O is automatically routed over the repaired link by the switch after the failed link is replaced and recabled. No manual intervention is required.
- If both links have failed and a LUN failover has occurred, you must manually run a `failbackt3path` command to return the paths to their optimal state, after you repair and recable the links.

## ▼ To Isolate the T1 or T2 Data Path

1. Run `linktest` from the Storage Automated Diagnostic Environment for a guided isolation procedure.
2. After replacing the failed FRU, run `failbackt3path` , if needed.

# Sun StorEdge T3+ Array Event Grid

The Storage Automated Diagnostic Environment Event Grid enables you to sort Sun StorEdge T3+ array events by component, category, or event type. The Storage Automated Diagnostic Environment GUI displays an event grid that describes an event and its severity, and tells what, if any, action should be taken. Refer to the *Storage Automated Diagnostic Environment User's Guide* for more information.

## ▼ To Use the Sun StorEdge T3+ Array Event Grid

1. From the Storage Automated Diagnostic Environment Help menu, click the Event Grid link.
2. Select the criteria from the Storage Automated Diagnostic Environment event grid, like the one shown in FIGURE 8-5.

**Storage Automated Diagnostic Environment** 2.0.06.010 diag176.central.sun.com

Maintenance | Monitor | Diagnose | Report | Utilities | Help

Help | SiteMap

### Event Grid

Select a Category/Component/EventType and type [GO] to limit the report. Click on the Columns headers to change the sort. Check [ReportFormat] to display a Report format. Click Info/Action to Review.

Category:  Component:  EventType:  ReportFormat

+ Cat	Comp.	EventType	Sev.	Action	Description
t3	power.temp	Alarm+			The state of power.u1pcu1.PowTemp on diag213 (ip=xxx.20.67.213) is Normal
t3	disk.port	Alarm-	■	Y	[ Info/Action ] The state of disk.u1d1.Port1State on T3 t300 changed from 'OK' to 'failed'
t3	interface.loopcard.cable	Alarm-	■	Y	[ Info/Action ] The state of loopcable.u1l1.CableState changed from 'OK' to 'failed'
t3	power.battery	Alarm-	■	Y	[ Info/Action ] The state of power.u1pcu1.BatState on diag213 (ip=xxx.20.67.213) is Fault
t3	power.fan	Alarm-	■	Y	[ Info/Action ] The state of power.u1pcu1.Fan1State on diag213 (ip=xxx.20.67.213) is Fault
t3	power.output	Alarm-	■	Y	[ Info/Action ] The state of power.u1pcu1.PowOutput on diag213 (ip=xxx.20.67.213) is Fault
t3	power.temp	Alarm-	■	Y	[ Info/Action ] The state of power.u1pcu1.PowTemp on diag213 (ip=xxx.20.67.213) is Fault
t3	enclosure	Alarm.log	■	Y	[ Info/Action ] Errors(s) found in logfile: /var/adm/messages.t3
t3	enclosure	Alarm.timeDiscrepancy	■	Y	[ Action ] Time of T3 diag213 (ip=xxx.20.67.213) is different from host: T3=Fri Oct 26 10:16:17 200, Host=2001-10-26 12:21:04
t3	enclosure	Audit			[ Info ] Auditing a new T3 called ras d2-t3b1 (ip=xxx.0.0.41) slr-mi.370-3990-01-e-e1.003239

FIGURE 8-5 Sun StorEdge T3+ Array Event Grid

TABLE 8-1 lists all of the events for the Sun StorEdge T3+ array.

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
power.temp	Alarm+			The power temperature is normal.	
sysvolslice	Alarm	Yellow	Y	The vol slice feature is possible in Sun StorEdge T3+ array firmware version 2.1 and above. This option enables volume slicing, up to 16 LUN per single Sun StorEdge T3+ array or partner group. This feature also enables LUN masking (HBA zoning) features.	This option is disabled by default. To activate the feature, type <code>sys_enable_volslice_on</code> from the Sun StorEdge T3+ array command line.
disk.port	Alarm-	Red	Y	The Sun StorEdge T3+ array has reported that one port of a dual-ported disk has failed.	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify disk state in <code>fru stat</code>, <code>fru list</code>, and <code>vol stat</code>.</li> </ol>

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
interface. loopcard.cable	Alarm-	Red	Y	<p>The Sun StorEdge T3+ array has reported that a loopcard is in a failed state.</p> <p>Possible Drive Status Messages:</p> <p><b>Value Description</b>            0 Drive mounted            2 Drive present            3 Drive is spun up            4 Drive is disabled            5 Drive has been replaced            7 Invalid system area on drive            9 Drive not present            D Drive disabled; drive is being reconstructed            S Drive substituted</p>	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify the loopcard state with fru stat.</li> <li>3. Verify the matching firmware with the other loopcard.</li> <li>4. Reenable the loopcard if possible (<code>enable u (encid) [[1 2]</code>).</li> <li>5. Replace the loopcard if necessary.</li> <li>6. Reenable the disk if possible</li> <li>7. Replace the disk, if necessary.</li> </ol>
power.battery	Alarm-	Red	Y	<p>The state of the batteries in the Sun StorEdge T3+ array is not optimal.</p> <p>Possible causes are:</p> <ul style="list-style-type: none"> <li>• The voltage level on the power supply and the battery have moved out of acceptable thresholds.</li> <li>• The internal power cooling unit (PCU) temperature has exceeded acceptable thresholds.</li> <li>• A PCU fan has failed.</li> </ul>	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Run <code>refresh -s</code> to verify the battery state.</li> <li>3. Replace the battery, if necessary.</li> </ol>

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
power.fan	Alarm-	Red	Y	The state of a fan on the Sun StorEdge T3+ array is not optimal.	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify the fan state with <code>fru stat</code>.</li> <li>3. Replace the power cooling unit, if necessary.</li> </ol>
power.output	Alarm-	Red	Y	The state of the power in the Sun StorEdge T3+ array power cooling unit is not optimal.	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify power cooling unit state in <code>fru stat</code>.</li> <li>3. Replace power cooling unit, if necessary.</li> </ol>
power.temp	Alarm-	Red	Y	The state of the temperature in the Sun StorEdge T3+ array power cooling unit is either too high or is unknown.	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify that the power cooling unit state is in <code>fru stat</code>.</li> <li>3. Replace the power cooling unit, if necessary.</li> </ol>
log	Alarm	Red	Y	This event includes all important errors found.	Check the <code>/messages</code> file for appropriate action.
time_diff	Alarm	Yellow	Y		Fix the date and time on the Sun StorEdge T3+ array using the <code>date</code> command. The date and time should be the same as the monitoring host.

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
enclosure	Audit			<p>Auditing a new Sun StorEdge T3+ array</p> <p>Audits occur every week. The Storage Automated Diagnostic Environment sends a detailed description of the enclosure to the Sun Network Storage Command Center (NSCC).</p>	
ib	Comm_Established			Communication regained InBand (ib)	
oob	Comm_Established			Communication regained oob (OutOfBand)	
ib	Comm_Lost	Down	Y	<p>Since InBand (ib) monitoring is established using luxadm, the monitoring may not be activated for a particular Sun StorEdge T3+ array.</p>	<ol style="list-style-type: none"> <li>1. Verify luxadm with the command line (luxadm probe, luxadm display)</li> <li>2. Verify cables, GBICs, and connections along the data path.</li> <li>3. Check the Storage Automated Diagnostic Environment SAN Topology GUI to identify the failing segment of the data path.</li> <li>4. Verify the correct FC switch configuration, if applicable.</li> </ol>

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
oob	Comm_Lost	Down	Y	<p>OutOfBand (oob) means that the Sun StorEdge T3+ array failed to answer to a ping or failed to return its tokens.</p> <p>This OutOfBand problem can be caused by a very slow network, or because the Ethernet connection to this Sun StorEdge T3+ array was lost.</p>	<ol style="list-style-type: none"> <li>1. Check the Ethernet connectivity to the affected Sun StorEdge T3+ array.</li> <li>2. Verify that the Sun StorEdge T3+ array is booted correctly.</li> <li>3. Verify the correct TCP/IP settings on the Sun StorEdge T3+ array .</li> <li>4. Increase the http timeout.</li> <li>5. Ping timeout in Utilities -&gt;System -&gt;System -&gt;Timeouts.</li> </ol> <p>The current default timeouts are 10 seconds for ping and 60 seconds for http (tokens).</p>
t3ofdg	Diagnostic Test-	Red		The t3ofdg(1M) test failed.	
t3test	Diagnostic Test-	Red		The t3test(1M) test failed.	
t3volverify	Diagnostic Test-	Red		The t3volverify(1M) test failed.	



**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
enclosure	Discovery			<p>The Storage Automated Diagnostic Environment discovered a new Sun StorEdge T3+ array</p> <p>Discovery events occur the first time the Storage Automated Diagnostic Environment probes a storage device. The Discovery event creates a detailed description of the device monitored and sends it using any active notifier, such as the SRS Net Connect provider service or email.</p>	
controller	Topology			A new controller, as identified by its serial number, has been installed on the Sun StorEdge T3+ array.	
disk	Topology			A new disk, as identified by its serial number, has been installed on the Sun StorEdge T3+ array.	
interface. loopcard	Topology			A new loopcard, as identified by its serial number, has been installed on the Sun StorEdge T3+ array.	
power	Topology			A new PCU has been installed on the Sun StorEdge T3+ array.	
enclosure	Location Change			The location of a Sun StorEdge T3+ array has been changed.	
enclosure	QuiesceEnd			Quiesce has ended on a Sun StorEdge T3+ array.	

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
enclosure	QuiesceStart			Quiesce has started on a Sun StorEdge T3+ array.	
controller	Topology-	Red	Y	The Sun StorEdge T3+ array has reported that a controller was removed from the chassis.	Replace the controller within the 30-minute power shutdown timeframe.
disk	Topology-	Red	Y	The Sun StorEdge T3+ array has reported a disk has been removed from the chassis.	Replace the disk within the 30-minute power shutdown timeframe.
interface. loopcard	Topology-	Red	Y	The Sun StorEdge T3+ array has reported that a loopcard has been removed from the chassis.	Replace the loopcard within the 30-minute power shutdown timeframe.
power	Topology	Red	Y	The Sun StorEdge T3+ array has reported that a power cooling unit PCU has been removed from the chassis.	Replace the PCU within the 30-minute shutdown timeframe.
controller	State Change+			The status of the controller has changed from disabled to ready-enabled.	
disk	State Change+			The status of the disk has changed from fault-disabled to ready-enabled.	
interface. loopcard	State Change+			The Sun StorEdge T3+ array has reported that a loopcard has been replaced or brought back online.	
volume	State Change+			The status of the LUN in a Sun StorEdge T3+ array has changed from unmounted to mounted and is now available.	

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
power	State Change+			The status of the PCU has changed from ready-disable to ready-enable.	
controller	State Change+				
disk	State Change+				
interface. loopcard	State Change+				
volume	State Change+				
power	State Change+			The Sun StorEdge T3+ array has reported that a LUN has changed state.	
controller	State Change-	Red	Y	The Sun StorEdge T3+ array has reported that a power cooling unit has been disabled.	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify the controller state with <code>fru_stat</code> and <code>sys_stat</code>.</li> <li>3. Re-enable the controller if possible (<code>enable u</code>)</li> <li>4. Run <code>logger -dmpstlog</code> from a serial port session on the affected controller. The output from logger will only go to the syslog facility. Review the syslog on the master controller to determine the cause of failure.</li> <li>5. Replace the controller as indicated by the NVRAM failure code.</li> </ol>

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
disk	State Change-	Red	Y	The Sun StorEdge T3+ array has reported that a disk has failed.	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify the disk state with <code>vol_stat</code>, <code>fru_stat</code>, and <code>fru_list</code>.</li> </ol> <p>Drive Status Messages:            0 Drive mounted            2 Drive present            3 Drive is spun up            4 Drive is disabled            5 Drive has been replaced            7 Invalid system area on drive            9 Drive not present            D Drive disabled; is being reconstructed            S Drive substituted</p> <ol style="list-style-type: none"> <li>3. Replace the disk if necessary.</li> </ol>
interface. loopcard	State Change-	Red	Y	The Sun StorEdge T3+ array has indicated that the loopcard is no longer in an optimal state.	<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify loopcard state with <code>fru stat</code>.</li> <li>3. Verify matching firmware with other loopcard.</li> <li>4. Reenable the loopcard, if possible with: (<code>enable u(encid)   [1   2   ]</code>)</li> <li>5. Replace the loopcard, if necessary.</li> </ol>

**TABLE 8-1** Storage Automated Diagnostic Environment Event Grid for the Sun StorEdge T3+ Array

Component	Event Type	Severity	Action	Description	Action
volume	State Change-	Red	Y		<ol style="list-style-type: none"> <li>1. Open a Telnet session to the affected Sun StorEdge T3+ array.</li> <li>2. Verify the status of the LUNs with <code>vol_mode</code> or <code>vol_stat</code>.</li> </ol> <p>Drive Status Messages:</p> <ul style="list-style-type: none"> <li>0 Drive mounted</li> <li>2 Drive present</li> <li>3 Drive is spun up</li> <li>4 Drive is disabled</li> <li>5 Drive has been replaced</li> <li>7 Invalid system area on drive</li> <li>9 Drive not present</li> <li>D Drive disabled; is being reconstructed</li> <li>S Drive substituted</li> </ul>
power	State Change-	Red	Y	<p>The Sun StorEdge T3+ array has reported that a power cooling unit has been disabled.</p> <p>A PCU failure can happen due to:</p> <ol style="list-style-type: none"> <li>1. Power loss</li> <li>2. The PCU fails</li> <li>3. The power switch is disrupted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the power supply and cables.</li> <li>2. Replace PCU, if necessary.</li> </ol>
enclosure	Statistics			Displays statistics about the Sun StorEdge T3+ array enclosure	



# Troubleshooting Virtualization Engine Devices

---

This chapter describes how to troubleshoot the virtualization engine component of a Sun StorEdge 6900 series system.

This chapter contains the following sections:

- “About the Virtualization Engine” on page 107
  - “Virtualization Engine Diagnostics” on page 108
  - “Virtualization Engine LEDs” on page 110
  - “Translating Host-Device Names” on page 115
  - “Virtualization Engine Event Grid” on page 132
- 

## About the Virtualization Engine

The virtualization engine supports the multipathing functionality of the Sun StorEdge T3+ array. Each virtualization engine has physical access to all underlying Sun StorEdge T3+ arrays and controls access to half of the Sun StorEdge T3+ arrays. The virtualization engine has the ability to assume control of all arrays in the event of component failure. The configuration is maintained between virtualization engine pairs through redundant T port connections by way of a pair of Sun StorEdge network FC switch-8 or switch-16 switches.

---

# Virtualization Engine Diagnostics

The virtualization engine monitors the following components:

- Virtualization engine router
- Sun StorEdge T3+ array
- Cabling between the router and the storage

## Service Request Numbers (SRNs)

SRNs are used to inform the user of storage subsystem activities.

## Service and Diagnostic Codes

The virtualization engine's service and diagnostic codes inform the user of subsystem activities. The codes are presented as a light-emitting diode (LED) readout. See Appendix A for the table of codes and related appropriate actions to take. In some cases, you might not be able to receive SRNs because of communication errors. If this occurs, you must read the virtualization engine LEDs to determine the problem.

## Retrieving Service Information

You can retrieve service information from one of two sources:

- CLI Interface
- Error Log Analysis Commands

Both of these sources are described in the following sections.

### CLI Interface

The Serial Loop Intraconnect (SLIC) daemon, which runs on the Storage Service Processor, communicates with the virtualization engine. The SLIC daemon periodically polls the virtualization engine for all subsystem errors and topology changes. It then passes this information, in the form of a SRN, to the `Error Log` file.



