Sun StorEdge™ 3900 and 6900 Series Troubleshooting Guide

Sun Microsystems, Inc.
4150 Network Circle
Santa Clara, CA 95054 U.S.A.
650-960-1300

Part No. 816-4290-11
March 2002, Revision A

Send comments about this document to: docfeedback@sun.com

Please
Recycle

Adobe PostScript

Contents

List of Figures

Preface

The Sun StorEdge 3900 and 6900 Series 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 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.

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 quiescing the I/O, and tools you can use to isolate and troubleshoot problems.

Chapter 3 provides Fibre Channel link troubleshooting procedures.

Chapter 4 presents information about configuration settings, specific to the Sun StorEdge 3900 and 6900 series. It also provides a procedure for how to clear the lock file.

Chapter 5 provides information on host device troubleshooting.

Chapter 6 provides information on Sun StorEdge network FC switch-8 and switch-16 switch device troubleshooting.

Chapter 7 provides detailed information for troubleshooting the virtualization engines.

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 discusses ethernet hub troubleshooting. Information associated with the 3COM Ethernet hubs is limited in this guide, however, as this is third-party information.

Appendix A provides virtualization engine references, including SRN and SNMP Reference, an SRN / SNMP single point of failure table, and port communication and service code tables.

Appendix B provides a list of SUNWsecfg Error Messages and recommendations for corrective action.

Using UNIX Commands

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

See one or more of the following for this information:

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

Typographic Conventions

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

Shell Prompts

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

Related Documentation

Product	Title	Part Number
Late-breaking News	• *Sun StorEdge 3900 and 6900 Series Release Notes*	816-3247
Sun StorEdge 3900 and 6900 series hardware information	• *Sun StorEdge 3900 and 6900 Series Site Preparation Guide* • *Sun StorEdge 3900 and 6900 Series Regulatory and Safety Compliance Manual* • *Sun StorEdge 3900 and 6900 Series Hardware Installation and Service Manual*	816-3242 816-3243 816-3244
Sun StorEdge T3 and T3+ array	• *Sun StorEdge T3 and T3+ Array Start Here* • *Sun StorEdge T3 and T3+ Array Installation, Operation, and Service Manual* • *Sun StorEdge T3 and T3+ Array Administrator's Guide* • *Sun StorEdge T3 and T3+ Array Configuration Guide* • *Sun StorEdge T3 and T3+ Array Site Preparation Guide* • *Sun StorEdge T3 and T3+ Field Service Manual* • *Sun StorEdge T3 and T3+ Array Release Notes*	816-0772 816-0773 816-0776 816-0777 816-0778 816-0779 816-0781
Diagnostics	• *Storage Automated Diagnostics Environment User's Guide*	816-3142
Sun StorEdge network FC switch-8 and switch-16	• *Sun StorEdge Network FC Switch-8 and Switch-16 Release Notes* • *Sun StorEdge Network FC Switch-8 and Switch-16 Installation and Configuration Guide* • *Sun StorEdge Network FC Switch-8 and Switch-16 Best Practices Manual* • *Sun StorEdge Network FC Switch-8 and Switch-16 Operations Guide* • *Sun StorEdge Network FC Switch-8 and Switch-16 Field Troubleshooting Guide*	816-0842 816-0830 816-2688 816-1986 816-1701
SANbox switch management using SANsurfer	• *SANbox 8/16 Segmented Loop Switch Management User's Manual* • *SANbox-8 Segmented Loop Fibre Channel Switch Installer's/ User's Manual* • *SANbox-16 Segmented Loop Fibre Channel Switch Installer's/ User's Manual*	875-3060 875-1881 875-3059
Expansion cabinet	• *Sun StorEdge Expansion Cabinet Installation and Service Manual*	805-3067
Storage server processor	• *Netra X1 Server User's Guide* • *Netra X1 Server Hard Disk Drive Installation Guide*	806-5980 806-7670

Accessing Sun Documentation Online

A broad selection of Sun system documentation is located at:

`http://www.sun.com/products-n-solutions/hardware/docs`

A complete set of Solaris documentation and many other titles are located at:

`http://docs.sun.com`

Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can email your comments to Sun at:

`docfeedback@sun.com`

Please include the part number (816-4290-10) of your document in the subject line of your email.

CHAPTER 1

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

Series	System	Sun StorEdge Fibre Channel Switch Supported	Sun StorEdge T3+ Array Partner Groups Supported	Additional Array Partner Groups Supported with Optional Additional Expansion Cabinet
Sun StorEdge 3900 series	Sun StorEdge 3910 system	Two 8-port switches	1 to 4	Not applicable
	Sun StorEdge 3960 system	Two 16-port switches	1 to 4	1 to 5
Sun StorEdge 6900 series	Sun StorEdge 6910 system	Two 8-port switches	1 to 3	1 to 4
	Sun StorEdge 6960 system	Two 16-port switches	1 to 3	

Predictive Failure Analysis 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 links are monitored at all end points using the link FC-ELS link counters. When link errors surpass the threshold values, an alert is sent. This enables Sun personnel to replace components that are experiencing high transient fault levels before a hard fault occurs.
- **Enclosure status**—Many devices, like the Sun StorEdge network FC switch-8 and switch-16 switch and the Sun StorEdge T3+ array, will 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.
- **SPOF notification**—Storage Automated Diagnostic Environment notification for path failures and failovers (that is, Sun StorEdge Traffic Manager software failover) can be considered PFA, since Sun-trained personnel are notified and can repair the primary path. This eliminates the time of exposure to single points of failure 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 can be used to troubleshoot problems that occur in supported components of the Sun StorEdge 3900 and 6900 series.

CHAPTER 2

General Troubleshooting Procedures

This chapter contains the following sections:

Troubleshooting Overview Tasks

This section lists the high-level steps 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 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 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:**
   - Storage Automated Diagnostic Environment Topology view
   - Storage Automated Diagnostic Environment Revision Checking (manual patch or package, to check whether the package or patch is installed)
   - Verify the functionality using one of the following:
     - `checkdefaultconfig`(1M)
     - `checkt3config`(1M)
     - `cfgadm -al` output
     - `luxadm`(1M) output
   - Check the multipathing status using the Sun StorEdge Traffic Manager software or `VxDMP`.
3. **Check the status of a Sun StorEdge T3+ array by using one or more of the following methods:**
   - Storage Automated Diagnostic Environment device monitoring reports
   - Run the `SEcfg` script, which displays and shows the Sun StorEdge T3+ array configuration
   - Manually open a telnet session to the Sun StorEdge T3+ array
   - `luxadm`(1M) display output
   - LED status on the Sun StorEdge T3+ array
   - Explorer Data Collection Utility output (located on the Storage Service Processor)

4. **Check the status of the Sun StorEdge FC network switch-8 and switch-16 switches using the following tools:**
   - Storage Automated Diagnostic Environment device monitoring reports
   - Run the `SEcfg` script, which displays and shows the Sun StorEdge T3+ array configuration
   - LED Status (online/offline, POST error codes found in the *Sun StorEdge network FC switch-8 and switch-16 switch Installation and Configuration Guide*)
   - Explorer Data Collection Utility output (located on the Storage Service Processor)
   - SANsurfer GUI

Note – To run the SANsurfer GUI 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:**
   - Storage Automated Diagnostic Environment device monitoring reports
   - Run the SEcfg script, which displays and shows the virtualization engine
   - Refer to the LED status blink codes in Chapter 7.
6. **Quiesce the I/O along the path to be tested as follows:**
   - For installations using VERITAS VxDMP, disable `vxdmpadm`
   - For installations using the Sun StorEdge Traffic Manager software, unconfigure the Fabric device.
   - Refer to "To Quiesce the I/O" on page 8
   - Halt the application.
7. **Test and isolate the FRUs using the following tools:**
   - Storage Automated Diagnostic Environment diagnostic tests (this might require the use of 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 Reference Manual* and the Sun StorEdge *3900 and 6900 Installation and Service Manual* 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 by using one of the following methods:**
   - Multipathing software
   - Restarting the application

Multipathing Options in the Sun StorEdge 6900 Series

Using the virtualization engines presents several challenges in how multipathing is handled in the Sun StorEdge 6900 series.