# Error Log Analysis Commands

## ▼ To Display the Log Files and Retrieve SRNs

- Type

```
# /opt/svengine/sduc/sreadlog
```

Errors that need action are returned in the following format:

```
TimeStamp: nnn:Txxxxx.uuuuuuuu SRN=mmmmm  
TimeStamp: nnn:Txxxxx.uuuuuuuu SRN=mmmmm  
TimeStamp:nnn:Txxxxx.uuuuuuuu SRN=mmmmm
```

A description of the errors follows.

Item	Description
TimeStamp	The time and date when the error occurred
<i>nnn</i>	The name of the virtualization engine pair (v1 or v2)
<i>Txxxxx</i> <sup>1</sup>	The LUN where the error occurred
<i>uuuuuuuu</i>	The unique ID of the drive or the virtualization engine router
SRN= <i>mmmmm</i>	The SRN defined in numerical order. Refer to “Virtualization Engine References” on page 155 for the SRN codes.

<sup>1</sup> *Txxxxx* can represent a physical or a logical LUN.

## Example

```
# /opt/svengine/sduc/sreadlog -d v1

2002:Jan:3:10:13:05:v1.29000060-220041F9.SRN=70030
2002:Jan:3:10:13:31:v1.29000060-220041F9.SRN=70030
2002:Jan:3:10:17:10:v1.29000060-220041F9.SRN=70030
2002:Jan:3:10:17:37:v1.29000060-220041F9.SRN=70030
2002:Jan:3:10:22:26:v1.29000060-220041F9.SRN=70030
2002:Jan:3:10:25:54:v1.29000060-220041F9.SRN=70030
```

### ▼ To Clear the Log

- Type

```
# /opt/svengine/sduc/sclrlog
```

---

## Virtualization Engine LEDs

TABLE 9-1 describes the LEDs on the back of the virtualization engine.

TABLE 9-1 Virtualization Engine LEDs

LED	Color	State	Description
Power	Green	Solid on	The virtualization engine is powered on.
Status <sup>1</sup>	Green	Solid on	This is the normal operating mode.
		Blink service code	The number of blinks indicate a decimal number that corresponds to a diagnostic code.
Fault	Amber	Solid on	Serious problem

Decipher the blinking of the Status LED to determine the diagnostic code. After you have determined the diagnostic code, look up the decimal number of the code in Appendix A.

<sup>1</sup> The Status LED blinks a service code when the Fault LED is solid on.

# Power LED Codes

The virtualization engine LEDs are shown in FIGURE 9-1.

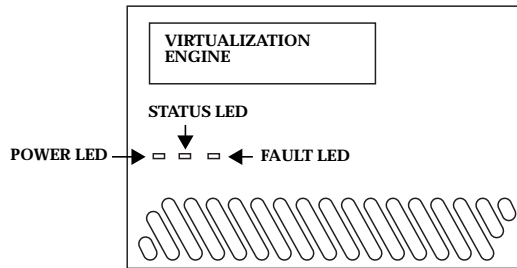


FIGURE 9-1 Virtualization Engine Front Panel LEDs

## Interpreting LED Service and Diagnostic Codes

The Status LED communicates the status of the virtualization engine in decimal numbers. Each decimal number is represented by a number of blinks, followed by a medium duration period (two seconds) of no LED display.

TABLE 9-2 lists the status LED code descriptions.

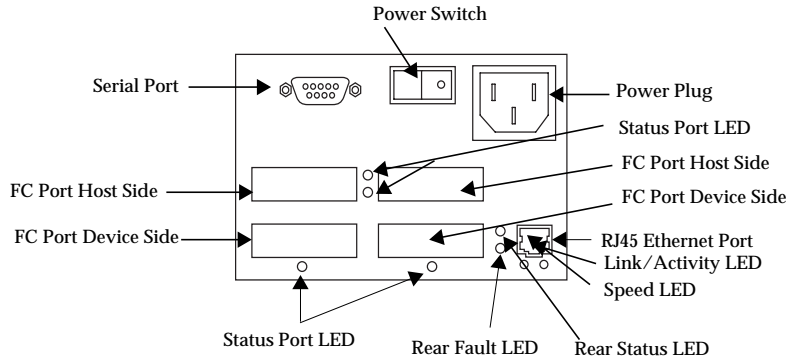
TABLE 9-2 LED Diagnostic Codes

Code	LED Blink Pattern
0	Fast
1	Once
2	Twice with one second between blinks
3	Three times with one second between blinks
...	
10	Ten times with one second between blinks

The blink code repeats continuously, with a four-second off interval between code sequences.

## Back Panel Features

The back panel of the virtualization engine contains the Sun StorEdge network FC switch-8 or switch-16 switches, a socket for the AC power input, and various data ports and LEDs.



**FIGURE 9-2** Virtualization Engine Back Panel

## Ethernet Port LEDs

The Ethernet port LEDs indicate the speed, activity, and validity of the link, shown in TABLE 9-3.

**TABLE 9-3** Speed, Activity, and Validity of the Link

LED	Color	State	Description
Speed	Amber	Solid on	The link is 100Base-TX.
		Off	The link is 10Base-T.
Link Activity	Green	Solid on	A valid link is established.
		Blink	Operations, including data activity, are normal.

---

# FC Link Error Status Report

The virtualization engine's host-side and device-side interfaces provide statistical data for the counts listed in TABLE 9-4.

**TABLE 9-4** Virtualization Engine Statistical Data

Count Type	Description
Link failure count	The number of times the virtualization engine's frame manager detects a nonoperational state or other failure of N port initialization protocol.
Loss of synchronization count	The number of times that the virtualization engine detects a loss in synchronization.
Loss of signal count	The number of times that the virtualization engine's frame manager detects a loss of signal.
Primitive sequence protocol error	The number of times that the virtualization engine's frame manager detects N port protocol errors.
Invalid transmission word	The number of times that the virtualization engine's 8-bit and 10-bit decoder does not detect a valid 10-bit code.
Invalid cyclic redundancy code (CRC) count	The number of times that the virtualization engine receives frames with a defective CRC and a valid EOF. A valid EOF includes EOFn, EOFt, or EOFdti.

## ▼ To Check the FC Link Error Status Manually

The Storage Automated Diagnostic Environment, which runs on the Storage Service Processor, monitors the FC link status of the virtualization engine. The virtualization engine must be power-cycled to reset the counters. Therefore, you should manually check the accumulation of errors during a fixed period of time. To check the status manually, follow these steps:

1. Use the `svstat` command to take a reading, as shown in CODE EXAMPLE 9-1. A status report for the host-side and device-side ports is displayed.
2. Within the next few minutes, take another reading.

The number of new errors that occurred within that time frame represents the number of link errors.

---

**Note** – If the `t3ofdg(1M)` is running while you perform these steps, the following error message is displayed:

Daemon error: check the SLIC router.

---

**CODE EXAMPLE 9-1** FC Link Error Status Example

```
# /opt/svengine/sduc/svstat -d v1

I00001 Host Side FC Vital Statistics:
Link Failure Count           0
Loss of Sync Count          0
Loss of Signal Count         0
Protocol Error Count         0
Invalid Word Count           8
Invalid CRC Count            0

I00001 Device Side FC Vital Statistics:
Link Failure Count           0
Loss of Sync Count          0
Loss of Signal Count         0
Protocol Error Count         0
Invalid Word Count           139
Invalid CRC Count            0

I00002 Host Side FC Vital Statistics:
Link Failure Count           0
Loss of Sync Count          0
Loss of Signal Count         0
Protocol Error Count         0
Invalid Word Count           11
Invalid CRC Count            0

I00002 Device Side FC Vital Statistics:
Link Failure Count           0
Loss of Sync Count          0
Loss of Signal Count         0
Protocol Error Count         0
Invalid Word Count           135
Invalid CRC Count            0
diag.xxxxx.xxx.com: root#
```

---

**Note** – `v1` represents the first virtualization engine pair

---

---

**Note** – The Serial Loop IntraConnect (SLIC) daemon must be running for the `svstat(1M) -d v1` command to work.

---

## Translating Host-Device Names

You can translate host-device names to VLUN, disk pool, and physical Sun StorEdge T3+ array LUNs.

The `luxadm` output for a host device, shown in CODE EXAMPLE 9-2, does *not* include the unique VLUN serial number that is needed to identify this LUN. The procedure to obtain the VLUN serial number is detailed next.

### CODE EXAMPLE 9-2 `luxadm` Output for a Host Device

```
# /usr/sbin/luxadm display /dev/rdisk/c4t2B00006022004186d0s2

DEVICE PROPERTIES for disk: /dev/rdisk/c4t2B00006022004186d0s2
  Status(Port A):      O.K.
  Vendor:              SUN
  Product ID:         SESS01
  WWN(Node):          2a00006022004186
  WWN(Port A):        2b00006022004186
  Revision:           080E
  Serial Num:         Unsupported
  Unformatted capacity: 56320.000 MBytes
  Write Cache:        Enabled
  Read Cache:         Enabled
    Minimum prefetch: 0x0
    Maximum prefetch: 0x0
  Device Type:        Disk device
  Path(s):
    /dev/rdisk/c4t2B00006022004186d0s2
    /devices/pci@1f,4000/pci@2/SUNW,qlc@5/fp@0,0/
    ssd@w2b00006022004186,0:c,raw
```

---

# Displaying the VLUN Serial Number

## ▼ To Display Devices That are Not Sun StorEdge Traffic Manager (MPxIO)-Enabled

1. Use the `format -e` command.
2. Type the number of the disk on which you are working at the `format` prompt.
3. Type `inquiry` at the `scsi` prompt.
4. Find the VLUN serial number in the Inquiry displayed list.

```
# format -e c4t2B00006022004186d0

format> scsi

...

scsi> inquiry

Inquiry:
  00 00 03 12 2b 00 00 02 53 55 4e 20 20 20 20 20    ....+...SUN
  53 45 53 53 30 31 20 20 20 20 20 20 20 20 20 20    SESS01
  30 38 30 45 62 57 33 4b 30 30 31 48 30 30 30      080Ebw3K001H000

Vendor:                SUN
Product:               SESS01
Revision:              080E
Removable media:      no
Device type:          0
```

From this screen, note that the VLUN number is **62 57 33 4b 30 30 31 48**, beginning with the fifth pair of numbers on the third line, up to and including the twelfth pair.



## ▼ To Display Sun StorEdge Traffic Manager (MPxIO)-Enabled Devices

If the devices support the Sun StorEdge Traffic Manager software, you can use this shortcut.

- **Type:**

```
# /usr/sbin/luxadm display /dev/rdisk/c6t29000060220041956257334B30303148d0s2

DEVICE PROPERTIES for disk: /dev/rdisk/
c6t29000060220041956257334B30303148d0s2
  Status(Port A):      O.K.
  Status(Port B):     O.K.
  Vendor:             SUN
  Product ID:         SESS01
  WWN(Node):          2a00006022004195
  WWN(Port A):        2b00006022004195
  WWN(Port B):        2b00006022004186
  Revision:           080E
  Serial Num:         Unsupported
  Unformatted capacity: 56320.000 MBytes
  Write Cache:        Enabled
  Read Cache:         Enabled
    Minimum prefetch: 0x0
    Maximum prefetch: 0x0
  Device Type:        Disk device
  Path(s):
    /dev/rdisk/c6t29000060220041956257334B30303148d0s2
    /devices/scsi_vhci/ssd@g29000060220041956257334b30303148:c,raw
  Controller          /devices/pci@1f,4000/SUNW,qlc@4/fp@0,0
    Device Address    2b00006022004195,0
    Class             primary
    State             ONLINE
  Controller          /devices/pci@1f,4000/pci@2/SUNW,qlc@5/fp@0,0
    Device Address    2b00006022004186,0
    Class             primary
    State             ONLINE
```

The `/dev/rdisk/cntn` represents the Global Unique Identifier of the device. It is 32 bits long.

- The first 16 bits correspond to the WWN of the master virtualization engine router.
- The remaining 16 bits are the VLUN serial number.
  - Virtualization engine WWN = 2900006022004195
  - VLUN serial number = 6257334B30303148

---

# Viewing the Virtualization Engine Map

The virtualization engine map is stored on the Storage Service Processor.

## 1. To view the virtualization engine map, type:

```
# /opt/SUNWsecfg/showvemap -n v1 -f

VIRTUAL LUN SUMMARY

Disk pool  VLUN Serial      MP Drive  VLUN      VLUN      Size  SLIC Zones
          Number          Target   Target    Name      GB
-----
t3b00     6257334F30304148    T49152   T16384    VDRV000   55.0
t3b00     6257334F30304149    T49152   T16385    VDRV001   55.0

DISK POOL SUMMARY

Disk pool  RAID  MP Drive  Size  Largest Free  Total Free  Number of
          Target  Target   GB    Block, GB    Space, GB   VLUNs
-----
t3b00     5     T49152   477    367          367         2
t3b01     5     T49153   477    477          477         0

MULTIPATH DRIVE SUMMARY

Disk pool  MP Drive  T3+ Active  Controller Serial
          Target  Path WWN    Number
-----
t3b00     T49152   50020F2300006DFA  60020F2000006DFA
t3b01     T49153   50020F230000725B  60020F2000006DFA

VIRTUALIZATION ENGINE SUMMARY

Initiator  UID                VE Host  Online  Revision  Number of SLIC Zones
-----
I00001     2900006022004195  v1a     Yes    08.17     0
I00002     2900006022004186  v1b     Yes    08.17     0

ZONE SUMMARY

Zone Name      HBA WWN              HBA Name      Initiator  Online  Number of
                                         VLUNs
-----
Undefined      210000E08B033401    Undefined     I00001     Yes    0
Undefined      210000E08B026C0F    Undefined     I00002     Yes    0
```

---

**Note** – This example uses the virtualization engine map file, which could include old information.

---

2. **Optionally open a Telnet session to the virtualization engine and run the runsecfg utility to poll a live snapshot of the virtualization engine map.** Refer to “To Failback the Virtualization Engine” on page 120 for instructions about how to open a Telnet session.

```
Determining the virtualization engine pairs on the system .....

MAIN MENU - SUN StorEdge 6910 SYSTEM CONFIGURATION TOOL

1) T3+ Configuration Utility
2) Switch Configuration Utility
3) Virtualization Engine Configuration Utility
4) View Logs
5) View Errors
6) Exit
Select option above:> 3

VIRTUALIZATION ENGINE MAIN MENU

1) Manage VLUNs
2) Manage Virtualization Engine Zones
3) Manage Configuration Files
4) Manage Virtualization Engine Hosts
5) Help
6) Return
Select option above:> 3

MANAGE CONFIGURATION FILES MENU

1) Display Virtualization Engine Map
2) Save Virtualization Engine Map
3) Verify Virtualization Engine Map
4) Help
5) Return
Select configuration option above:> 1
Do you want to poll the live system (time consuming) or view the file [1|f]: 1
```

From the virtualization engine map output, you can match the VLUN serial number to the VLUN name (VDRV000), the disk pool (t3b00), and the multipath (MP) drive target (T49152). This information can also help you find the controller serial number (60020F2000006DFA), which you need to perform Sun StorEdge T3+ array LUN failback commands.

## ▼ To Failback the Virtualization Engine

In the event of a Sun StorEdge T3+ array LUN failover, the virtualization engine will route all I/O through the failover port on the Sun StorEdge T3+ array. After you isolate and check the cause of the failover, the virtualization engine continues to send I/O through the failover path. To restore the I/O to the primary path and fail the LUN back to its original controller, use the following procedure:

1. **Verify that the T3+ array active path needs to be restored by viewing a live snapshot of the virtualization engine map, as shown in “Viewing the Virtualization Engine Map” on page 118.**

If there has been a failover, the Multipath Drive Summary will show the same Sun StorEdge T3+ array active path WWN for all LUNs associated with one Sun StorEdge T3+ array, as shown in CODE EXAMPLE 9-3.