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 problem on a Sun StorEdge 6900 series system.

```
# luxadm display

/dev/rdsk/c6t29000060220041F96257354230303052d0s2
DEVICE PROPERTIES for disk: /dev/rdsk/
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/rdsk/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 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.

Alternatives to Sun StorEdge Traffic Manager

As an alternative to using Sun StorEdge Traffic Manager, you can manually halt the I/O using one of two methods: quiesce I/O and unconfigure the c2 path. These methods are explained below.

▼ 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 Storage Automated Diagnostic Environment Topology GUI, determine which virtualization engine is in the path you need to disable.**

3. **Use the world wide 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 I/O has halted.**

   This halts the I/O only up to the A3/B3 link (see FIGURE 2-2). I/O continues to move over the T1 and T2 paths, as well as the A4/B4 links to the Sun StorEdge T3+ array.

▼ To Suspend the I/O

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

1. **Stop all customer applications that are accessing the Sun StorEdge T3+ array.**
2. **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 and any FRU replacement is finished, return the Controller state back to the default by using virtualization engine failback. Refer to "Virtualization Engine Failback" on page 81.

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, SCSI errors will occur on the data host and a brief suspension of I/O will occur.

▼ To Return the Path to Production

1. **Type `cfgadm -c configure` *device*.**

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

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

▼ To View the VxDisk Properties

1. **Type the following**:

```
# 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

# vxdmpadm 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
```

From the VxDisk output, notice that there are two physical paths to the LUN:

- c20t2B000060220041F4d0s2
- c23t2B000060220041F9d0s2

Both of these paths are currently enabled with VxDMP.

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

```
# luxadm display /dev/rdsk/c20t2B000060220041F4d0s2

DEVICE PROPERTIES for disk: /dev/rdsk/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/rdsk/c20t2B000060220041F4d0s2
/devices/pci@a,2000/pci@2/SUNW,qlc@4/fp@0,0
ssd@w2b000060220041f4,0:c,raw

# luxadm display /dev/rdsk/c23t2B000060220041F9d0s2

DEVICE PROPERTIES for disk: /dev/rdsk/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/rdsk/c23t2B000060220041F9d0s2
  /devices/pci@e,2000/pci@2/SUNW,qlc@4/fp@0,0/
ssd@w2b000060220041f9,0:c,raw
```

▼ To Quiesce the I/O on the A3/B3 Link

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

```
# vxdmpadm disable ctlr=<c#>
```

3. **Verify that the path is disabled:**

```
# vxdmpadm listctlr all
```

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

▼ To Suspend the I/O on the A3/B3 Link

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

1. **Stop all customer applications that are accessing the Sun StorEdge T3+ array.**
2. **Manually pull the link from the Sun StorEdge T3+ array to the switch and wait for a Sun StorEdge T3+ array LUN failover.**
   a. **After the failover occurs, replace the cable and proceed with testing and FRU isolation.**
   b. **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.

▼ To Return the Path to Production

1. **Type:**

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

2. **Verify that the path has been re-enabled by typing:**