**CODE EXAMPLE 9-3** Multipath Drive Summary

Disk pool	MP Drive Target	T3+ Active Path WWN	Controller Serial Number
t3b00	T49152	50020F230000725B	60020F2000006DFA
t3b01	T49153	50020F230000725B	60020F2000006DFA

2. **If the Sun StorEdge T3+ array LUNS have failed over, run the command found in CODE EXAMPLE 9-5 for that specific Sun StorEdge T3+ array.**

---

**Note** – The Sun StorEdge T3+ array name is the same as the disk pool name—but with the last digit (equal to the Sun StorEdge T3+ array LUN number) removed, as shown in CODE EXAMPLE 9-4.

For example, the LUNs in disk pools t3b00 and t3b01 are named t3b0 on the Sun StorEdge T3+ array device.

---

**CODE EXAMPLE 9-4** Sun StorEdge T3+ array and Disk Pool Name

```
# /opt/SUNWsecfg/bin/failbackt3path -n t3b0
```

a. If no failures occur, the command exits with no output.

b. If failures occur, you might see one of the following messages:

**CODE EXAMPLE 9-5 Sun StorEdge T3+ Array Failure Codes**

```
# /opt/SUWNsecfg/bin/failbackt3path -n t3b0
MultiPath failback command failed. Returned Result = 513

# /opt/SUWNsecfg/bin/failbackt3path -n t3b0
MultiPath failback command failed. Returned Result = 586
```

The *message return code 513* indicates that the Sun StorEdge T3+ array did not require a failback. The *message return code 586* indicates that the Sun StorEdge T3+ array failback could not be completed because the primary path could not be reached.

3. If you encounter the return code 586, check the switches *sw2a* and *sw2b* and make sure the ports associated with the Sun StorEdge T3+ array and virtualization engines are online.

In this example:

a. *t3b0* should be plugged in to port 2 (on a 1 Gbit switch) of both *sw2a* and *sw2b* (port 1 on a 2 Gbit switch)

b. The virtualization engine should be plugged in to port 1 (on a 1 Gbit switch) of the same two switches (port 0 on a 2 Gbit switch).

Refer to the *Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide* to determine which switch ports are used for each component.

4. Run the `showswitch(1M)` command for *sw2a* and *sw2b*.

5. Look at the output sections "Port Status" and "Name Server" to see if the ports are online. The output will look like that in CODE EXAMPLE 9-6 if there are no problems.

**CODE EXAMPLE 9-6 Error-Free Online Switch Ports**

```
# showswitch -s sw2a

...

*****
Port Status
*****

Port #   Port Type      Admin State   Oper State    Status        Loop
Mode
-----  -
1       F_Port          online        online        logged-in
2       TL_Port         online        online        logged-in     Target
Devices: 1 Address: 0x02
         0xef
Proxy-AL_PA      Public Address      World-Wide Name
E8               0010C000            2900006022004195
E4               00110000            2900006022004186

3       TL_Port         online        offline       Not-logged-in
4       TL_Port         online        offline       Not-logged-in
5       TL_Port         online        offline       Not-logged-in
6       TL_Port         online        offline       Not-logged-in
7       T_Port          online        online        logged-in
8       T_Port          online        online        logged-in

*****
Name Server
*****

Port  Address  Type  PortWWN          Node WWN          FC-4 Types
----  -
01    10C000   N     2900006022004195  2800006022004195  SCSI_FCP
02    10C1EF   NL    50020f2300006dfa  50020f2000006dfa  SCSI_FCP

...
```

6. If either port 1 or port 2 is offline, check the GBICs and cables.
7. If a Sun StorEdge T3+ array switch port is offline, log in to the Sun StorEdge T3+ array and look at the status of the controllers and the port list, as shown in CODE EXAMPLE 9-7.

**CODE EXAMPLE 9-7** Status of Sun StorEdge T3+ Array Controllers and Port List

```

t3b0://<1>fru stat ulc1
CTRLR      STATUS    STATE      ROLE        PARTNER     TEMP
-----
ulctr      ready     enabled   master      u2ctr       28.0
t3b0://<2>fru stat u2c1
CTRLR      STATUS    STATE      ROLE        PARTNER     TEMP
-----
u2ctr      ready     enabled   alternate master  ulctr       27.0
t3b0://<3>port list

port      targetid  addr_type  status      host        wwn
ulp1      0         hard       online     sun         50020f2300006dfa
u2p1      1         hard       online     sun         50020f230000725b

```

8. If either controller is in a disabled state or if either port is offline, refer to the *Sun StorEdge T3+ Installation and Configuration Guide* for corrective action.
9. After the problem has been corrected, repeat Step 2.

---

## Manually Clearing and Restoring the SAN Database

It is occasionally necessary to manually clear and restore the SAN database on the virtualization engines.




---

**Caution** – This procedure clears the SAN database and removes the configuration of the disk pools, multipath drives, zoning, and VLUNs. After you perform this procedure, you must restore the virtualization map to the virtualization engine pair using `restorevemap(1M)`. This requires a valid copy of the `v1.san` or `v2.san` files located in the `/opt/WUNWsecfg/etc/vn.map` directory.

---

## ▼ To Reset the SAN Database on Both Virtualization Engines

### 1. Type:

```
# resetsandb -n vepair  
# restorevemap -n vepair
```

You do not need to manually open a Telnet session to the virtualization engines, unless an ERROR HALT 50 state is detected. Although you might need to power cycle the virtualization engine, first attempt to reset the virtualization engines using the following steps.

### 2. To disable the switch ports associated with the `vehostname`, type:

```
# /opt/SUNWsecfg/flib/setveport -n vehostname -d
```

### 3. Open a Telnet session into `vehostname` and clear the SAN database by entering **9** at the prompt.

### 4. Select **Q** to exit the telnet session.

### 5. To enable the switch ports associated with the `vehostname`, type:

```
# /opt/SUNWsecfg/flib/setveport -n vehostname -e
```

### 6. To reset the virtualization engine and force it to synchronize with its partner virtualization engine, type:

```
# resetve -n vehostname
```



## ▼ To Reset the SAN Database on a Single Virtualization Engine

1. To disconnect the virtualization engine's device-side FC cables, type:

```
# setveport -v virtualization-engine-name -d
```

2. Open a Telnet session to the virtualization engine specified in Step 1.

3. Enter the password.

The User Service Utility Menu is displayed.

4. Type 9 to clear the SAN database.

- A successful command displays the message

```
SAN database has been cleared!
```

- An unsuccessful command results in the service code 051.  
If this occurs, repeat Steps 1 through 3.
- If the command continues to fail, replace the virtualization engine.

5. To reconnect the virtualization engine's device-side FC cables, type:

```
# setveport -v virtualization-engine-name -c
```

6. Type B to reboot the virtualization engine.

---

# Restarting the `slicd` Daemon

Follow this procedure to restart the `slicd` daemon if the `SLIC` daemon becomes unresponsive, or if a message similar to the following is displayed:

```
connect: Connection refused or Socket error encountered..
```

## ▼ To Restart the `slicd` Daemon

### 1. Check whether the `slicd` daemon is running:

```
# ps -ef | grep slicd
```

### 2. Use the `ipcs(1)` command to check for any message queues, shared memory, or semaphores still in use:

```
# ipcs
IPC status from <running system> as of Wed Feb 20 12:48:30 MST 2002
T          ID          KEY          MODE          OWNER        GROUP
Message Queues:
Shared Memory:
m           0      0x50000483  --rw-r--r--    root         root
m          301      0x5555aa8a  --rw-----    root         other
m          302      0x5555aaaa  --rw-----    root         other
m          303      0x5555aaba  --rw-----    root         other
m           4       0x7cc       --rw-----    root         root
Semaphores:
s      196608      0x5555aa9a  --ra-----    root         other
s      196609      0x5555aa7a  --ra-----    root         other
s      196610      0x5555aaba  --ra-----    root         other
s           3       0x10e1     --ra-----    root         root
```

Segments identified with `0x5555aa` in the address are associated with `slicd`.

### 3. Remove the segments by typing the following:

```
# ipcrm -m 301 -m 302 -m 303 -s 196608 -s 196609 -s 196610
```

Refer to the `ipcrm(1)` man page for details.

The message queues, and shared memory and semaphores have been removed.

**4. To restart the `slicd` for the `v1` virtualization engine, type:**

```
# /opt/SUNWsecfg/bin/startslbcd -n v1
(or v2, depending on configuration)
```

**5. Confirm that the `slicd` daemon is running:**

```
# ps -ef | grep slicd

root 16132 16130  0 11:45:00 ?          0:00 ./slicd
root 16135 16130  0 11:45:00 ?          0:00 ./slicd
root 16130      1 0 11:45:00 ?          0:00 ./slicd
root 16131 16130  0 11:45:00 ?          0:00 ./slicd
root 16189 15877  0 11:48:49 pts/1    0:00 grep slicd
root 16143 16130  0 11:45:00 ?          0:00 ./slicd
```

If the `slicd` daemon is running, it resets the virtualization engine. If the process fails, the `slicd` daemon changes the IP address to that of the second virtualization engine and attempts to restart the `slicd` process.

**6. If the second virtualization engine fails, power cycle the virtualization engines and make sure they are not in an ERROR HALT 50 condition.**

An ERROR HALT 50 condition requires that you visually inspect the virtualization engines with firmware revision 8.14 or earlier.

For virtualization engines with firmware revision 8.17 or later, you can determine error conditions with the following steps:

- a. Open a Telnet session into `v1_hostname`.**
- b. Display the Vital Product Data (VPD) by entering `.1` at the prompt.**

The last line of the output displays any error codes, as shown in the following example.

```
Product Type : FC-FC-3 SVE H
FC-FC-3 router H Firmware Revision : 8.017      Official Release
Vicom(release), Apr 11 2002 17:49:16
Loader Revision : 2.02.42
Unique ID      : 00000060-2200418A
Unit Serial Number : 00250339
PCB Number     : 00166425
MAC address    : 0.60.22.3.D1.E3

DIP SW1 = 00000000      DIP SW2 = 00000011      (1 = down ; 0 = up)
          76543210          76543210

Error: None
```

---

# Diagnosing a creatediskpools(1M) Failure

When modifying the Sun StorEdge T3+ array configuration on a Sun StorEdge 6900 series, the system should automatically create disk pools. If the virtualization engine cannot find two paths to all Sun StorEdge T3+ array LUNs, however, the multipath drives cannot be created. If this happens, the following procedure can help troubleshoot the problem:

1. **Inspect the SUNWsecfg log file (/var/adm/log/SEcfglog) to see if any errors are indicated.**

In the following example, `creatediskpools(1M)` for `t3b0` indicates a missing Sun StorEdge T3+ array path.

```
Thu May 30 17:35:19 MDT 2002 creatediskpools: t3b0 ENTER: /opt/SUNWsecfg/
bin/creatediskpools -n t3b0.

Thu May 30 17:35:19 MDT 2002 checkslicd: v1 ENTER /opt/SUNWsecfg/bin/
checkslicd -n v1.

Thu May 30 17:35:21 MDT 2002 checkslicd: v1 EXIT.

There are no eligible drives to create MultiPath drive automatically.
Thu May 30 17:35:32 MDT 2002 creatediskpools: ERROR: No mpdrives found on
virtualization engine pair v1.

Thu May 30 17:35:32 MDT 2002 creatediskpools: INFO verify all T3+ array
LUNS have 2 paths to the virtualization engine pair, then re-run
creatediskpools.

Thu May 30 17:35:32 MDT 2002 creatediskpools: Failed to create at least
one disk pool.

Thu May 30 17:35:33 MDT 2002 creatediskpools: t3b0 EXIT.
```

## 2. Run the `showswitch(1M)` command for `sw2a` and `sw2b`.

Refer to the *Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Manual* to see to which switch ports the Sun StorEdge T3+ array and virtualization engine should be attached.

In this example, the Sun StorEdge T3+ array (`t3b0`) should be attached to port 2 of `sw2a` and `sw2b` and the virtualization engine should be attached to port 1. All ports should be online.

```
# showswitch -s sw2a

*****
Port Status
*****
Port #   Port Type      Admin State   Oper State   Status       Loop
Mode
-----  -
1       F_Port         online        online       logged-in
2       TL_Port        online        offline      Not-logged-in
3       TL_Port        online        offline      Not-logged-in
4       TL_Port        online        offline      Not-logged-in
5       TL_Port        online        offline      Not-logged-in
6       TL_Port        online        offline      Not-logged-in
7       T_Port         online        online       logged-in
8       T_Port         online        online       logged-in
```

```
*****
Name Server
*****
Port  Address  Type  PortWWN          Node WWN          FC-4 Types
-----  -
01     10C000   N     2900006022004195  2800006022004195  SCSI_FCP
...
```

Here, port 2 on `sw2a` is offline. If required ports are offline, then check the GBICs and cables. If a Sun StorEdge T3+ array switch port is offline, then login to the T3+ array and look at the status of the controllers and the port list as follows:

```
t3b0:/:<1>fru stat ulc1
CTRL  STATUS  STATE    ROLE      PARTNER  TEMP
-----  -
ulctr  ready   disabled -         -        -
t3b0:/:<2>fru stat u2c1
CTRL  STATUS  STATE    ROLE      PARTNER  TEMP
-----  -
u2ctr  ready   enabled  master    -        27.0
t3b0:/:<3>port list

port  targetid  addr_type  status  host  wwn
ulp1  0         hard      offline sun   50020f2300006dfa
u2p1  1         hard      online  sun   50020f230000725b
```

**3. After corrective action has been successfully completed, run the following command:**

```
# creatediskpools -n t3b0
```

The SECFglog file should display the following message:

```
Thu May 30 17:40:23 MDT 2002 creatediskpools: t3b0 ENTER: /opt/SUNWsecfg/  
bin/creatediskpools -n t3b0.  
  
Thu May 30 17:40:24 MDT 2002 checkslicd: v1 ENTER /opt/SUNWsecfg/bin/  
checkslicd -n v1.  
  
Thu May 30 17:40:28 MDT 2002 checkslicd: v1 EXIT.  
  
MultiPath found -- T00000 and T00002  
MultiPath found -- T00001 and T00003  
  
Automatic MultiPath Drive created successfully.  
Thu May 30 17:40:58 MDT 2002 creatediskpools: mpdrive T49152 is t3b00.  
New disk pool name is t3b00  
  
Thu May 30 17:41:17 MDT 2002 creatediskpools: mpdrive T49153 is t3b01.  
New disk pool name is t3b01  
  
Thu May 30 17:41:30 MDT 2002 creatediskpools: t3b0 EXIT.
```

# Virtualization Engine Event Grid

The Storage Automated Diagnostic Environment Event Grid enables you to sort virtualization engine events by component, category, or event type. The Storage Automated Diagnostic Environment GUI displays an event grid that describes the severity of the event, tells whether action is required, provides a description of the event, and lists the recommended action. Refer to the *Storage Automated Diagnostic Environment User's Guide* Help section for more information.

## ▼ To Use the Virtualization Engine Event Grid

- From the Storage Automated Diagnostic Environment Help menu, select the Event Grid link.

FIGURE 9-3 shows the Virtualization Engine Event Grid, from which you can select related criteria for the event you are troubleshooting.

**Storage Automated Diagnostic Environment** Home Help Logout  
 Admin Monitor Diagnose Configure Report 2.1.B1.001 ccadieux.central.sun.com

General Reports

**Event Grid** [ Help ]

Select a Category/Component/EventType and type [GO] to limit the report. Click on the Columns headers to change the sort. Check [ReportFormat] to display a Report format. Click Info/Action to Review.