```
# vxdmpadm listctlr all
```

Fibre Channel Links

The following sections provide troubleshooting information for the basic components and Fibre Channel links, listed in TABLE 2-1.

TABLE 2-1

Link	Provides Fibre Channel Link Between these Components
A1 to B1	Datahost, 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	AltMaster Sun StorEdge T3+ array and the “B” path switch
T1 to T2	sw2a and sw2b*

* Sun StorEdge 6900 series only

Note – In an actual Sun StorEdge 3900 or 6900 series configuration, there could be more Sun StorEdge T3+ arrays than are shown in FIGURE 2-1 and FIGURE 2-2.

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

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. If the Storage Automated Diagnostic Environment is not installed on the data host, there will be areas of limited monitoring, diagnosis and isolation.

The following diagrams provide troubleshooting information for the basic components and Fibre Channel links specific to the Sun StorEdge 3900 series, shown in FIGURE 2-1, and the Sun StorEdge 6900 series, shown in FIGURE 2-2.

Fibre Channel Link Diagrams

FIGURE 2-1 shows the basic components and the Fibre Channel links for a Sun StorEdge 3900 series system:

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

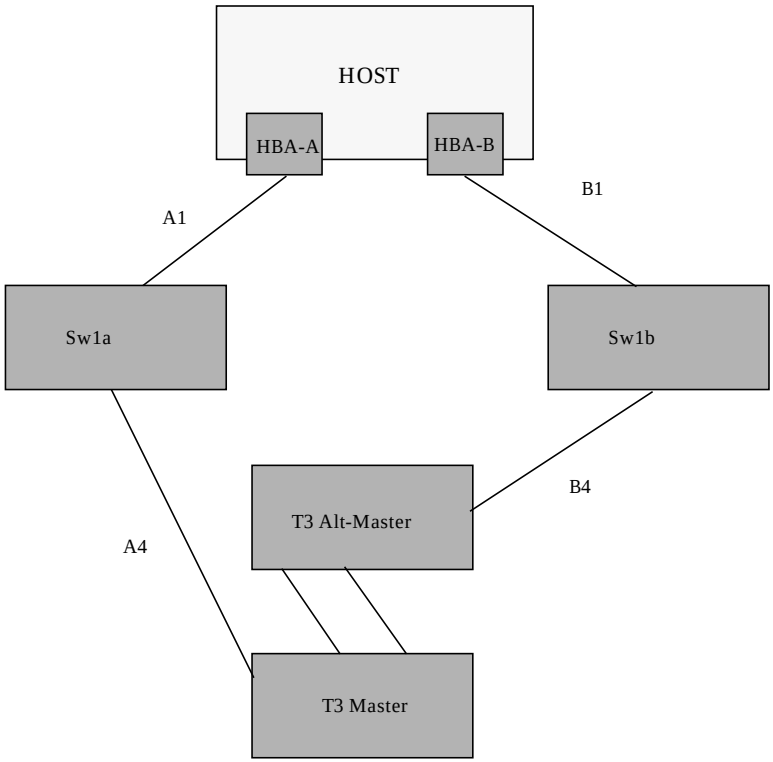

FIGURE 2-1 Sun StorEdge 3900 Series Fibre Channel Link Diagram

FIGURE 2-2 shows the basic components and the Fibre Channel links for a Sun StorEdge 6900 series system:

- **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 switch
- **T1 to T2—**T Port switch-to-switch link

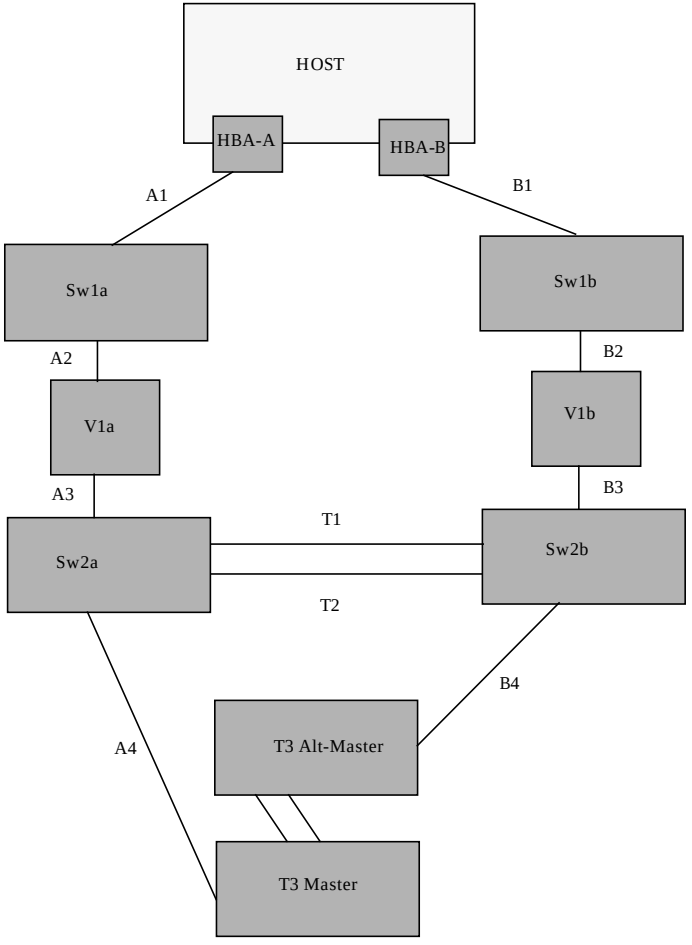

FIGURE 2-2 Sun StorEdge 6900 Series Fibre Channel Link Diagram

Host Side Troubleshooting

Host-side troubleshooting refers to the messages and errors 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, running on the Storage Service Processor, detects. You can find these messages by monitoring the following Sun StorEdge 3900 series and the 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.

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 into the appropriate Host or Slave for testing the components. The following two tests, the `qlctest`(1M) and the `switchtest`(1M) are provided as examples.

`qlctest`(1M)

The `qlctest`(1M) 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 2-1 **`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"

<snip>

"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) is used to diagnose 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 port statistics are monitored for errors, and the chassis status is checked.

CODE EXAMPLE 2-2 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 diagnostics 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.

Storage Automated Diagnostic Environment Event Grid

The Storage Automated Diagnostic Environment generates component-specific event grids that describe the severity of an Event, whether action is required, 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. **Click 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 2-2**.**

TABLE 2-2 Event Grid Sorting Criteria

Category	Component	Event Type	Severity	Action
• All (Default) • Sun StorEdge A3500FC array • Sun StorEdge A5000 array • Agent • Host • Message • Sun Switch • Sun StorEdge T3+ array • Tape • Vvirtualization engine	• All (Default) • Backplane • Controller • Disk • Interface • LUN • Port • Power	• Agent Deinstall • Agent Install • Alarm • Alternate Master + • Alternate Master— • Audit • CommunicationEstablished • CommunicationLost • Discovery • Heartbeat • Insert Component • Location Change • Patch Info • Quiesce End • Quiesce Start • Removal • Remove Component • State Change +(from offline to online) • State Change—(from online to offline) • Statistics • Backup	**Red—** Critical (Error)  **Yellow—** Alert (Warning)  **Down—** System Down 	**Y**—This event is actionable and is sent to RSS/SRS **N**—This event is non actionable

CHAPTER 3

Troubleshooting the Fibre Channel Links

A1/B1 Fibre Channel (FC) Link

If a problem occurs with the A1/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 a severe problem can cause a path to go offline.

FIGURE 3-1, FIGURE 3-2, and FIGURE 3-3 are examples of A1/B1 Fibre Channel 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 3-1 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 3-2 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 3-3 Storage Service Processor Notification

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

▼ To Verify the Data Host

An error in the A1/B1 FC link can cause a path to go offline in the multipathing software.

CODE EXAMPLE 3-1 `luxadm`(1M) Display

```
# luxadm display

/dev/rdsk/c6t29000060220041F96257354230303052d0s2
DEVICE PROPERTIES for disk: /dev/rdsk/
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/rdsk/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/B1 FC link can also cause a device to enter the “unusable” state in `cfgadm`. In this case, the output for `luxadm -e port` will show that a device that was “connected” changed to an “unconnected” state.

CODE EXAMPLE 3-2 cfgadm -al Display

```
...

# 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 A1/B1 FC Link Segment

- 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)
  - You must specify a payload of 200 bytes or less when testing the A1/B1 FC link, while the link is connected to the HBA (limitation in HBA ASIC).
  - 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

CODE EXAMPLE 3-3 `switchtest`(1M) called with options

```
# ./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 HBA connection. This is done both in the Storage Automated Diagnostic Environment GUI and from the command-line interface (CLI).

▼ To Isolate the A1/B1 FC Link

1. **Quiesce the I/O on the A1/B1 FC link path.**
2. **Run `switchtest` or `qlctest` 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 GBIC and rerun `switchtest`.**
   b. **If `switchtest` fails again, replace the switch.**
6. **Insert a loopback connector into the HBA.**
7. **Run `qlctest`.**
   - If the test fails, replace the HBA.
   - If the test passes, replace the cable.
8. **Recable the entire link.**
9. **Run `switchtest` or `qlctest` to validate the fix.**
10. **Return the path to production.**

A2/B2 Fibre Channel (FC) Link

If a problem occurs with the A2/B2 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 a severe problem can cause a path to go offline.

FIGURE 3-4 and FIGURE 3-5 are examples of A2/B2 FC 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 3-4 A2/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 3-5 A2/B2 FC Link Storage Service Processor Side Event

▼ To Verify the Host Side

An error in the A2/B2 FC link can result 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 3-4 cfgadm -al

```
# cfgadm -al

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

<snip>

# 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

# luxadm display /dev/rdsk/c6t29000060220041F96257354230303052d0s2

DEVICE PROPERTIES for disk: /dev/rdsk/
c6t29000060220041F96257354230303052d0s2
  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/rdsk/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              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 Reference Manual*.

▼ To Verify the A2/B2 FC Link

You can check the A2/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.

Refer to Chapter 5 of the *Storage Automated Diagnostic Environment User's Guide* for more information.

FRU Tests Available for A2/B2 FC Link Segment

- The `linktest` is not available.
- The switch and/or GBIC—`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 A2/B2 FC Link

1. **Quiesce the I/O on the A2/B2 FC link path.**
2. **Break the connection by uncabling the link.**
3. **Insert the loopback connector into 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 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**

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

   The procedures for restoring virtualization engine settings are in the *Sun StorEdge 3900 and 6900 Series Reference Manual*.

A3/B3 Fibre Channel (FC) Link

If a problem occurs with the A3/B3 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 a severe problem can cause a path to go offline.

FIGURE 3-6, FIGURE 3-7, and FIGURE 3-8 are examples of A3/B3 FC 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 3-6 A3/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 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
```

FIGURE 3-7 A3/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 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
```

FIGURE 3-8 A3/B3 FC Link Storage Service Processor-Side Event

▼ To Verify the Host Side

An error in the A3/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 3-5 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

# 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


# luxadm display

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

<snip>

/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 3-6 VxDMP Error Message

```
Jan  8 18:26:38 diag.xxxxx.xxx.com vxdmp: [ID 619769 kern.notice] NOTICE:
vxdmp: Path failure on 118/0x1f8