Category:  Component:  EventType:  ReportFormat

+ Cat	Comp.	EventType	Sev.	Action	Description
ve	volume	Alarm	<input checked="" type="checkbox"/>	Y	[ Info ] Volume E00012 on 'v1a' changed mapping ...
ve	enclosure	Alarm.log	<input checked="" type="checkbox"/>		Change in Port Statistics on VE 'v1a'
ve	enclosure	Audit			[ Info ] Auditing a Virtualization Engine called 'v1a'
ve	oob	Comm_Established			Communication regained with VE 'v1a'
ve	oob.ping	Comm_Lost	<input checked="" type="checkbox"/>	Y	[ Info/Action ] Lost communication with VE 'v1a'
ve	oob.slicd	Comm_Lost	<input checked="" type="checkbox"/>	Y	[ Info/Action ] Lost communication with VE/slicd 'v1a'
ve	oob.command	Comm_Lost	<input checked="" type="checkbox"/>	Y	[ Info/Action ] Lost communication with VE/slicd 'v1a'
ve	ve_diag	DiagnosticTest-	<input checked="" type="checkbox"/>		ve_diag (diag240) on ve-1 (ip=xxx.20.67.213) failed
ve	veluntest	DiagnosticTest-	<input checked="" type="checkbox"/>		veluntest (diag240) on ve-1 (ip=xxx.20.67.213) failed
ve	enclosure	Discovery			[ Info ] Discovered a new Virtualization Engine called 'v1a'

Page: 1 of 1

- 9 events.
- Sev: Severity of the event (warning -> Error -> Down)
- Action: This event is Actionable and will be sent to RSS/SRS.
- SubComp: SubComponent

FIGURE 9-3 Virtualization Engine Event Grid



TABLE 9-5 lists the Virtualization Engine Events.

**TABLE 9-5** Storage Automated Diagnostic Environment Event Grid for Virtualization Engine

Component	EventType	Severity	Information	Required Action
volume	Alarm	Yellow	This event occurs when the virtualization engine has detected a change in status for a multipath drive or a VLUN. This usually indicates a pathing problem to a Sun StorEdge T3+ array controller, such as changes in active and passive paths.	<ol style="list-style-type: none"> <li>1. Check the Sun StorEdge T3+ array for current LUN ownership.</li> <li>2. Use the SUNWsecfg utility on the Storage Service Processor to fail LUNs back to the correct controller, if needed.</li> </ol>
volume_add	Alarm	Yellow	A new VLUN was added to the configuration.	None.
volume_delete	Alarm	Yellow	A VLUN was deleted from the configuration.	None.
enclosure	Alarm.log	Yellow	Port statistics on virtualization engine v1a changed.	None.
enclosure	Audit		Automatic weekly audits send a detailed description of the enclosure to the Sun Network Storage Command Center (NSCC).	None.
oob (OutofBand)	Comm_Established		Communication regained with virtualization engine v1a	
oob.ping	Comm_Lost	Down	Ethernet connectivity to the virtualization engine has been lost.	<ol style="list-style-type: none"> <li>1. Check power to the virtualization engine.</li> <li>2. Check Ethernet connectivity to the virtualization engine.</li> <li>3. Check the status of the sliced daemon.</li> <li>4. Make sure the virtualization engine is booted correctly.</li> <li>5. Verify the correct TCP/IP settings on the virtualization engine.</li> <li>6. Replace the virtualization engine, if necessary.</li> <li>7. Run <code>ipcs(1)</code> and <code>ipcrm(1)</code> to clean up old semaphore.</li> </ol>

**TABLE 9-5** Storage Automated Diagnostic Environment Event Grid for Virtualization Engine (*Continued*)

Component	EventType	Severity	Information	Required Action
oob.slicd	Comm_ Lost	Down	The virtualization engine failed to execute <code>slicd</code> command.	<ol style="list-style-type: none"> <li>1. Check the status of the <code>slicd</code> daemon.</li> <li>2. Check the power on the virtualization engine.</li> <li>3. Make sure the virtualization engine is booted correctly.</li> <li>4. Verify that the TCP/IP settings on the virtualization engine are correct.</li> <li>5. Check the T3 message log for failover conditions in the Sun StorEdge T3+ array.</li> <li>6. Replace the virtualization engine, if necessary.</li> </ol>
oob. command	Comm_ Lost	Down	Invalid command or <code>slicd</code> daemon problem.	<ol style="list-style-type: none"> <li>1. Check the status of the <code>slicd</code> daemon.</li> <li>2. Check the power on the virtualization engine.</li> <li>3. Make sure the virtualization engine is booted correctly.</li> <li>4. Verify that the TCP/IP settings on the virtualization engine are correct.</li> <li>5. Check the T3 message log for failover conditions in the Sun StorEdge T3+ array.</li> <li>6. Replace the virtualization engine, if necessary.</li> </ol>

**TABLE 9-5** Storage Automated Diagnostic Environment Event Grid for Virtualization Engine *(Continued)*

Component	EventType	Severity	Information	Required Action
ve_diag	Diagnostic Test-	Red	The ve_diag test on ve-1 failed	
veluntest	Diagnostic Test-	Red	The veluntest failed	
enclosure	Discovery		<p>The discovery device found a new virtualization engine called v1a.</p> <p>Discovery events occur the first time the agent probes a storage device and creates a detailed description of the device monitored. The discovery device sends it, using any active notifier (such as NetConnect or email).</p>	



# Troubleshooting Using Microsoft Windows 2000

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## General Notes

- Use the Manufacturer's HBA Utilities to monitor and diagnose the HBAs. The examples in this chapter use Qlogic's SANblade Manager utility.
- The Storage Automated Diagnostic Environment running on the Storage Service Processor is *not* able to monitor the host-to-switch link.
- The Storage Automated Diagnostic Environment running the Storage Service Processor is *not* able to execute `switchtest(1M)` on switch ports with Microsoft Windows 2000 HBAs currently attached as F ports.
- The FRUs in the host-to-switch link can be isolated using the HBA utilities on the host and Storage Automated Diagnostic Environment's `switchtest` on the Storage Service Processor, in conjunction with loopback connector plugs.
- Install the Sun StorEdge T3+ array Failover Driver software *before* connecting the host to the switches.

---

# Troubleshooting Tasks Using Microsoft Windows 2000

## Launching the Sun StorEdge T3+ Array Failover Driver GUI

- From the Microsoft Windows 2000 Advanced Server GUI, click Programs -> T3 StorEdge Configurator -> Configurator.

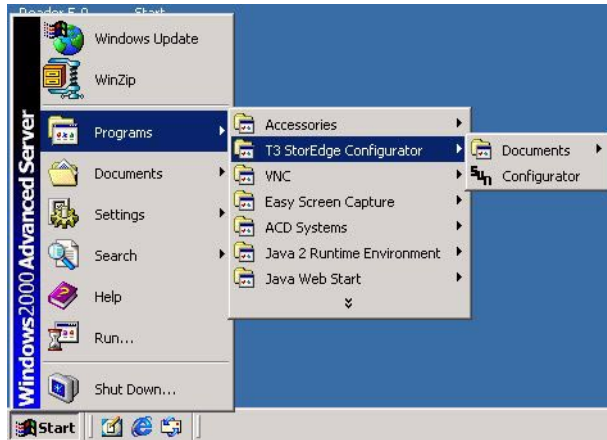


FIGURE 10-1 Launching the Sun StorEdge T3+ Array Failover Driver

# Checking the Version of the Sun StorEdge T3+ Array Failover Driver

- From the Microsoft Windows 2000 Advanced Server GUI, click Help -> About.

The About Multipath Configurator window is displayed.



**FIGURE 10-2** Sun StorEdge T3+ Array Failover Driver Versions 2.0.0.123 and 2.1.0.104

---

**Note** – In FIGURE 10-2, the example on the left shows build number 2.0.130 comprised of driver version 2.0.0.123 and application version 2.0.0.125.

The same build number might have a different driver version and application version. The example on the right shows build number 2.0.130 comprised of driver version 2.1.0.104 and application version 2.1.0.104.

Be aware of these possible version differences when gathering system information from the customer.

---

## ▼ To Use the Sun StorEdge T3+ Array Failover Driver GUI

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**Note** – The Sun StorEdge T3+ Array Failover Driver GUI is limited to the Sun StorEdge 3900 series systems. You must use the CLI for the Sun StorEdge 6900 series systems.

---

### 1. Make sure the Sun StorEdge T3+ Array failover driver is loaded.

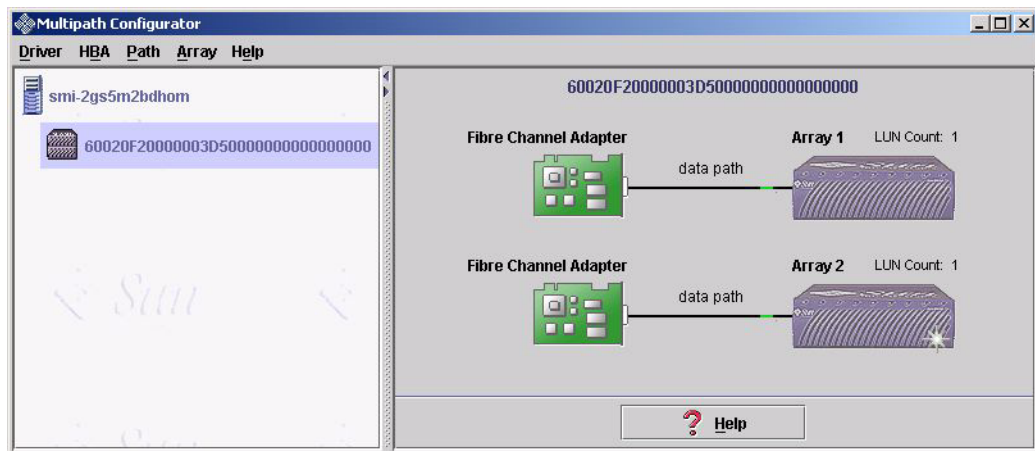
From the Microsoft Windows 2000 Advanced Server GUI, click **Administrative Tools -> Computer Management -> Software Environment**.

### 2. Ensure the "Jafo" driver is in a Running and OK state.

### 3. Launch the Sun StorEdge T3+ Array Failover Driver GUI using instructions found in "Launching the Sun StorEdge T3+ Array Failover Driver GUI" on page 138.

The Multipath Configurator window is displayed.

A healthy Sun StorEdge 3900 series system has a solid line connecting the HBA to the storage, as shown in FIGURE 10-3.



**FIGURE 10-3** Healthy Sun StorEdge 3900 series system, shown using Multipath Configurator

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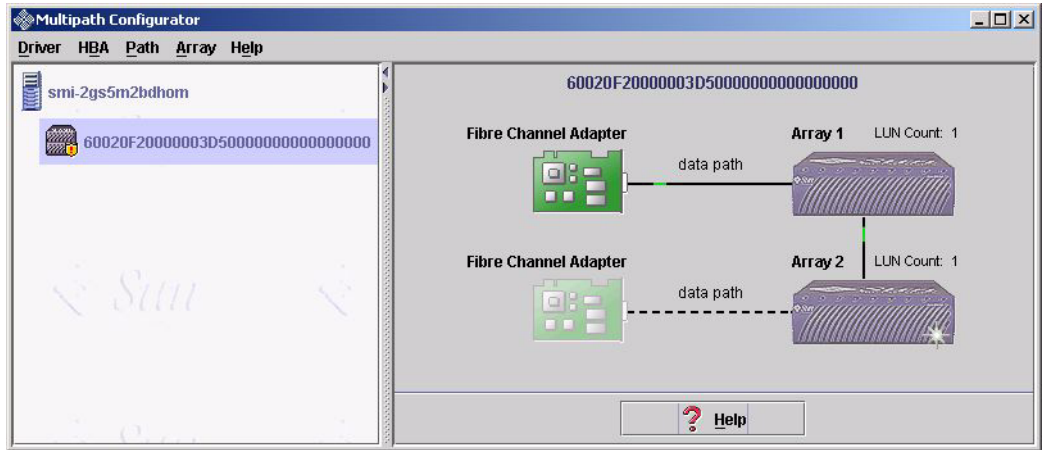
**Note** – Note the connection between the two arrays, indicating that the back end loop is being used.

---



**4. Compare the healthy Sun StorEdge 3900 series system to a system that has experienced a LUN failover.**

A system that has experienced a LUN failover has a broken line connecting the HBA to the storage, as shown in FIGURE 10-4.



**FIGURE 10-4** Sun StorEdge 3900 series system with a LUN failover, shown using Multipath Configurator

**5. To further check the affected Sun StorEdge T3+ array:**

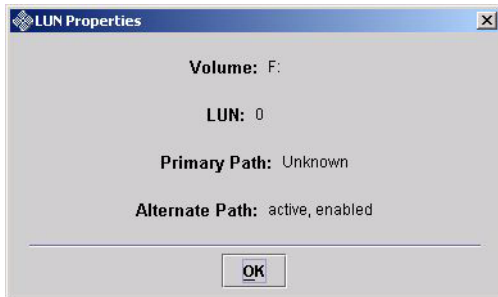
- a. Right-click the Sun StorEdge T3+ array in the failed path.**
- b. Select Array Properties.**



**FIGURE 10-5** Multipath Configurator Array Properties

- c. To view details about the Sun StorEdge T3+ Array paths, click the Details button.

The Multipath Configurator LUN Properties detail window is displayed.



**FIGURE 10-6** Multipath Configurator LUN Properties Detail

---

**Note** – From this example, note the Primary Path is Unknown and the Alternate Path is currently in use.

---

## ▼ To Use the Sun StorEdge T3+ Array Failover Driver Command Line Interface (CLI)

Use the `jafo_nutil.exe` interface, which is available with Sun StorEdge T3+ Array Failover Driver version 2.1 and later, to gather information about:

- The WWN of monitored Sun StorEdge T3+ array partner groups
- The WWN of individual LUNs
- Device paths
- LUN to drive letter mapping
- The status for
  - primary paths
  - secondary paths
  - standby paths
  - active paths

In addition, you can use the `jafo_nutil.exe` interface to perform failback operations in recovery scenarios.

Although the Sun StorEdge T3+ Array Failover Driver GUI is limited to the Sun StorEdge 3900 series systems, you can use the CLI for both the Sun StorEdge 3900 series systems and the Sun StorEdge 6900 series systems.