Jan  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
```

▼ To Verify the Storage Service Processor

You can check the A3/B3 FC link using the Storage Automated Diagnostic Environment, Diagnose—Test from Topology functionality. Storage Automated Diagnostic Environment's implementation of diagnostic tests verify 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/B3 FC Link Segment

- The `Linktest` is not available.
- The switch and/or GBIC - `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/B3 FC Link

1. **Quiesce the I/O on the A3/B3 FC link path.**
2. **Break the connection by uncabling the link.**
3. **Insert the loopback connector into 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 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**
6. **Return the path to production.**

   The procedures for restoring virtualization engine settings are in the *Sun StorEdge 3900 and 6900 Series Reference Manual*.

A4/B4 Fibre Channel (FC) Link

If a problem occurs with the A4/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 a severe problem can cause a path to go offline.

and FIGURE 3-10 are examples of A4/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 3-9 A4/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: u1ctr 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 3-10 Storage Service Processor Notification

▼ To Verify the Data Host

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

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 would remain ONLINE and ACTIVE.

The `mpdrive failback` 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, Sun StorEdge Traffic Manager or VxDMP takes the entire path that was connected to the failed switch offline, and the ISL ports on the surviving switch go offline as well.

To verify the failover `luxadm` display can be used, the failed path will be marked OFFLINE, as shown in CODE EXAMPLE 3-7.

CODE EXAMPLE 3-7 Failed Path marked OFFLINE

```
# luxadm display /dev/rdsk/c26t60020F200000644>

DEVICE PROPERTIES for disk: /dev/rdsk/
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/rdsk/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 "unusable" in `cfgadm`, as shown in CODE EXAMPLE 3-8.

CODE EXAMPLE 3-8 Failed Path marked “unusable”

```
# cfgadm -al
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/B4 FC Link Segment

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

▼ To Isolate the A4/B4 FC Link

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

Alternatively, follow these steps:

1. **Quiesce the I/O on the A4/B4 FC link path.**
2. **Run `switchtest` to test the entire link (re-create the problem).**
3. **Break the connnection by uncabling the link.**
4. **Insert the loopback connector into 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 occured (determine if failovers occur using the `luxadm failover` or `mpdrive failback` commands).**

CHAPTER 4

Configuration Settings

This chapter contains the following sections:

For a complete listing of SUNWsecfg Error Messages and recommended action, refer to Appendix B.

Verifying 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

- **Run one of the following scripts:**
  - Use the `/opt/SUNWsecfg/runsecfg` script and select the various Verify menu selections.
  - Run the `/opt/SUNWsecfg/bin/checkdefaultconfig` script to check all accessible components. The output is shown in CODE EXAMPLE 4-1.
  - Run the `checkswitch` | `checkt3config` | `checkve` | `checkvemap` scripts manually from `/opt/SUNWsecfg/bin`.

  The scripts listed above 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 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 4-1 `/opt/SUNWsecfg/checkdefaultconfig` 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.
```

10. **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.”