FIGURE 10-7 displays example output for a Sun StorEdge 3900 series system from the `jafo_nutil.exe` interface.

```
# E:\Program Files\Sun Microsystems\T3 Storedge Multiplatform Driver>
jafo_nutil.exe

HBA WWN:00000000000000000000000000000000 NAME:Device\ScsiPort5
DESC:QLogic QLA2200 PCI Fibre Channel Adapter DRIVER:ql2200
FW_REV:Can't obtain from OS

HBA WWN:00000000000000000000000000000000 NAME:Device\ScsiPort4
DESC:QLogic QLA2200 PCI Fibre Channel Adapter DRIVER:ql2200
FW_REV:Can't obtain from OS

DEVICE VENDOR:Sun Microsystems T3 Disk Array FW_REV:0201
SERIAL:00163874 WWN:60020f20000003d50000000000000000
FO_CAPABLE:true MASTER:true

LUN NAME:G WWN:60020f20000003d53cf7c0f500028022 GOOD_PATHS:2
STATE:up(1)

PATH NAME:5,0,0,0 HBA_NAME:Device\ScsiPort5 TARGET:0,0,0
TYPE:secondary STATE:up_standby(3)

PATH NAME:4,0,0,0 HBA_NAME:Device\ScsiPort4 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
CONTROLLER ID:0 DESC:Sun T3 Disk Array Controller

DEVICE VENDOR:Sun Microsystems T3 Disk Array FW_REV:0201
SERIAL:00524894 WWN:60020f20000003d50000000000000000
FO_CAPABLE:true MASTER:false

LUN NAME:H WWN:60020f20000003d53cf7c4640008025e GOOD_PATHS:2
STATE:up(1)

PATH NAME:5,0,0,5 HBA_NAME:Device\ScsiPort5 TARGET:0,0,0
TYPE:primary STATE:up_active(2)

PATH NAME:4,0,0,5 HBA_NAME:Device\ScsiPort4 TARGET:0,0,0
TYPE:secondary STATE:up_standby(3)

CONTROLLER ID:0 DESC:Sun T3 Disk Array Controller
```

**FIGURE 10-7** Sun StorEdge T3+ Array Failover Driver CLI Output for the Sun StorEdge 3900 Series

FIGURE 10-8 displays example output for a Sun StorEdge 6900 series system from the jafo\_nutil.exe interface.

```
# E:\Program Files\Sun Microsystems\T3 StorEdge Multiplatform
Driver>jafo_nutil

HBA WWN:00000000000000000000000000000000 NAME:Device\ScsiPort4
DESC:QLogic QLA2200 PCI Fibre Channel Adapter DRIVER:ql2200
FW_REV:Can't obtain from OS
HBA WWN:00000000000000000000000000000000 NAME:Device\ScsiPort5
DESC:QLogic QLA2200 PCI Fibre Channel Adapter DRIVER:ql2200
FW_REV:Can't obtain from OS

DEVICE VENDOR:Sun Microsystems 69XX Storage Subsystem FW_REV:0811
SERIAL:bW3T001w WWN:290000602200418f0000000000000000
FO_CAPABLE:true MASTER:true

LUN NAME:J: WWN:290000602200418f6257335430303177 GOOD_PATHS:2
STATE:up(1)

PATH NAME:4,0,0,0 HBA_NAME:Device\ScsiPort4 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
PATH NAME:5,0,0,0 HBA_NAME:Device\ScsiPort5 TARGET:0,0,0
TYPE:primary STATE:up_active(2)

LUN NAME:K: WWN:290000602200418f6257335430303178 GOOD_PATHS:2
STATE:up(1)

PATH NAME:4,0,0,1 HBA_NAME:Device\ScsiPort4 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
PATH NAME:5,0,0,1 HBA_NAME:Device\ScsiPort5 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
LUN NAME:G: WWN:290000602200418f6257335430303179 GOOD_PATHS:2
STATE:up(1)
PATH NAME:4,0,0,2 HBA_NAME:Device\ScsiPort4 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
PATH NAME:5,0,0,2 HBA_NAME:Device\ScsiPort5 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
LUN NAME:H: WWN:290000602200418f625733543030317a GOOD_PATHS:2
STATE:up(1)
PATH NAME:4,0,0,3 HBA_NAME:Device\ScsiPort4 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
PATH NAME:5,0,0,3 HBA_NAME:Device\ScsiPort5 TARGET:0,0,0
TYPE:primary STATE:up_active(2)
CONTROLLER ID:0 DESC:Sun Microsystems 69XX Array Controller
```

FIGURE 10-8 Sun StorEdge T3+ Array Failover Driver CLI Example Output for the Sun StorEdge 6900 Series

TABLE 10-1 lists some of the codes and descriptions for CLI output for a Sun StorEdge 6910 series system.

**TABLE 10-1** Tips for Interpreting Sun StorEdge 6910 Series CLI Output

Component	Output Code	Description
Device	FW_REV	Firmware revision level of the virtualization engine
	WWN	The worldwide name of the Master virtualization engine of the partner group.
LUN	NAME	Microsoft Windows 2000 Device letter
	WWN	<ul style="list-style-type: none"> <li>• The first 16 digits correspond to the Master virtualization engine WWN from the Device section.</li> <li>• The last 16 digits are the VLUN serial number.</li> </ul> <p>You can crosscheck the WWN using:</p> <ul style="list-style-type: none"> <li>• The <code>SUNWsecfg</code> virtualization engine maps</li> <li>• The Storage Automated Diagnostic Environment's device monitoring section (click on virtualization engine to view details).</li> </ul>
	PATH	The individual physical paths to the HBAs
	TYPE	All paths in a 6910 configuration should be Primary.



# Example of Fault Isolation

In the following example, a fault was injected into a running Sun StorEdge 3900 series system to show a troubleshooting flow.

## 1. Discover the Error

One of the best ways to discover errors is by using the Storage Automated Diagnostic Environment monitoring system. The Storage Automated Diagnostic Environment should be configured to email alerts and events to a local System Administrator. In FIGURE 11-1, the alert was displayed using the Storage Automated Diagnostic Environment GUI.

The screenshot shows the Storage Automated Diagnostic Environment GUI. The top navigation bar includes 'Admin', 'Monitor', 'Diagnose', 'Manage', and 'Report'. The 'Monitor Devices' section is active, displaying a table of devices and their last report times. A detailed alert for 'port.4' is shown on the right, indicating a switch port transition from 'online' to 'offline'.

Host	Type	Name	Sev.	Last Report
bradster	host	bradster.central.sun.com		2002-07-23 13:10:06
crash3	2x00	crash3-048		2002-07-23 12:48:25
crash3	Switch1	crash3-025		2002-07-23 12:49:12
crash3	Switch1	crash3-026		2002-07-23 12:49:12
crash3	Switch1	crash3-011		2002-07-23 12:49:10
crash3	Switch1	crash3-012		2002-07-23 12:49:11
crash3	a5k	Bart		2002-07-23 12:48:12
crash3	a5k	c		2002-07-23 12:48:18
crash3	a5k	A		2002-07-23 12:48:24
crash3	host	crash3.central.sun.com		2002-07-23 12:49:50
crash3	internal	internal		2002-07-23 12:49:09
crash3	t3	crash3-spet32		2002-07-23 12:49:43
crash3	t3	crash3-t300-8		2002-07-22 00:54:30
diag209	host	diag209.central.sun.com		2002-07-23 05:18:58
diag209	se	6910-diaq209		2002-07-23 05:18:59
diag209	switch	diag209-sw1a		2002-07-23 05:18:05
diag209	switch	diag209-sw2a		2002-07-23 05:18:06
diag209	switch	diag209-sw2b		2002-07-23 05:18:07
diag209	switch	diag209-sw1b		2002-07-23 05:18:06
diag209	t3b	diag209-t3b0		2002-07-23 05:18:37

**Alert Details:**

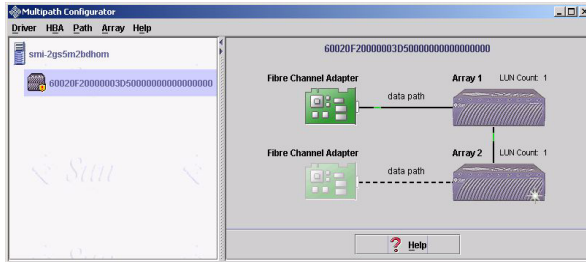
- alarm.system\_reboot EventGrid**
- 07-22 14:19:01 Switch uptime decreased on crash3-011 (ip=172.20.104.11) from 9447488s to 47665s
- port.4 EventGrid**
- 07-22 14:19:01 'port.4' in SWITCH crash3-011 (ip=172.20.104.11) is now Not-Available (state changed from 'online' to 'offline').
- link to a5k:5080020000084f40:1**
- 07-15 09:59:11 SIG-ERROR (17 in 1 mins): Origin: port 6 on 'switch '172.20.104.11'. Destination: ses-80 on a5k 'A'.
- link to a5k:5080020000083f80:1**
- 07-16 15:50:13 ITW-ERROR (65 in 1 mins): Origin: port 8 on 'switch '172.20.104.11'. Destination: ses-80 on a5k 'C'.
- link to t3:50020f2300000d82:1**
- 07-21 09:04:20 ITW-ERROR (62 in 1 mins): Origin: ctrl-2 on 't3 '50020f2000000d82'. Destination: port 4 on switch '172.20.104.11'.

FIGURE 11-1 Alerts Display Using the Storage Automated Diagnostic Environment

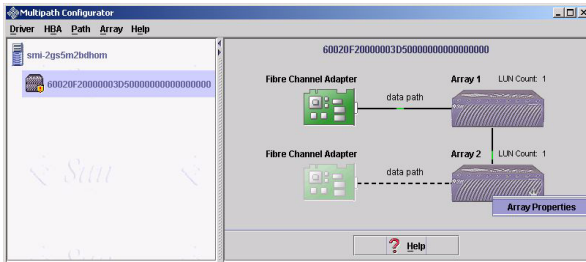
In this configuration, Port 2 is shown to have gone offline. Port 2 is a Microsoft Windows 2000 host-to-switch connection. Since the Storage Automated Diagnostic Environment does not have visibility to a Microsoft Windows 2000 host, use the Sun StorEdge T3+ Array Failover Driver utility (the Multipath Configurator) and the HBA utility to troubleshoot the host side.

## 2. Check the Sun StorEdge T3+ Array Failover Driver

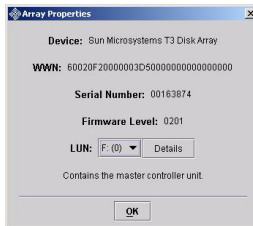
The next set of diagrams show the fault as displayed by the driver and the results of drilling down for more details.



**Array 1:**  
A solid line connecting the HBA to the storage represents a healthy system.



**Array 2:**  
A dotted line connecting the HBA to the storage represents a LUN failover.



For more information about the affected Sun StorEdge T3+ array LUN, right-click on the affected Sun StorEdge T3+ array (in the failed path) and click Array Properties.



From the Array Properties window, click Details and OK.

The LUN Properties window is displayed.

FIGURE 11-2 Drilling Down for Sun StorEdge T3+ Array Failover Driver Fault Detail



The primary path to Drive F: failed. The alternate path is currently handling all of the I/O.

### 3. Check the HBA

Using the HBA utility (Qlogic SANblade in this example), confirm the fault.

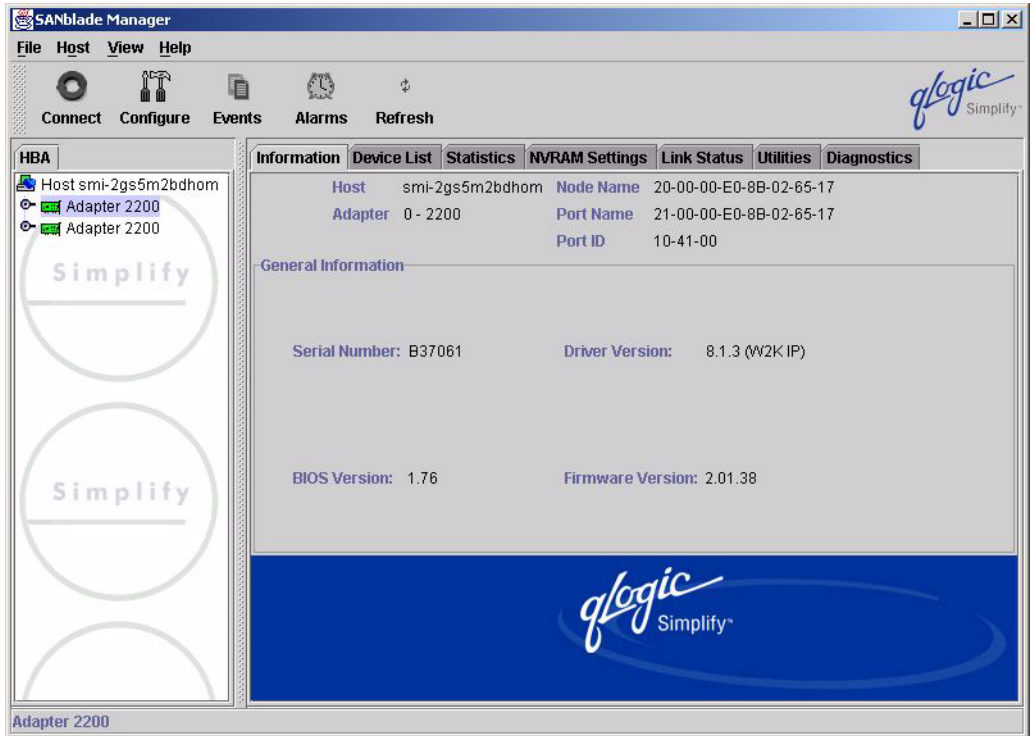


FIGURE 11-3 Fault Confirmation Using QLogic SunBlade

### 4. Isolate the components in the path.

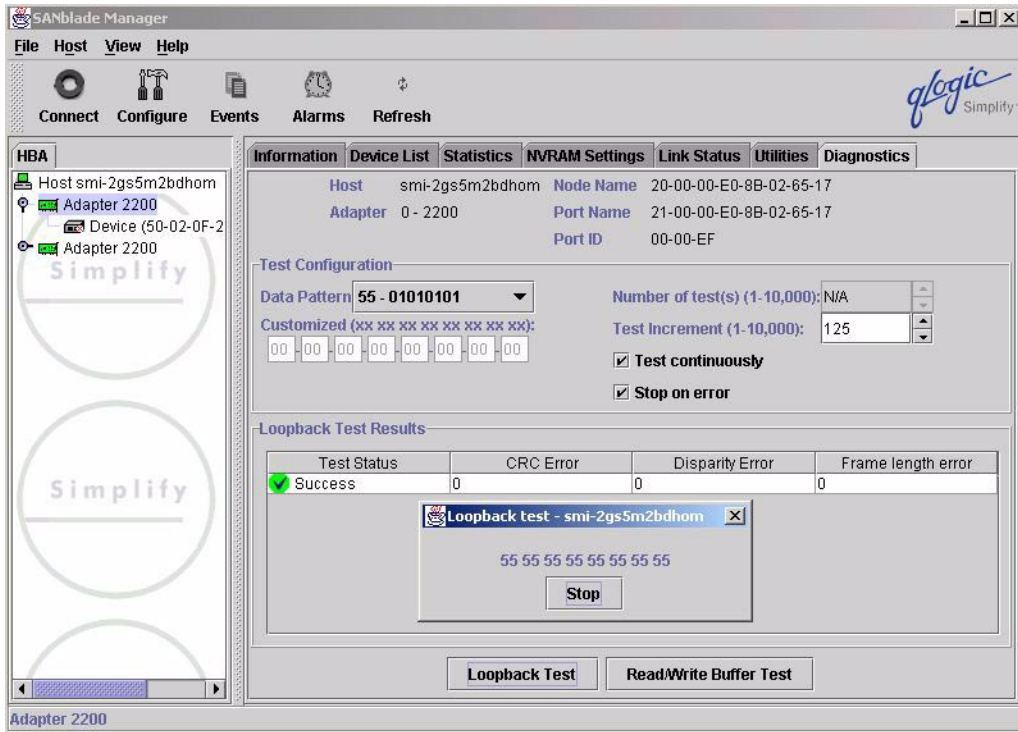
The components in the path are the HBA, the cable, the switch-side GBIC, and the Sun StorEdge network FC switch itself.

To isolate all components, use a combination of the Storage Automated Diagnostic Environment and the HBA utility (QLogic SunBlade).

---

**Note** – If no HBA utility is present, or if the utilities do not offer diagnostics, a best guess effort will have to suffice. Storage Automated Diagnostic Environment cannot test HBAs on Microsoft Windows 2000 hosts at this time.

---



**FIGURE 11-4** Diagnostics Using QLogic SunBlade

In this example, the HBA-to-switch cable was removed temporarily and a loopback connector was inserted into the HBA. The Qlogic SANblade LoopBack diagnostics were then run. The HBA passed the tests.

---

**Note** – The next components that can be isolated are the switch-side GBIC and the Sun StorEdge network FC switch itself.

For these components, you can launch the tests using the Storage Automated Diagnostic Environment Diagnose -> Tests -> Test From Topology functionality.

---

5. Again, temporarily remove the cable from the switch port in question, insert a loopback connector plug and run the switch port diagnostics.

The first run will test the switch-side GBIC as well as the Sun StorEdge network FC switch.

In the examples shown in FIGURE 11-5, FIGURE 11-6, and FIGURE 11-7, Port 2 on Switch diag156-sw1a was marked with a "Red" icon, indicating a problem.

**Note** – All tests were run with the default values.

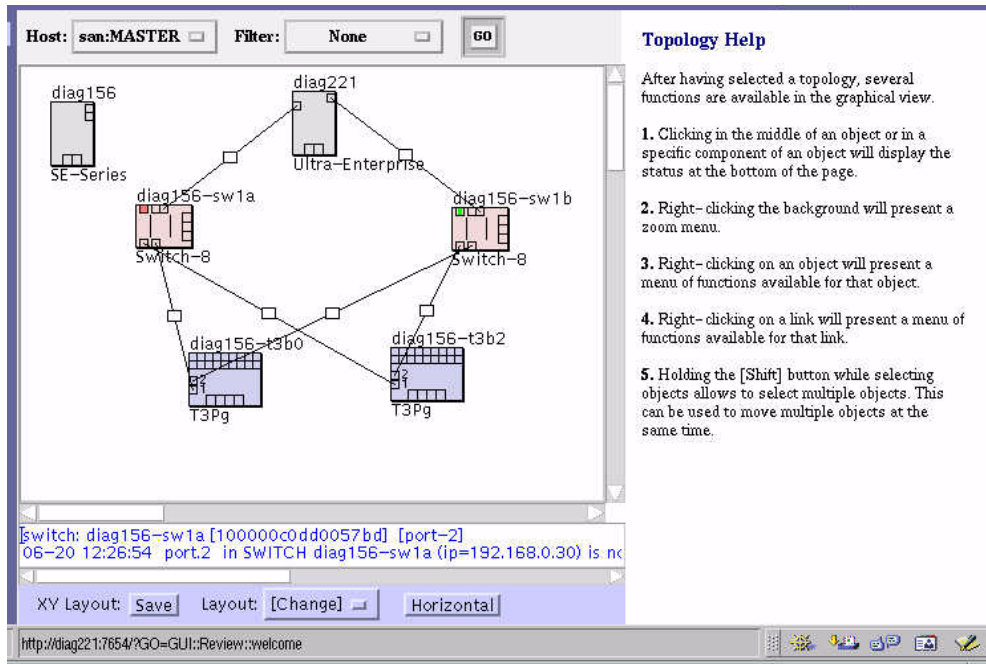
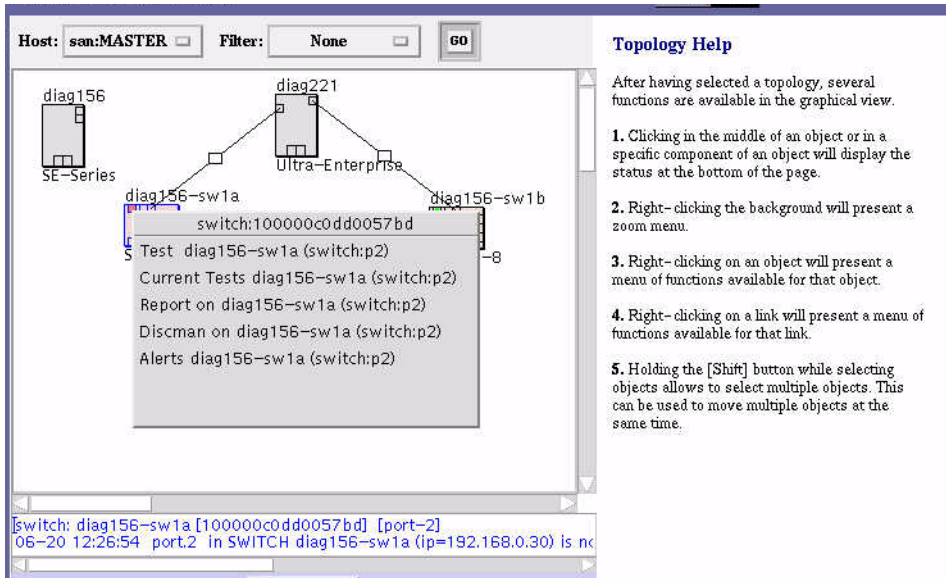


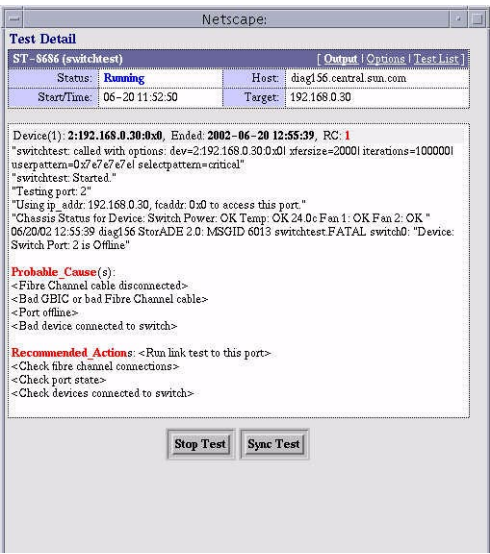
FIGURE 11-5 Storage Automated Diagnostic Environment Test from Topology



**Topology Help**

- After having selected a topology, several functions are available in the graphical view.
1. Clicking in the middle of an object or in a specific component of an object will display the status at the bottom of the page.
  2. Right-clicking the background will present a zoom menu.
  3. Right-clicking on an object will present a menu of functions available for that object.
  4. Right-clicking on a link will present a menu of functions available for that link.
  5. Holding the [Shift] button while selecting objects allows to select multiple objects. This can be used to move multiple objects at the same time.

**FIGURE 11-6 Storage Automated Diagnostic Environment Test from Topology Pull-Down Menu**



**FIGURE 11-7 Storage Automated Diagnostic Environment Test from Topology Test Detail**

The first run failed, indicating a problem with either the GBIC or with the Sun StorEdge network FC switch.

To further isolate the problem, a new GBIC was inserted into the port, the loopback connector was re-inserted, and the same test was run a second time.



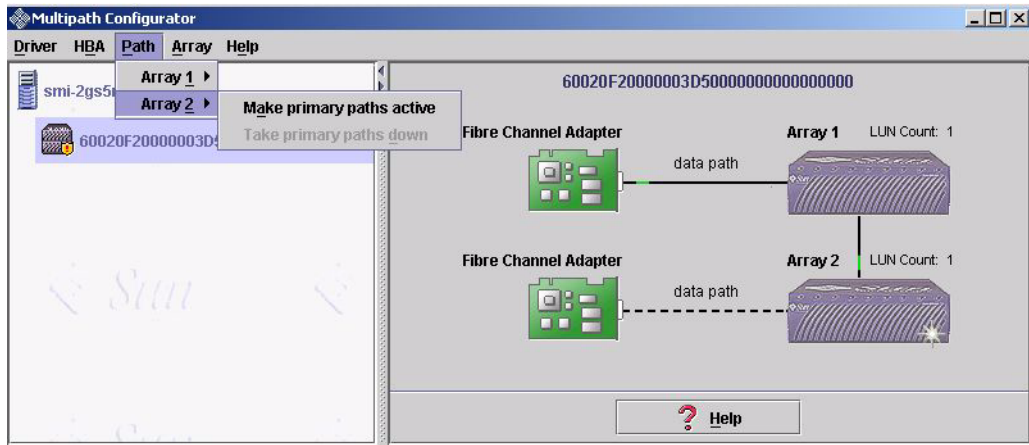
FIGURE 11-8 Successful Switch Test Results

On this pass, the test was successful. This indicates that the problem was most likely the switch-side GBIC, which was replaced.

**6. Recover the problem with the GBIC or the switch.**

**a. Recable the link between the HBA and switch.**

**b. Use the Sun StorEdge T3+ Array Failover Driver GUI for the Sun StorEdge 3900 series system, or the CLI for the 6900 series, to recover the multipathing.**



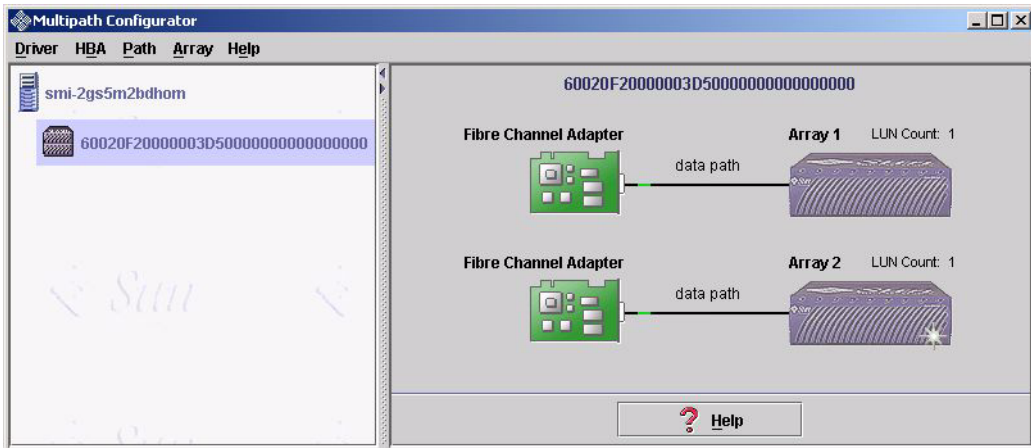
**FIGURE 11-9** Multipath Recovery using the Sun StorEdge T3+ Array Multipath Configurator

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**Note** – Storage Automated Diagnostic Environment should also post an event noting that the Port has gone back online.

---

The Multipath Configurator GUI should show both paths online and handling I/O, as illustrated in FIGURE 11-10.



**FIGURE 11-10** Recovered Paths

## Virtualization Engine References

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This appendix contains the following information:

- “SRN Reference” on page 155
- “SRN/SNMP Single Point-of-Failure Descriptions” on page 159
- “Port Communication Numbers” on page 160
- “Virtualization Engine Service Codes” on page 160

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### SRN Reference

TABLE A-1 provides an explanation of SRNs for the virtualization engine.

**TABLE A-1** SRN Reference

SRN	Description	Corrective Action
1xxxx	The SCSI <i>Request Sense</i> command has reported the condition of the disk drive, where xxxx is the Unit Error Code in Sense Data bytes 20 to 21.	If too many check conditions are returned, check the link status.
70000	The SAN configuration has changed.	No action is needed.
70001	The rebuild process has started.	No action is needed.
70002	The rebuild completed without error.	No action is needed.
70003	The drive copying information cannot be read from the primary drive.	If a spare drive is available, use it to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70004	If the initiator is master, then its follower has detected a write error on a member within a mirror drive.	If a spare drive is available, use it to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70005	If the initiator is master, then it has detected a write error on a member within a mirror drive.	If a spare drive is available, use it to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70006	Communication between the virtualization engines has failed.	Update the firmware.
70007	The primary drive cannot write to the drive being built.	If a spare drive is available, use it to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70008	If the initiator is master, then its slave has detected a read error on a member within a mirror drive.	If a spare drive is available, use it to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70009	If the initiator is master, then it has detected a read error on a member within a mirror drive.	If a spare drive is available, use it to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70010	The CleanUp configuration table is completed.	No action is needed.
70020	The SAN physical configuration has changed.	If the change was unintentional, check the condition of the drives.



**TABLE A-1** SRN Reference

SRN	Description	Corrective Action
70021	The drive is offline.	If the change was unintentional, check the condition of the drives.
70022	The virtualization engine is offline.	If the change was unintentional, check the condition of the drives.
70023	The drive is unresponsive.	Check the condition of drives.
70024	For the Sun StorEdge T3+ array pack, the master virtualization engine has detected the partner virtualization engine's IP Address.	No action is needed.
70025	For Sun StorEdge T3+ array pack: The master virtualization engine is unable to detect the partner virtualization engine's IP address.	Check the Ethernet connection between the two virtualization engines.
70030	The SAN configuration was changed by the SAN Builder.	No action is needed.
70040	The zoning configuration of the host has changed.	No action is needed.
70050	A multipath drive failover occurred.	Check the multipath drive.
70051	A multipath drive failback occurred.	No action is needed.
70098	Instant copy degraded.	If no spare is available, replace the failed drive with a new drive.
70099	Degrade because the drive has disappeared.	Reinsert the missing drive, or replace it with a drive of equal or greater capacity.
7009A	A mirror drive was written to, causing it to enter the read degrade state.	Reinsert the missing drive, or replace it with a drive of equal or greater capacity.
7009B	A drive entered the write degrade state.	Reinsert the drive (if good) or replace it if it is defective.
7009C	During a rebuild, the last primary drive failed. This is a very rare multipoint failure.	<ol style="list-style-type: none"> <li>1. Backup the drive data.</li> <li>2. Destroy the mirror drive where the failure has occurred.</li> <li>3. Format the drives using mode 14.</li> <li>4. Create a new mirror drive.</li> <li>5. Reassign the old SCSI ID and LUN to the new mirror drive.</li> <li>6. Restore the data.</li> </ol>
71000	Communication has been recovered between the two virtualization engines.	No action is needed.

**TABLE A-1** SRN Reference

SRN	Description	Corrective Action
71001	This is a generic error code for the SLIC. It signifies communication problems between the virtualization engine and the daemon.  Error halt mode also forces this service request number.	<ol style="list-style-type: none"> <li>1. Check the condition of the virtualization engine.</li> <li>2. Check the cabling between the virtualization engine and daemon server.</li> </ol>
71002	The SLIC was busy.  Error halt mode also forces this service request number.	<p>Check the condition of the virtualization engine.</p> <p>Check the cabling between the virtualization engine and the daemon server.</p>
71003	The SLIC master was unreachable.	Check conditions of the virtualization engines in the SAN.
71010	The status of the SLIC daemon has changed.	No action is needed.
72000	The primary and secondary SLIC daemon connection is active.	No action is needed.
72001	The virtualization engine failed to read the SAN drive configuration.	No action is needed.
72002	The virtualization engine failed to lock on to the SLIC daemon.	No action is needed.
72003	The virtualization engine failed to read the SAN SignOn information.	No action is needed.
72004	The virtualization engine failed to read the zone configuration.	No action is needed.
72005	The virtualization engine failed to check for SAN changes.	No action is needed.
72006	The virtualization engine failed to read the SAN event log.	No action is needed.
72007	The SLIC daemon connection is down.	Wait 1 to 5 minutes for the backup daemon to come up. If it doesn't, check the network connection for virtualization engine halt, or hardware failure.

# SRN/SNMP Single Point-of-Failure Descriptions

TABLE A-2 provides Simple Network Management Protocol (SNMP) descriptions, associated Service Request Numbers (SRNs), and recommendations for corrective action.