11. **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
```

If you interrupt any of the SUNWsecfg scripts (by typing a Control-C default font, 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 any virtualization engine configuration change, 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.

---

2. **Monitor the /var/adm/log/SEcfglog file to see when the savevemap process successfully exits.**

CODE EXAMPLE 4-2 **savevemap** 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` process has successfully exited.

CHAPTER 5

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:

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, whether action is required, a description of the event, and the recommended action. Refer to the *Storage Automated Diagnostic Environment User's Guide* for more information.

▼ Using the Host 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 5-1**.**

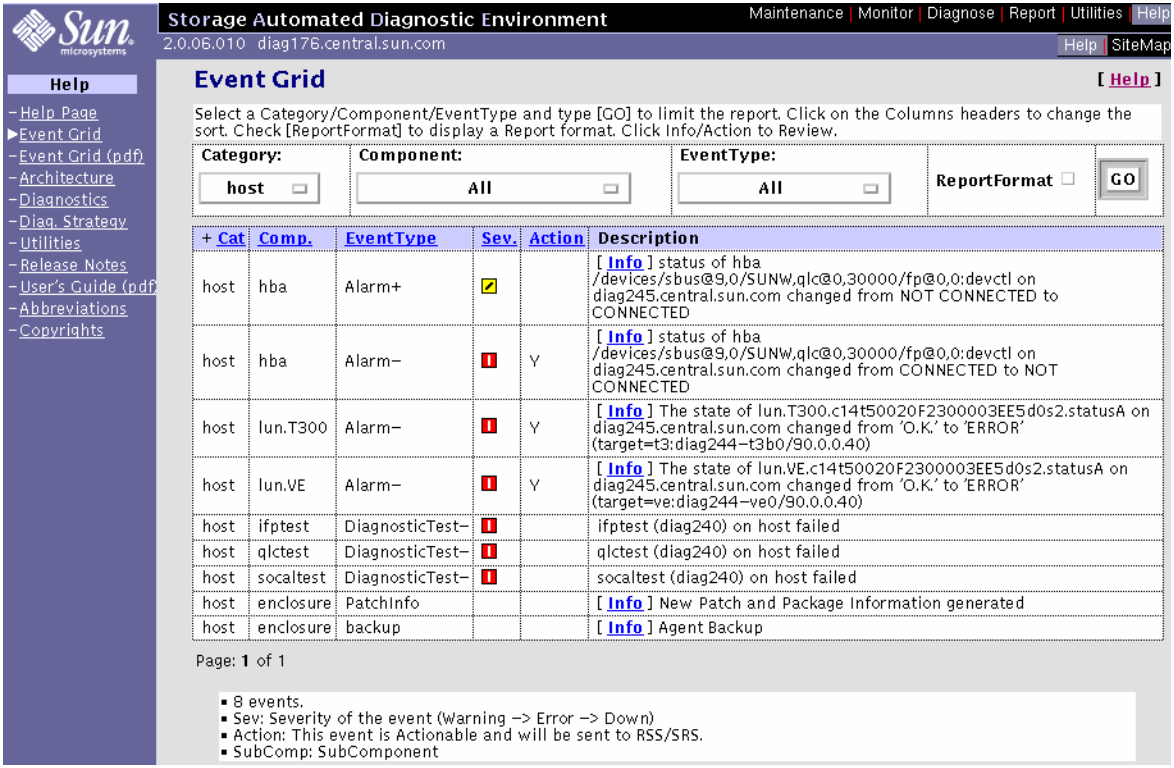

FIGURE 5-1 Host Event Grid

TABLE 5-1 lists all the host events in the Storage Automated Diagnostic Environment.

TABLE 5-1 Storage Automated Diagnostic Environment Event Grid for the Host

Category	Component	EventType	Sev	Action	Description	Information
host	hba	Alarm+	Yellow		[Info] status of hba `/devices/sbus@9,0/SUNW,qlc@0,30000/fp@0,0:devctl` on `diag.`*xxxxx.xxx*`.com` changed from NOT CONNECTED to CONNECTED	Monitors changes in the output of the `luxadm -e` port.
host	hba	Alarm-	Red	Y	[Info] status of hba `/devices/sbus@9,0/SUNW,qlc@0,30000/fp@0,0:devctl` on `diag.`*xxxxx.xxx*`.com` changed from CONNECTED to NOT CONNECTED	• Monitors changes in the output of the `luxadm -e` port. • Found path to 20 HBA ports.
host	lun.t300	Alarm-	Red	Y	[Info] The state of `lun.T300.c14t50020F2300003EE5d0s2.statusA` on `diag.`*xxxxx.xxx*`.com` changed from OK to ERROR (target=t3:diag244-t3b0 / 90.0.0.40)	`luxadm` display reported a change in the port status of one of its paths. The Storage Automated Diagnostic Environment then tries to find to which enclosure this path corresponds by reviewing its database of Sun StorEdge T3+ arrays and virtualization engines.

TABLE 5-1 Storage Automated Diagnostic Environment Event Grid for the Host *(Continued)*

host	lun.VE	Alarm-	Red	Y	[Info] The state of `lun.VE.c14t50020F2300003EE5d0s2.statusA on diag.`*xxxxx.xxx*`.com` changed from OK to ERROR (target=ve:diag244-ve0/90.0.0.40)	`luxadm` display reported a change in the port status of one of its paths. The Storage Automated Diagnostic Environment then tries to find to which enclosure this path corresponds by reviewing its database of Sun StorEdge T3+ arrays and virtualization engines.
host	ifptest	Diagnostic Test-	Red	Y	ifptest (diag240) on host failed.	
host	qlctest	Diagnostic Test-	Red		qlctest (diag240) on host failed.	
host	socaltest	Diagnostic Test-	Red		socaltest (diag240) on host failed.	
host	enclosure	PatchInfo			[Info] New patch and package information generated.	Send changes to the output of showrev -p and `pkginfo -|`.
host	enclosure	backup			[Info] Agent Backup	Backup of the configuration file of the agent.

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.

▼ 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 Utilities -> System -> Recover Config.**

   Refer to Chapter 7 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 Recover Config and Reset slave to this master checkboxes are checked.**

   c. **Click Recover.**

6. **Choose Maintenance -> General Maintenance.**

   Ensure that all host and device settings are recovered correctly.

   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 Chapter 3, "Maintenance," of the *Storage Automated Diagnostic Environment User's Guide*.

2. **In the Maintain Hosts window, select the host to be replaced from the Existing Hosts list, 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 Chapter 3, “Maintenance,” 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 Create and Retrieve Selected Topologies.**

    c. **Click Merge and Push Master Topology.**

Conclusion

Any time a master, alternate master, or slave monitoring host is replaced, you must recover the configuration using the procedures described above. 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.

CHAPTER 6

Troubleshooting Sun StorEdge FC Switch-8 and Switch-16 Devices

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

This chapter contains the following sections:

Sun StorEdge Network FC Switch-8 and Switch-16 Switch Description

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, which is available on the Storage Service Processor. You configure and modify the switches using the Configuration Utilities. *Do not configure or modify the switches using any method other than the* `SUNWsecfg` *tools.*

▼ To Diagnose and Troubleshoot Switch Hardware

1. **To diagnose and troubleshoot the switch hardware, begin by running the `SUNWsecfg checkswitch` utility.**
2. **For detailed troubleshooting procedures, refer to the *Sun StorEdge SAN Field Troubleshooting Guide,* Release 3.0.**

   The *Sun StorEdge SAN Field Troubleshooting Guide, Release 3.0* describes how to diagnose and troubleshoot the switch hardware. The scope of this document includes the Sun StorEdge network FC switch-8 and switch-16 switch and the interconnections (HBA, GBIC, cables) on either side of the switch. In addition, the document provides examples of fault isolation and includes a Brocade switch appendix.

Switch Event Grid

The Storage Automated Diagnostic Environment 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, whether action is required, a description of the event, and the recommended action. Refer to the *Storage Automated Diagnostic Environment User's Guide* for more information.

▼ Using the Switch 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 6-1**.**

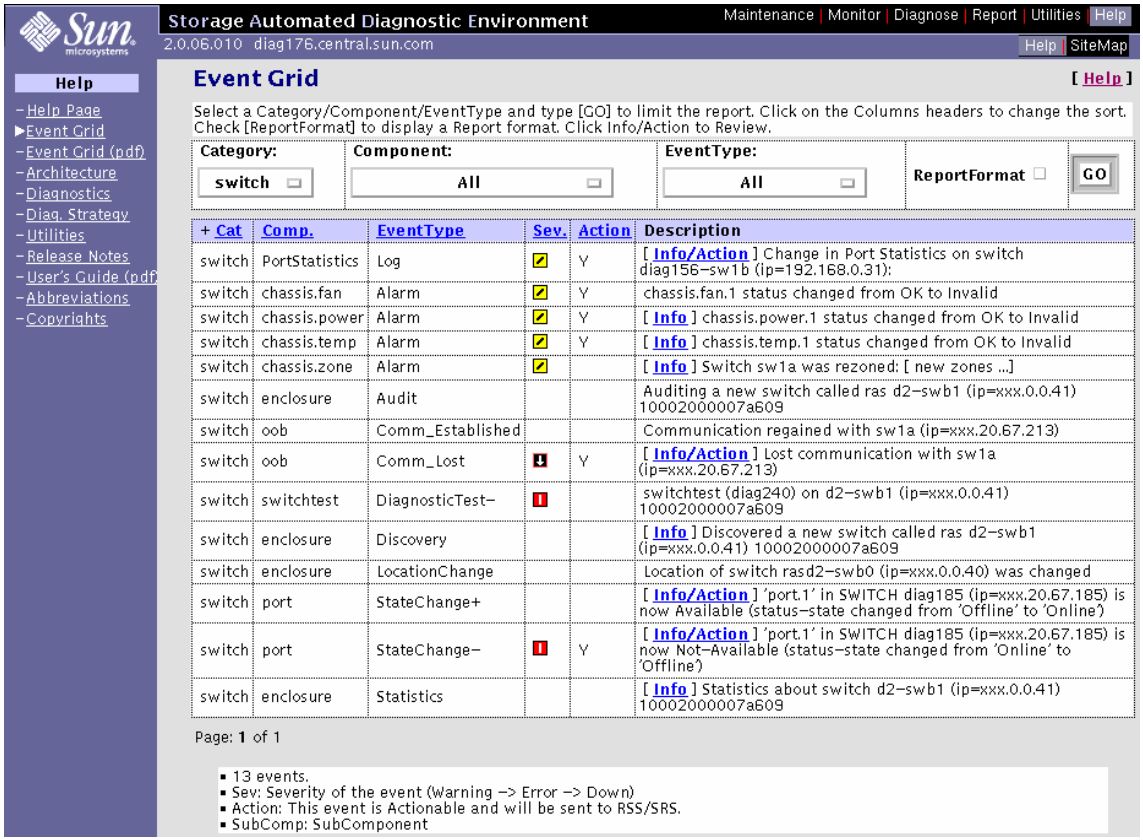

FIGURE 6-1 Switch Event Grid

TABLE 6-1 lists the switch events.

TABLE 6-1 Storage Automated Diagnostic Environment Event Grid for Switches

Cat	Component	EventType	Sev	Action	Description	Information/Action
switch	port statistics	Log	Yellow	Y	[Info / Action] Change in port statistics on switch `diag156-sw1b (ip=192.168.0.31)`	Information: The switch has reported a change in an error counter. This could indicate a failing component in the link. Action: Check the Topology GUI for any link errors. Run linktest on the link to isolate the failing FRU. Quiesce I/O on the link before running linktest.
switch	chassis.fan	Alarm	Yellow		chassis.fan.1 status changed from OK	
switch	chassis.power	Alarm	Yellow		[Info] chassis.power.1 status changed from OK	This event monitors changes in the status of the chassis' power supply, as reported by SANbox chassis_status.
switch	chassis.temp	Alarm	Yellow		[Info] chassis.temp.1 status changed from OK	This event monitors changes in the status of the chassis' temperature supply, as reported by SANbox chassis_status.
switch	chassis.zone	Alarm	Yellow		[Info] Switch sw1a was rezoned: [new zones ...]	This event reports changes in the zoning of a switch.

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

Cat	Component	EventType	Sev	Action	Description	Information/Action
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	Down	Yes	[Info / Action] Lost communication with sw1a (ip=xxx.20.67.213)	Information: Ethernet connectivity to the switch has been lost. Recommended action: 1. Check Ethernet connectivity to the switch. 2. Verify that the switch is booted correctly with no POST errors. 3. Verify that the switch Test Mode is set for normal operations. 4. Verify the TCP / IP settings on switch via Forced PROM Mode access. 5. Replace switch, if needed.
switch	switchtest	Diagnostic Test-	Red		switchtest (diag240) on d2-swb1 (ip=xxx.0.0.41) 10002000007a609	

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

Cat	Component	EventType	Sev	Action	Description	Information/Action
switch	enclosure	Discovery			[Info] Discovered a new switch called rasd2-swb1 (ip=xxx.0.0.41) 10002000007a609	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 (NetConnect, Email).
switch	enclosure	LocationChange			Location of switch rasd2-swb0 (ip xxx.0.0.40) was changed	

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

Cat	Component	EventType	Sev	Action	Description	Information/Action
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)	Port on switch is now available.
switch	port	StateChange-	Red	Y	[Info / Action] port.1 in `SWITCH diag185 (ip=`*xxx*`.20.67.185)` is now Not-Available (status state changed from ONLINE to OFFLINE)	Information: A port on the switch has logged out of the Fabric and has gone offline. Recommended action: 1. Verify cables, GBICs, and connections along the Fibre Channel path. 2. Check Storage Automated Diagnostic Environment SAN Topology GUI to identify failing segment of the data path. 3. Verify the correct FC switch configuration.
switch	enclosure	Statistics			[Info] Statistics about `switch d2-swb1 (ipxxx.0.0.41) 10002000007a609`	Port Statistics

Replacing the Master Midplane

Follow this procedure when replacing the master midplane in a Sun StorEdge network FC switch-8 or switch-16 switch or a Brocade Silkworm switch. This procedure is detailed in the *Storage Automated Diagnostic Environment User's Guide*.

▼ To Replace the Master Midplane

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

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

2. **In the Maintain Devices window, delete the device that is to be replaced.**
3. **Choose Maintenance -- > General Maintenance -- > Discovery.**
4. **In the Device Discovery window, rediscover the device.**
5. **Choose Maintenance -- > Topology Maintenance -- > Topology Snapshot.**

   a. **Select the host that monitors the replaced FRU.**

   b. **Click Create and Retrieve Selected Topologies.**

   c. **Click Merge and Push Master Topology.**

Conclusion

Any time a master midplane is replaced, you must rediscover the device using the procedure described above. 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.

CHAPTER 7

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:

Virtualization Engine Description

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 among the router and storage

Service Request Numbers

The service request numbers 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 LED readout. See Appendix A for the table of codes and actions to take. In some cases, you might not be able to receive Service Request Numbers (SRNs) because of communication errors. If this occurs, you must read the virtualization engine LEDs to determine the problem.

▼ To Retrieve Service Information

You can retrieve service information in two ways:

- CLI Interface
- Error Log Analysis Commands

Both of these methods are described in the following sections.

CLI Interface

The 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 for topology changes. It then passes this information in the form of an SRN to the Error Log file.

▼ To Display Log Files and Retrieve SRNs

Use the `/opt/svengine/sduc/sreadlog` command to display log files and retrieve the Service Request Numbers (SRN) for errors that need action. Data is returned in the following format:

`TimeStamp`:*nnn*:T*xxxxx.uuuuuuuu* `SRN=`*mmmmm*

`TimeStamp`:*nnn*:T*xxxxx.uuuuuuuu* `SRN=`*mmmmm*

`TimeStamp`:*nnn*:T*xxxxx.uuuuuuuu* `SRN=`*mmmmm*

Item	Description
TimeStamp	Time and date when error occurred
nnn	The name of the virtualization engine pair (v1 or v2)
T*xxxxx*	The LUN where the error occurred.
Note: T*xxxxx* can represent a physical or a logical LUN.	
uuuuuuuu	The unique ID of the drive or the virtualization engine router
`SRN=`*mmmmm*	The SRN defined in numerical order

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
```