**TABLE A-2** SRN/SNMP Single Point-of-Failure Table

SRN	SNMP Description	Corrective Action	SRN after Corrective Action
70020 70021 70030 70050*	<ul style="list-style-type: none"> <li>The SAN topology has changed.</li> <li>The Global SAN configuration has changed.</li> <li>The SAN configuration has changed.</li> <li>A physical device is missing.</li> </ul>	<ul style="list-style-type: none"> <li>Check the SAN cabling and connections between the Sun StorEdge T3+ array and the virtualization engine.</li> <li>Perform Sun StorEdge T3+ array failback, if necessary.</li> </ul>	70020 70030 70051**
70025	The IP of the partner's virtualization engine is not reachable.	Check the Ethernet cabling and connections.	None
72000 72007 70020 70021 70022 70025 70030 70050	<ul style="list-style-type: none"> <li>The SAN topology has changed.</li> <li>The Global SAN configuration has changed.</li> <li>The SAN configuration has changed.</li> <li>The IP of the partner virtualization engine is not reachable.</li> <li>A physical device is missing.</li> <li>A SLIC virtualization engine is missing.</li> <li>A SLIC daemon connection is inactive.</li> <li>The virtualization engine failed to check for SAN changes, or a daemon error occurred.</li> <li>A secondary daemon connection is active.</li> </ul>	<ul style="list-style-type: none"> <li>Check cabling and connections between the virtualization engines.</li> <li>Cycle power on failed virtualization engine, if the fault LED flashes.</li> <li>Perform Sun StorEdge T3+ array failback, if necessary.</li> <li>Enable VERITAS path.</li> <li>Check the SLIC virtualization engine.</li> </ul>	70020 70021 70022 70024** 70030 70050
<p>* Sun StorEdge T3+ array LUN failover. ** Sun StorEdge T3+ array LUN failback.</p>			

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# Port Communication Numbers

TABLE A-3 Port Communication Numbers

Port	Port	Port Number
Daemon	Management programs	20000
Daemon	Daemon	20001
Daemon	Virtualization engine	25000
Virtualization engine	Virtualization engine	25001

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# Virtualization Engine Service Codes

TABLE A-4 lists the service code numbers for errors that occur on the virtualization engine, along with recommendations for corrective action:

TABLE A-4 Virtualization Engine Service Codes —0 -399 Host-Side Interface Driver Errors

Service Code Number	Cause of Error	Recommended Corrective Action
005	A PCI bus parity error has occurred.	<ul style="list-style-type: none"><li>• Replace the virtualization engine.</li></ul>
24	The attempt to report one error resulted in another error.	<ul style="list-style-type: none"><li>• Cycle power to the virtualization engine.</li></ul>
40	The database is corrupt.	<ul style="list-style-type: none"><li>• Clear the SAN database.</li><li>• Cycle power to the virtualization engine.</li><li>• Import the SAN zone configuration</li></ul>
41	The database is corrupt.	<ul style="list-style-type: none"><li>• Clear the SAN database.</li><li>• Cycle power to the virtualization engine.</li><li>• Import the SAN zone configuration.</li></ul>
42	The zone mapping database is corrupt.	<ul style="list-style-type: none"><li>• Import the SAN zone configuration</li></ul>

**TABLE A-4** Virtualization Engine Service Codes (*Continued*)—0 -399 Host-Side Interface Driver Errors

050	An attempt to write a value into nonvolatile storage failed, perhaps because a hardware failure, or one of the databases stored in Flash memory could not accept the entry being added.	<ul style="list-style-type: none"> <li>• Clear the SAN database.</li> <li>• Cycle power to the virtualization engine.</li> </ul>
051	The virtualization engine cannot erase Flash memory.	<ul style="list-style-type: none"> <li>• Replace the virtualization engine.</li> </ul>
53	The cabling configuration is unauthorized.	<ul style="list-style-type: none"> <li>• Check the cabling. Ensure the server and switch connect to the host side and the storage connects to the device side of the virtualization engine.</li> <li>• If necessary, clear the SAN database.</li> <li>• If necessary, cycle the virtualization engine power.</li> <li>• If necessary, import the SAN zone configuration.</li> </ul>
54	The cabling configuration is unauthorized.	<ul style="list-style-type: none"> <li>• Check the cabling.</li> </ul>
57	Too many HBAs are attempting to log in.	<ul style="list-style-type: none"> <li>• Check the cabling.</li> </ul>
60	The node mapping table was cleared using SW2.	<ul style="list-style-type: none"> <li>• No action required.</li> </ul>
62	SW2 settings are incorrect..	<ul style="list-style-type: none"> <li>• Correct the SW2 setting.</li> <li>• Cycle the virtualization engine power.</li> </ul>
126	Too many virtualization engines in the SAN.	<ul style="list-style-type: none"> <li>• Remove the extra virtualization engine.</li> <li>• Cycle the virtualization engine power.</li> </ul>
130	The connection between virtualization engines is down.	<ul style="list-style-type: none"> <li>• Correct the problem.</li> <li>• Cycle the power on the follower virtualization engine.</li> </ul>

**TABLE A-5** Virtualization Engine Service Codes —400-599 Device-Side Interface Driver Errors

Service Code Number	Cause of Error	Recommended Corrective Action
409	The FC device-side type code is invalid.	<ul style="list-style-type: none"><li>• Cycle the power</li><li>• If the problem persists, replace the virtualization engine.</li></ul>
434	Cannot continue due to many elastic store errors. Elastic store errors result from a clock mismatch between transmitter and receiver and indicate an unreliable link. This error can also occur if a device in the SAN loses power unexpectedly.	<ul style="list-style-type: none"><li>• Check for the faulty component and replace it.</li><li>• Cycle the power on the faulty virtualization engine.</li></ul>

# Configuration Utility Error Messages

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The *Sun StorEdge 3900 and 6900 Series Reference Manual* lists and defines the command utilities that configure the various components of the Sun StorEdge 3900 and 6900 series storage systems. If you encounter errors with the command line utilities, refer to the recommendations for corrective action in this appendix.

The error messages are broken out into the following sections:

- “Virtualization Engine Error Messages” on page 164  
TABLE B-1 lists `SUNWsecfg` error messages specific to the virtualization engine.
- “Switch Error Messages” on page 168  
TABLE B-2 lists `SUNWsecfg` error messages specific to the Sun StorEdge network FC switch-8 and switch-16 switches.
- “Sun StorEdge T3+ Array Partner Group Error Messages” on page 171  
TABLE B-3 lists `SUNWsecfg` error messages specific to the Sun StorEdge T3+ array.
- “Other Error Messages” on page 175  
TABLE B-4 lists miscellaneous `SUNWsecfg` error messages common to all components.

# Virtualization Engine Error Messages

TABLE B-1 Virtualization Engine Error Messages

Source of Error Message	Cause of Error Message	Suggested Corrective Action
Common to virtualization engine	Invalid virtualization engine pair name, or the virtualization engine is unavailable. This is usually because the <code>savevemap</code> command is running	Run <code>ps -ef   grep savevemap</code> or <code>listavailable -v</code> (which returns the status of individual virtualization engines) to confirm that the configuration locks are set.
Common to virtualization engine	No virtualization engine pairs were found, or the virtualization engine pairs are offline. This is usually due to the <code>savevemap</code> command running.	Run <code>ps -ef   grep savevemap</code> or <code>listavailable -v</code> (which returns the status of individual virtualization engines) to confirm that the configuration locks are set.
Common to virtualization engine	The virtualization engine was unable to obtain a lock on <code>\$vepair</code> .  Another virtualization engine command is updating the configuration.	<ol style="list-style-type: none"> <li>1. Run <code>listavailable -v</code> (which returns the status of individual virtualization engines)</li> <li>2. Check for the lock file directly by using <code>ls -la /opt/SUNWsecfg/etc</code> (look for <code>.v1.lock</code> or <code>.v2.lock</code>).</li> <li>3. If the lock is set in error, use the <code>removelocks -v</code> command to clear.</li> </ol>
Common to virtualization engine	The virtualization engine was unable to start <code>slicd</code> on <code>/\${vepair}</code> , so it cannot execute the command.	<ol style="list-style-type: none"> <li>1. Run <code>startslicd</code> and then <code>showlogs -e 50</code> to determine why <code>startslicd</code> could not start the daemon.</li> <li>2. Reset or power off the virtualization engine if the problem persists.</li> </ol>
Common to virtualization engine	The login failed.  A password is required to log in to the virtualization engine. The utility uses the <code>VEPASSWD</code> environment variable to login.  The environment variable <code>VEPASSWD</code> might be set to an incorrect value.	<ol style="list-style-type: none"> <li>1. Set the <code>VEPASSWD</code> environment variable with the proper value.</li> <li>2. Try to login again.</li> </ol>



**TABLE B-1** Virtualization Engine Error Messages (Continued)

Source of Error Message	Cause of Error Message	Suggested Corrective Action
Common to virtualization engine	<p>After resetting the virtualization engine, the \$VENAME is unreachable.</p> <p>The hardware might be faulty.</p>	<p>Check the IP address and netmask that has been assigned to the virtualization engine hardware.</p> <p>Be aware that the machine takes approximately 30 seconds to boot after a reset.</p>
Common to virtualization engine	<ul style="list-style-type: none"> <li>• The device-side operating mode is not set properly.</li> <li>• The device-side UID reporting scheme is not set properly.</li> <li>• The host-side operating mode is not set properly.</li> <li>• The host-side LUN mapping mode is not set properly.</li> <li>• The host-side Command Queue Depth is not set properly.</li> <li>• The host-side UID distinguish is not set properly.</li> <li>• The IP is not set properly.</li> <li>• The subnet mask is not set properly.</li> <li>• The default gateway is not set properly.</li> <li>• The server port number is not set properly.</li> <li>• The host WWN Authentications are not set properly.</li> <li>• The host IP Authentications are not set properly.</li> <li>• The Other VEHOST IP is not set properly.</li> </ul>	<ol style="list-style-type: none"> <li>1. Log in to the virtualization engine and verify that the device, host, and network settings are correct.</li> <li>2. Make sure the virtualization engine hardware is not in ERROR 50 mode.</li> <li>3. If required, power cycle the virtualization engine hardware, or disable the host side switch port.</li> <li>4. Run the <code>setupve -n ve_name</code> command and enable the switch port.</li> </ol>
checkslidc	The virtualization engine cannot establish communication with the \${vepair}.	Run <code>startslidc -n \${vepair}</code> .
checkslidc	The virtualization engine cannot establish communication with the virtualization engine pair \${vepair} initiator \${initiator}.	<ol style="list-style-type: none"> <li>1. Determine the host name associated with \${initiator} by using the <code>showvemap -n \${vepair} -f</code> command output.</li> <li>2. Run the command <code>resetve -n vename</code>.</li> </ol>

**TABLE B-1** Virtualization Engine Error Messages (Continued)

Source of Error Message	Cause of Error Message	Suggested Corrective Action
checkvemap	Cannot establish communication with <code>#{vepair}</code>	<ol style="list-style-type: none"> <li>1. Run the <code>checkvemap</code> command again.</li> <li>2. If this fails, check the status of both virtualization engines.</li> <li>3. If there is an error condition, see Appendix A for corrective action.</li> </ol>
createvezone	<p>An invalid WWN (<code>\$(wwn)</code>) is on the <code>\$(vepair)</code> initiator (<code>\$(init)</code>), or the virtualization engine is unavailable.</p> <p>For a WWN to be available for <code>createvezone</code>, the WWN in the map file (<code>showvemap -n ve_pairname</code>) must be "Undefined" and the online status should be "Yes."</p>	<p>The WWN that was specified has a SLIC zone and/or an HBA alias has already been assigned.</p> <ol style="list-style-type: none"> <li>1. If a zone name is assigned, run the <code>rmvezone</code> command.</li> <li>2. If errors still exist, run <code>sadapter alias -d \$(vepair) -r \$(initiator) -a \$zone -n " "</code>.</li> <li>3. Run <code>savemap -n \$(vepair)</code>.</li> </ol>
createvlun	Invalid disk pool <code>\$(diskpool)</code> on <code>\$(vepair)</code> , or disk pool is unavailable.	<ol style="list-style-type: none"> <li>1. Run the <code>showvemap -n \$(vepair)</code> command to verify that the disk pool was created properly.</li> <li>2. If the disk pool is unavailable, run <code>creatediskpools -n \$(t3name)</code>.</li> <li>3. If that fails, check the Sun StorEdge T3+ array for unmounted volumes or path failures, by running <code>checkt3config -n \$(t3name) -v</code>.</li> </ol>
createvlun	Unable to execute command. The associated Sun StorEdge T3+ array physical LUN <code>#{t3lun}</code> for disk pool <code>#{diskpool}</code> might not be mounted.	<ol style="list-style-type: none"> <li>1. Run <code>checkt3mount -n \$(t3name) -l ALL</code> to see the mount status of the volume.</li> <li>2. For further information about problems with the underlying Sun StorEdge T3+ array, run <code>checkt3config -n \$(t3name) -v</code>.</li> </ol>

**TABLE B-1** Virtualization Engine Error Messages (*Continued*)

Source of Error Message	Cause of Error Message	Suggested Corrective Action
restorevemap	<ul style="list-style-type: none"> <li>• The import zone data failed.</li> <li>• The restore physical and logical data failed.</li> <li>• The restore zone data failed.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check the status of both virtualization engines.</li> <li>2. If an error condition exists, refer to Appendix A for corrective action.</li> <li>3. Run the <code>restorevemap</code> command again.</li> </ol>
setdefaultconfig	<ul style="list-style-type: none"> <li>• The virtualization engine is unable to properly configure the virtualization engine host <code>\${vehost}</code>.</li> <li>• The virtualization engine cannot continue the configuration of other components.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check the status of the virtualization engine and reset, if necessary.</li> <li>2. Run the <code>setdefaultconfig</code> command again.</li> </ol>
setdefaultconfig	The <code>setupve(1M)</code> command failed.	<ol style="list-style-type: none"> <li>1. Run <code>setupve -n ve_hostname -v</code> (verbose mode).</li> <li>2. Check the errors.</li> <li>3. Run <code>checkve -n ve_hostname</code>.</li> </ol> <p>You can continue to configure VLUNs and zones only if both of these commands work.</p>

# Switch Error Messages

**TABLE B-2** Sun StorEdge Network FC Switch Error Messages

Source of Error Message	Cause of Error Message	Suggested Corrective Action
Common to all Sun StorEdge network FC switches	The Sun StorEdge system type entered ( <code>\${cab_type}</code> ) does not match the system type discovered ( <code>\${boxtype}</code> ).	Either call the command with the <code>-f force</code> option to force the series type, or do not specify the cabinet type (no <code>-c</code> option).
Common to all Sun StorEdge network FC switches	The switch is unable to obtain a lock on switch <code>\${switch}</code> . Another command is running.	<ol style="list-style-type: none"> <li>1. Check <code>listavailable -s</code> to see if another switch command might be updating the configuration.</li> <li>2. If the switch in question does not appear, check for the existence of the lock file directly by typing <code>ls -la /opt/SUNWsecfg/etc</code> (look for <code>.switch.lock</code>).</li> <li>3. If the lock is set in error, use the <code>removelocks -s</code> command to clear it.</li> </ol> <p>Due to a non-reentrant interface, there is a single lock file for all switches. Only one can be accessed at a time.</p>
Common to all Sun StorEdge network FC switch commands	Unable to determine switch type. Interface may be down or type is unsupported. The switch commands now have to be able to determine if the switch is a 1 Gbit or 2 Gbit switch, and they were unable to obtain the flash revision on the switch for some reason.	<ol style="list-style-type: none"> <li>1. Reset the switch.</li> <li>2. Rerun the appropriate switch command.</li> </ol>
Common to all Sun StorEdge network FC switch commands	Invalid login id and/or password entered.  The user has set a login id and password on the 2Gbit switch.	<ol style="list-style-type: none"> <li>1. Set the <code>SWLOGIN</code> and <code>SWPASSWD</code> environment variables to the correct switch login id and password.</li> <li>2. Re-run the switch command.</li> </ol>

**TABLE B-2 Sun StorEdge Network FC Switch Error Messages (Continued)**

Source of Error Message	Cause of Error Message	Suggested Corrective Action
checkswitch	<ul style="list-style-type: none"> <li>The current configuration on \$switch does not match the defined configuration.</li> <li>One of the predefined static switch configuration parameters that can be overridden for special configurations (such as NT connect or cascaded switches) is set incorrectly.</li> </ul>	<ol style="list-style-type: none"> <li>Select View Logs or see \$LOGFILE for more details.</li> <li>Rerun setupswitch on the specified \$switch.</li> </ol>
checkswitch	The other back-end switch is not the same type as this switch. Firmware should be upgraded or downgraded so the two switches match.	Run the following command on the other back-end switch to upgrade it: <pre>setswitchflash -s switch2 -f /usr/opt/SUNWsmgr2/firmware/SANbox1/16040233.flb</pre>
checkswitch (2 Gbit switches)  modifyswitch (2 Gbit switches)  saveswitch (2 Gbit switches)	<p>No active zone set found.</p> <p>2 Gbit switches have a zone configuration with a zoneset and zone(s). Each zone then has port or WWN members. 1 Gbit switches had numbered hard zones only.</p>	<ol style="list-style-type: none"> <li>Attempt to activate an existing zone set.</li> <li><pre>/opt/SUNWsecfg/flib/sandbox2 -x switchip get_zoneset_list</pre></li> <li>From that list, select the zoneset you want to be active. It should be named something similar to <code>hostname_swla_zset</code></li> <li><pre>/opt/SUNWsecfg/flib/sandbox2 -x switchip activate_zoneset zoneset</pre></li> <li>If you are still having problems, rerun setupswitch.</li> <li>Rerun the initial command you attempted to run.</li> </ol>
restoreswitch	Map file format or version is invalid for switch type found. User must have upgraded or changed out the switch with a different type and did not use the SUNWsecfg commands to reconfigure.	<ol style="list-style-type: none"> <li><pre>cp /opt/SUNWsecfg/etc/"switch".map /opt/SUNWsecfg/etc/"switch".save</pre></li> <li>Run <pre>saveswitch -s switch</pre></li> <li>Manually edit the configurable items in the <pre>/opt/SUNWsecfg/etc/"switch".map</pre> file to valid values that equal the values in <pre>"switch".save</pre> file.</li> <li>Rerun <pre>restoreswitch -s switch</pre>.</li> </ol>