Item	Description
`TimeStamp`	January 3, 2002 10:13
nnn	v1 (virtualization engine pair v1)
uuuuuuuu	29000060-220041F9 (v1a, obtained by checking the virtualization engine map from the SEcfg utility)
`SRN=`*mmmmm*	SRN=70030: SAN Configuration Changed (Refer to Appendix A for codes.)

▼ To Clear the Log

- **Use the `/opt/svengine/sduc/sclrlog` command.**

Virtualization Engine LEDs

TABLE 7-1 describes the LEDs on the back of the virtualization engine..

TABLE 7-1 Virtualization Engine LEDs

LED	Color	State	Description
Power	Green	Solid on	The virtualization engine is powered on
Status[1]	Green	• Solid on	• Normal operating mode
		• Blink Service Code	• Number of blinks to indicate a decimal number
Fault	Amber	Serious problem	Decipher the blinking of the Status LED to determine the service code. Once you have determined the service code, look up the decimal number of the service code in Appendix A.

1 The Status LED will blink a service code when the Fault LED is Solid on.

Power LED Codes

The virtualization engine LEDs are shown in FIGURE 7-1.

FIGURE 7-1 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 number of blinks, followed by a medium duration (two seconds) of LED off. TABLE 7-2 lists the status LED code descriptions.

TABLE 7-2 LED Service and Diagnostic Codes

0	Fast blink
1	LED blinks once
2	LED blinks twice with one short duration (one second) between blinks
3	LED blinks three times with one short duration (one second) between blinks
...	
10	LED blinks ten times with one short duration (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 and a socket for the AC power input, and various data ports and LEDs.

Ethernet Port LEDs

The Ethernet port LEDs indicate the speed, activity, and validity of the link, shown in TABLE 7-3.

TABLE 7-3 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	Normal operations, including data activity

Fibre Channel Link Error Status Report

The virtualization engine's host-side and device-side interfaces provide statistical data for the counts listed in TABLE 7-4.

TABLE 7-4 Virtualization Engine Statistical Data

Count Type	Description
Link Failure Count	The number of times the virtualization engine's frame manager detects a non-operational 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 8b / 10b decoder does not detect a valid 10-bit code.
Invalid CRC Count	The number of times that the virtualization engine receives frames with a bad CRC and a valid EOF. A valid EOF includes EOFn, EOFt, or EOFdti.

▼ To Check Fibre Channel Link Error Status Manually

The Storage Automated Diagnostic Environment, which runs on the Storage Service Processor, monitors the Fibre Channel 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 between 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 7-1**.**

   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 7-1 Fibre Channel 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 `SLIC` daemon must be running for the `/opt/svengine/sduc/svstat -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 7-2, does *not* include the unique VLUN serial number that is needed to identify this LUN.

CODE EXAMPLE 7-2 `luxadm` Output for a Host Device

```
# luxadm display /dev/rdsk/c4t2B00006022004186d0s2

DEVICE PROPERTIES for disk: /dev/rdsk/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/rdsk/c4t2B00006022004186d0s2
  /devices/pci@1f,4000/pci@2/SUNW,qlc@5/fp@0,0/
ssd@w2b00006022004186,0:c,raw
```

▼ To Display the VLUN Serial Number

Devices That Are Not Sun StorEdge Traffic Manager-Enabled

1. **Use the `format -e` command.**
2. **Type 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 5th pair of numbers on the 3rd line, up to and including the 12 pair.

Sun StorEdge Traffic Manager-Enabled Devices

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

2. **Type:**

```
# luxadm display /dev/rdsk/c6t2900006022004195625733 4B30303148d0s2

DEVICE PROPERTIES for disk: /dev/rdsk/
c6t2900006022004195625733 4B30303148d0s2
  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/rdsk/c6t2900006022004195625733 4B30303148d0s2
  /devices/scsi_vhci/ssd@g2900006022004195625733 4b30303148: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/rdsk/c#t#` 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 a the VLUN serial number.
  - Virtualization engine WWN = 2900006022004195
  - VLUN serial number = 6257334B30303148

▼ To View the Virtualization Engine Map

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

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

```
# showvemap -n v1 -f

VIRTUAL LUN SUMMARY

Disk pool  VLUN Serial      MP Drive   VLUN     VLUN      Size     Slic Zones
          Number             Target   Target    Name        GB
-------------------------------------------------------------------------------
t3b00     6257334B30303148   T49152   T16384   VDRV000     55.0
t3b00     6257334B30303149   T49152   T16385   VDRV001     55.0

*****
DISK POOL SUMMARY

Disk pool  RAID  MP Drive  Size  Free Space  T3+ Active        Number of
                 Target    GB       GB       Path WWN           VLUNs
-------------------------------------------------------------------------
t3b00      5     T49152   116.7     6.7     50020F2300006DFA       2
t3b01      5     T49153   116.7   116.7     50020F230000725B       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     08.14              0
I00002     2900006022004186  v1b      Yes     08.14              0
*****
ZONE SUMMARY
Zone Name        HBA WWN           Initiator  Online  Number of VLUNs
-------------------------------------------------------------------
Undefined        210000E08B033401  I00001     Yes            0
Undefined        210000E08B026C0F  I00002     Yes            0
```

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

---

2. **You can optionally establish a telnet connection to the virtualization engine and run the `runsecfg` utility to poll a live snapshot of the virtualization engine map.**

   Refer to "To Replace a Failed Virtualization Engine" on page 84 for telnet instructions.

```
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 [l|f]: l
```

From the virtualization engine map output, you can match the VLUN serial number to the VLUN name (`VDRV000`), the disk pool (`t3b00`) and the 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, use the following procedure to fail the LUN back to its original controller.

1. **From the Storage Service Processor, type:**

```
# /opt/svengine/sduc/mpdrive failback -d v1 -j 60020F2000006DFA
```

where:

- `-d` Virtualization engine pair on which to run the command
- `-j` Controller serial number, which corresponds to the Sun StorEdge T3+ array WWN of the affected partner pair

The failback command will always be performed on the controller serial number, regardless by which controller the LUN actually is currently owned (the Master or Alt-Master). All VLUNS are affected by a failover and failback of the underlying physical LUN.

The controller serial number is the system WWN for the Sun StorEdge T3+ array. In the above example, the master Sun StorEdge T3+ array WWN is `50020F2300006DFA`, and the number used in the failback command is `60020F2000006DFA`.

2. **The SLIC daemon must be running for the `mpdrive failback` command to work. Ensure that the `SLIC` daemon is running by using the command found in** CODE EXAMPLE 7-3**.**

If no `SLIC` processes are running, you can start them manually using the `SUNWsecfg` scripts, which are located in the `/opt/SUNWsecfg/bin/startslicd -n v1` directory.

CODE EXAMPLE 7-3 `slicd` Output Example

```
# ps -ef | grep slic

root  6299  6295  0   Jan 04 ?        0:00 ./slicd
root  6296  6295  0   Jan 04 ?        0:02 ./slicd
root  6295     1  0   Jan 04 ?        0:01 ./slicd
root  6357  6295  0   Jan 04 ?        0:00 ./slicd
root  6362  6295  0   Jan 04 ?        0:03 ./slicd
```

For detailed information about the SUNWsecfg scripts, refer to the *Sun StorEdge 3900 and 6900 Series Reference Manual*.

▼ To Replace a Failed Virtualization Engine

1. **Replace the old (failed) virtualization engine unit with a new unit.**
2. **Identify the MAC address of the new unit and replace the old MAC address with the new one in the `/etc/ethers` file:**

```
8:0:20:7d:82:9e virtualization engine-name
```

3. **Verify that RARP is running on the Storage Service Processor.**
4. **Disable the switch port:**

```
# /opt/SUNWsecfg/flib/setveport -v VE-name -d
```

5. **Power on the new unit.**
6. **Log in to the new unit, for example:**

```
# telnet v1a virtualization engine-name
```

7. **From the User Service Utility Menu, enter 9 to clear the SAN database.**
8. **Choose `Quit` to clear the SAN database.**
9. **Configure the new unit:**

```
# setupve -n virtualization engine-name
```

10. **Check the configuration:**

```
# checkve -n virtualization engine-name
```

11. **Enable the switch port:**

```
# /opt/SUNWsecfg/flib/setveport -v virtualization engine-name -e
```

12. **Reset the virtualization engine:**

```
# resetve -n virtualization engine-name
```

13. **Find the initiator number for the new and old number:**

```
# showvemap -n virtualization engine-pairname -l
```

The new unit will not have any zones defined.

14. **If zones were present before the replacement, type the following:**

```
# restorevemap -n virtualization engine pair -z \
-c old-ve-initiator-number -d new-ve-initiator-number
```

15. **Verify the new unit by typing:**

```
# showvemap -n virtualization engine-pairname -l
```

▼ To Manually Clear the SAN Database

It is occasionally necessary to manually clear the SAN database on the virtualization engine routers.

Caution – This procedure will wipe out the SAN database and will remove the configuration of disk pools, Multipath drives, Zoning, and VLUNs. After performing this procedure, the virtualization map must be restored to the virtualization engine pair using `/opt/SUNWsecfg/bin/restorevemap`. This requires a valid copy of the `/opt/SUNWsecfg/etc/v1.san or v2.san` file.

▼ To Reset the SAN Database on Both Virtualization Engines

- **Type:**

```
# resetsandb -n vepair command
```

▼ To Reset the SAN Database on a Single Virtualization Engine

1. **Disconnect the virtualization engine device side FC cables.**
2. **Telnet to the first virtualization engine in the pair.**
3. **Enter the password.**

   The User Service Utility Menu is displayed.
4. **Enter 9 to clear the SAN database.**
   - *A successful command will display the message

     `SAN database has been cleared!`
   - *An unsuccessful command will result in the service code 051. If this occurs, repeat steps 1-3.
   - If the command continues to fail, replace the virtualization engine.
5. **Reconnect the virtualization engine device side FC cables.**
6. **Enter B to Warm Reboot both virtualization engines.**

Stopping and Restarting the SLIC Daemon

Follow this procedure to restart the SLIC daemon if the SLIC daemon becomes unresponsive, or if messages such as the following are displayed:

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

▼ To Restart the SLIC Daemon

1. **Check whether the SLICD is running:**

```
# ps -eaf | grep slicd
```

2. **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 the SLIC daemon.

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

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

Check the `ipcrm`(1m) man page for details.

4. **Restart the SLIC daemon**

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

5. **Confirm that the SLIC daemon is running:**