**TABLE B-2** Sun StorEdge Network FC Switch Error Messages (Continued)

Source of Error Message	Cause of Error Message	Suggested Corrective Action
setswitchflash	Invalid flash file \$flashfile. Check the number of ports on switch \$switch.	You might be attempting to download a flash file for an 8-port switch to a 16-port switch. Check <code>showswitch -s \$switch</code> and look for “number of ports.” Ensure that this matches the second and third characters of the flash file name.
setswitchflash	<p>`\${switch}` timed out after reset. The switch took longer than two minutes to reset after a configuration change.</p> <p>The switch might not be set for <code>rarp</code>, or <code>rarp</code> is not working correctly.</p>	<ol style="list-style-type: none"> <li>1. Wait several minutes.</li> <li>2. Run <code>ping \$switch</code>.</li> <li>3. If errors persist, manually power cycle the switch.</li> </ol>
setupswitch	<p>Switch `\${switch}` timed out after reset.</p> <p>The switch took longer than two minutes to reset after a configuration change.</p>	<ol style="list-style-type: none"> <li>1. Wait several minutes.</li> <li>2. Run <code>ping \$switch</code></li> <li>3. If errors persist, manually power cycle the switch.</li> </ol>
setupswitch	<p>Could not set chassis ID on switch `\${switch}` to `\${cid}`.</p> <p>This occurs only in a SAN environment with cascaded switches.</p>	<ol style="list-style-type: none"> <li>1. Check the switch chassis IDs of all switches in the SAN.</li> <li>2. Verify that each ID is unique.</li> <li>3. After the chassis IDs have been established, override the switch chassis IDs with the following command:  <pre>setupswitch -s \$switch_name -i \$unique_chassis_id -v.</pre> </li> </ol>

# Sun StorEdge T3+ Array Partner Group Error Messages



**Caution** – Running `restoret3config(1M)` or `modifyt3config(1M)` destroys all data on the Sun StorEdge T3+ array.

**TABLE B-3** Sun StorEdge T3+ Array Error Messages

Source of Error Message	Cause of Error Message	Suggested Corrective Action
Common to Sun StorEdge T3+ array	<ul style="list-style-type: none"> <li>The current configuration does not match the reference (standard) configurations.</li> <li>This particular configuration is not a standard, supported type.</li> </ul>	<ol style="list-style-type: none"> <li>Check the current Sun StorEdge T3+ array configuration with the <code>showt3 -n &lt;t3&gt;</code> command.</li> <li>Verify whether the configuration is corrupted or has changed.</li> <li>Refer to the <code>raid.cfg</code> files in <code>/opt/SUNWsecfg/etc</code> to determine if the configuration commands are set up and functioning properly.</li> </ol>
Common to Sun StorEdge T3+ array	<ul style="list-style-type: none"> <li>Could not mount volume <code>\$volume</code></li> <li><code>\$lun config</code> does not match</li> <li>The LUN might have multiple drive failures or corrupted data or parity.</li> </ul>	<ol style="list-style-type: none"> <li>Replace the failed FRUs.</li> <li>Restore the Sun StorEdge T3+ array configuration with the <code>restoret3config -f -n t3_name</code> command.</li> </ol>
Common to Sun StorEdge T3+ array	<ul style="list-style-type: none"> <li>No volumes exist on this Sun StorEdge T3+ array.</li> <li><code>\$volume volume</code> not found on this Sun StorEdge T3+ array.</li> </ul>	Create and restore the Sun StorEdge T3+ array LUNs using <code>restoret3config(1M)</code> or <code>modifyt3config(1M)</code> .
Common to Sun StorEdge T3+ array	<ul style="list-style-type: none"> <li>The <code>\$fru</code> status is not ready or enabled.</li> <li>Operations on the Sun StorEdge T3+ array are being aborted.</li> </ul>	The disk, controller, or loop interface card in the Sun StorEdge T3+ array might be faulty. Replace the failed FRU and rerun the utility.

**TABLE B-3 Sun StorEdge T3+ Array Error Messages (Continued)**

Source of Error Message	Cause of Error Message	Suggested Corrective Action
Common to Sun StorEdge T3+ array	<ul style="list-style-type: none"> <li>The Sun StorEdge T3+ array is not of T3B type, so it aborts operations.</li> <li><code>t3config</code> utilities are supported only in the Sun StorEdge T3+ array; the <code>t3config</code> utilities are not supported on Sun StorEdge T3+ arrays with 1.xx firmware.</li> </ul>	<ol style="list-style-type: none"> <li>Refer to the T3 default/custom configuration table in the <i>Sun StorEdge 3900 and 6900 Series 2.0 Reference and Service Guide</i>.</li> <li>Use <code>showt3-n t3_name</code> to display the present configuration.</li> <li>Check the Sun StorEdge T3+ firmware version (it should be version 2.01.00 or higher). Upgrade if required.</li> </ol>
Common to Sun StorEdge T3+ array	<ul style="list-style-type: none"> <li>No response received from <code>\$t3_name</code>. Aborting operation.</li> </ul>	<ol style="list-style-type: none"> <li>Check the Sun StorEdge T3+ network connection.</li> <li>Check with Ping <code>\$t3_name</code> command to determine if the Sun StorEdge T3+ array is operating.</li> </ol>
Common to Sun StorEdge T3+ array	<code>volslice</code> is not enabled on this Sun StorEdge T3+ array.	Check the T3+ firmware (2.01.00 or higher) to make sure volume slicing is allowed with this version of firmware.
Common to Sun StorEdge T3+ array	<ul style="list-style-type: none"> <li>Error while opening the Sun StorEdge T3+ array.</li> <li>Cannot open after resetting the Sun StorEdge T3+ array.</li> </ul>	<ol style="list-style-type: none"> <li>Check the Sun StorEdge T3+ master and alternate master network connection.</li> <li>Check with Ping <code>\$t3_name</code> command to determine if the Sun StorEdge T3+ array is operating.</li> </ol>
<code>checkt3config</code>	The <code>vol init</code> command is being executed by another user. Additional <code>vol</code> commands cannot run.	<ol style="list-style-type: none"> <li>Check whether any other <code>secfg</code> utility is running.</li> <li>If an <code>secfg</code> utility is running, allow it to finish.</li> </ol>
<code>checkt3config</code>	An error occurred while the <code>checkt3config</code> command was checking the process list, causing the <code>t3_name</code> to abort.	Check whether any other <code>secfg</code> T3+ or native Sun StorEdge T3+ array commands are being executed on that particular Sun StorEdge T3+ array.
<code>checkt3config</code>	Snapshot configuration files are not present. Unable to check configuration.	<ol style="list-style-type: none"> <li>Verify that the snapshot files are saved and have read permissions in the <code>/opt/SUNWsecfg/etc/t3name / directory</code>.</li> <li>If the snapshot files are not available, create them using the <code>savet3config</code> command.</li> </ol>



**TABLE B-3 Sun StorEdge T3+ Array Error Messages (Continued)**

Source of Error Message	Cause of Error Message	Suggested Corrective Action
checkt3mount	<ul style="list-style-type: none"> <li>The \$lun status reported a bad or nonexistent LUN.</li> <li>While checking the configuration using the showt3 -n command, operations abort.</li> </ul>	<ol style="list-style-type: none"> <li>Run the showt3 -n command to verify that the requested LUN exists on the Sun StorEdge T3+ array.</li> <li>Confirm that the Sun StorEdge T3+ array configuration matches standard configurations.</li> </ol>
createt3group	User-specified LUN \$lun does not exist on the Sun StorEdge T3+ array.	Create the required slice or LUN before you set permissions using the createt3slice command.
createt3group	Unable to set permissions on the LUN \$lun to \$perm for new group.	Refer to the Sun StorEdge T3 and T3+ array documentation.
createt3group	Error while resetting permissions on LUN \$lun to NONE for group \$group.	Refer to the Sun StorEdge T3 and T3+ array documentation.
delfromt3group	Error deleting the world wide name (WWN) \$wwn from group.	Refer to the Sun StorEdge T3 and T3+ array documentation.
enablevol slicing	Error checking the Sun StorEdge T3+ enable volume slicing status.	<ol style="list-style-type: none"> <li>Check the Sun StorEdge T3+ array firmware level and verify it is 2.01.00 or higher.</li> <li>Check if volume slicing is supported and enabled on the Sun StorEdge T3+ array.</li> </ol>
enablevol slicing	Cannot enable volume slicing. The Sun StorEdge T3+ array firmware does not support this feature.	<ol style="list-style-type: none"> <li>Check the Sun StorEdge T3+ array firmware level and verify it is 2.01.00 or higher.</li> <li>Upgrade the firmware, if required.</li> </ol>
modifyt3config	<ul style="list-style-type: none"> <li>The lock file clear waiting period expired.</li> <li>The creatediskpools command aborted.</li> </ul>	<ol style="list-style-type: none"> <li>Check to see if any secfg T3+ commands are being executed.</li> <li>If the commands are executing, wait for them to complete.</li> <li>Run creatediskpools -n t3name.</li> </ol>
restoret3config	<ul style="list-style-type: none"> <li>An error occurred while the block size compare command was executing.</li> <li>The Sun StorEdge T3+ array block size parameter is different from the snapshot file. The Sun StorEdge T3+ array may have been reconfigured.</li> </ul>	Run the restoret3config command.

**TABLE B-3** Sun StorEdge T3+ Array Error Messages (Continued)

Source of Error Message	Cause of Error Message	Suggested Corrective Action
restoret3config	<ul style="list-style-type: none"> <li>• \$LUN configuration failed to restore.</li> <li>• The force option tried unsuccessfully to reinitialize.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check the Sun StorEdge T3+ configuration with the <code>showt3 -n t3_name</code> command.</li> <li>2. Refer to the Sun StorEdge T3 and T3+ documentation.</li> </ol>
restoret3config	<ul style="list-style-type: none"> <li>• \$LUN configuration is not found in the <code>\$restore_file</code>.</li> <li>• Cannot restore \$LUN.</li> </ul>	<ol style="list-style-type: none"> <li>1. Check for snapshot files in the <code>/opt/SUNWsecfg/etc/t3_name/</code> directory.</li> <li>2. If the snapshot files are not found, use the <code>modifyt3config</code> command to configure the Sun StorEdge T3+ array.</li> </ol>
rmt3group	An error occurred while removing Group.	Refer to the Sun StorEdge T3 and T3+ array documentation.
rmt3slice	An error failed to remove slice <code>\$slicename</code> .	Refer to the Sun StorEdge T3 and T3+ array documentation.
rmt3slice	An error failed to remove slice from volume <code>\$volume</code> .	<ol style="list-style-type: none"> <li>1. Check the volume status using the <code>checkt3mount</code> or <code>showt3</code> command.</li> <li>2. If unmounted, use the <code>restoret3config</code> command to mount.</li> </ol>
savet3config	While checking the configuration, the Sun StorEdge T3+ array configuration was not saved.	<ol style="list-style-type: none"> <li>1. If the configuration is different from standard Sun StorEdge T3+ array configuration, run the <code>showt3 -n t3_name</code> command to check the Sun StorEdge T3+ array configuration.</li> <li>2. Use the <code>modifyt3config</code> command to reconfigure the device.</li> </ol>
sett3lunperm	LUN <code>\$lun</code> does not exist on the Sun StorEdge T3+ array.	<ol style="list-style-type: none"> <li>1. Create a Sun StorEdge T3+ array slice.</li> <li>2. Before setting permissions, use the <code>createt3slice</code> command.</li> </ol>

# Other Error Messages

**TABLE B-4** Other SUNWsecfg Error Messages

Source of Error Message	Cause of Error Message	Suggested Corrective Action
Common to all components	If the Sun StorEdge 3900 or 6900 series has more than two failures (for example, both virtualization engines and two switches are down), the <code>getcabinet</code> tool might not determine the correct cabinet type. In this example, the <code>getcabinet</code> command might determine the device to be a Sun StorEdge 3900 series when, in reality, it is a Sun StorEdge 6900 series.	Set the <code>BOXTYPE</code> variable as follows: <code>BOXTYPE=6910; export BOXTYPE</code>
<code>checkdefaultconfig</code>	<ul style="list-style-type: none"> <li>• Could not determine the Sun StorEdge system type.</li> <li>• Multiple components might be down and the <code>getcabinet</code> command could not determine the Sun StorEdge series type (3910, 3960, 6910, or 6960).</li> </ul>	<p>To use the command line interface (CLI), set the <code>BOXTYPE</code> environment variable to one of the seven values.</p> <p>For example, <code>BOXTYPE=3910; export BOXTYPE</code>.</p>
<code>listavailable</code>	<ul style="list-style-type: none"> <li>• The component is unavailable. It is either not found or the configuration lock is set.</li> <li>• The components are down (they do not respond to a ping).</li> <li>• Another <code>SUNWsecfg</code> command is running and is updating the configuration (<code>ps -ef</code>).</li> </ul>	If no other commands are running and you believe the configuration lock might be set in error, run the <code>removelocks</code> command.
<code>setdefaultconfig</code>	The system could not determine the Sun StorEdge system type.	<p>To use the command line interface (CLI), set the <code>BOXTYPE</code> environment variable to one of the four values.</p> <p>For example, <code>BOXTYPE=3910; export BOXTYPE</code>.</p>



# Abbreviations and Acronyms

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This list contains definitions for acronyms used in this troubleshooting guide.

<b>ASIC</b>	application-specific integrated circuit
<b>CLI</b>	command-line interface
<b>CRC</b>	cyclic redundancy code
<b>DAS</b>	direct attached storage
<b>EOF</b>	end of file
<b>FC</b>	Fibre Channel
<b>FC-ELS</b>	Fibre Channel Extended Link Service
<b>FRU</b>	field replaceable unit
<b>GBIC</b>	gigabit interface converter
<b>GUI</b>	graphical user interface
<b>HBA</b>	host bus adapter
<b>ISL</b>	inter-switch link
<b>LED</b>	light emitting diode
<b>LUN</b>	logical unit number
<b>MAC</b>	media access control
<b>NSCC</b>	Network Storage Command Center
<b>PCU</b>	power cooling unit
<b>PDU</b>	power distribution unit

<b>PFA</b>	predictive failure analysis
<b>POST</b>	power on self test
<b>RAID</b>	redundant array of independent disks
<b>RARP</b>	reverse address resolution protocol
<b>RFE</b>	request for enhancement
<b>RSS</b>	Remote Storage Services
<b>SAN</b>	storage area network
<b>SCSI</b>	small computer system interface
<b>SLIC</b>	Serial Loop IntraConnect
<b>SNMP</b>	simple network management protocol
<b>SPOF</b>	single point of failure
<b>SRN</b>	Service Request Number
<b>SRS</b>	Sun Remote Services
<b>SSP</b>	Storage Service Processor
<b>SVE</b>	storage virtualization engine
<b>TCP/IP</b>	transport control protocol/internet protocol
<b>VLUN</b>	virtual LUN
<b>WWN</b>	worldwide name

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