```
# ps -eaf | 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
```

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

Sun StorEdge 6900 Series Multipathing Example

One Sun StorEdge T3+ array partner pair with 1 500GB RAID 5 LUN per brick (2 LUNs total)

Currently, there is one 10GB VLUN created from each physical LUN, for a total of two VLUNs. In a Sun StorEdge 6900 series, there are four possible physical paths to each Sun StorEdge T3+ array Volume (LUN). Refer to FIGURE 7-4 and FIGURE 7-3.

For example, to access the LUN on the Alt-Master, the Sun StorEdge T3+ array I/O could travel:

- From HBA-0 -> Switch -> SVE(1) -> Switch -> Alt-Master Controller (Primary Route from HBA-0)
- From HBA-0 -> Switch -> SVE(1) -> Switch -> Switch -> Master Controller -> Backend Loop to Alt-Master (Secondary Route from HBA-0)
- From HBA-1 -> Switch -> SVE(2) -> Switch -> Switch -> Alt-Master Controller (Primary Route from HBA-1)
- From HBA-1 -> Switch -> SVE(2) -> Switch -> Master Controller -> Backend Loop to Alt-Master (Secondary Route from HBA-1)

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 pathing failure to the primary path. In this 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 7-6.

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

In the event of a path failure before the second tier of Sun StorEdge network FC switch-8 and switch-16 switches (refer to FIGURE 7-5), one of the paths is disabled, but the other path continues sending I/O as normal and takes over the entire load. No Sun StorEdge T3+ array LUN failure is noted because of the redundant path by way of the Sun StorEdge network FC switch-8 and switch-16 switch T Ports.

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 of both T Ports failing between the switches), the virtualization engines force 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 7-6).

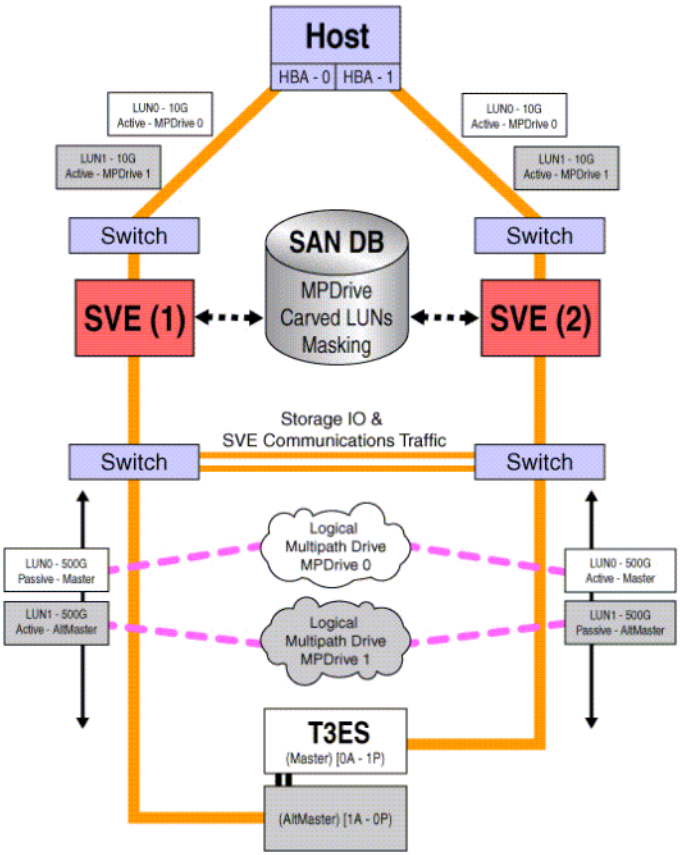

FIGURE 7-2 Sun StorEdge 6900 Series Logical View

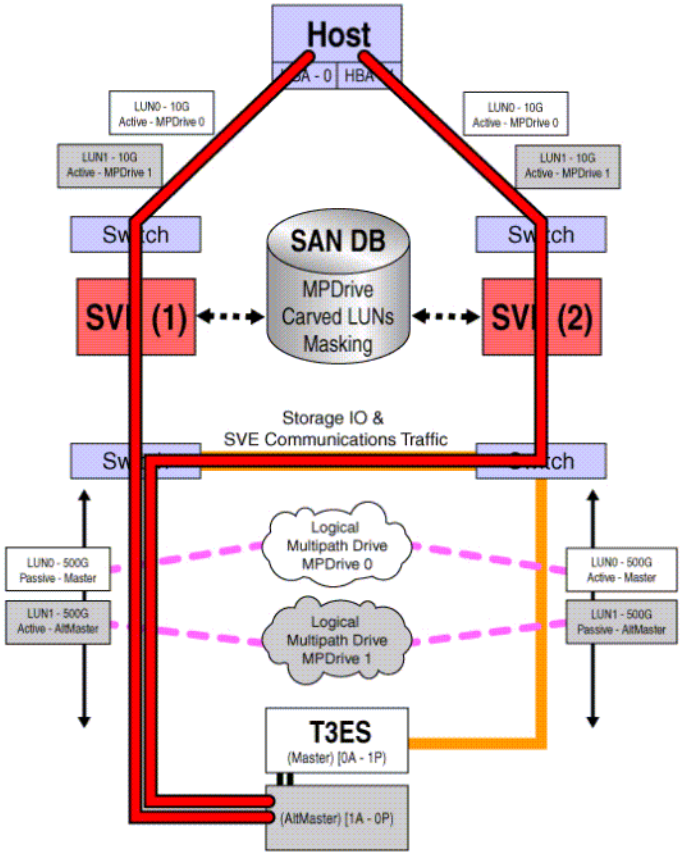

FIGURE 7-3 Primary Data Paths to the Alternate Master

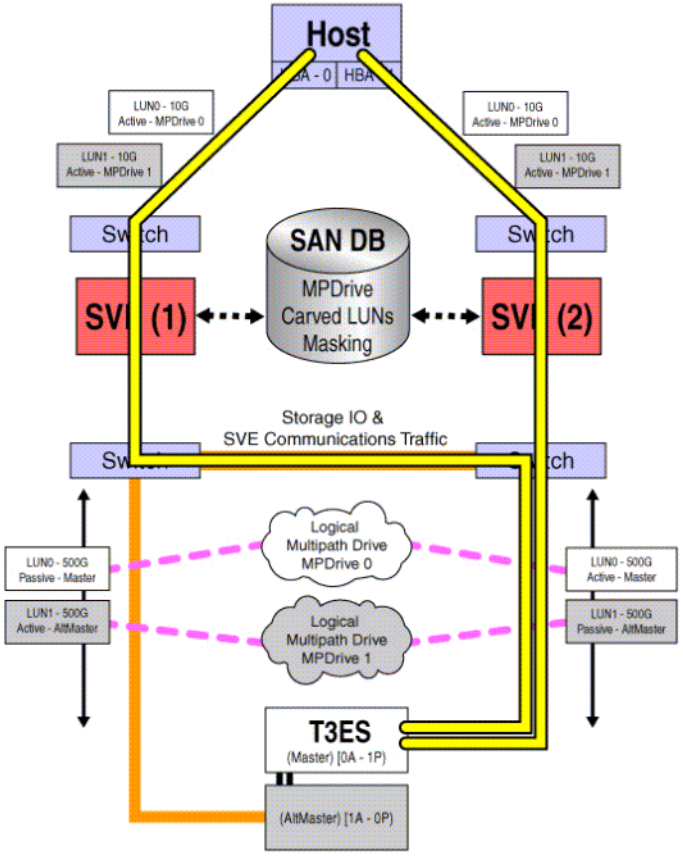

FIGURE 7-4 Primary Data Paths to the Master Sun StorEdge T3+ Array

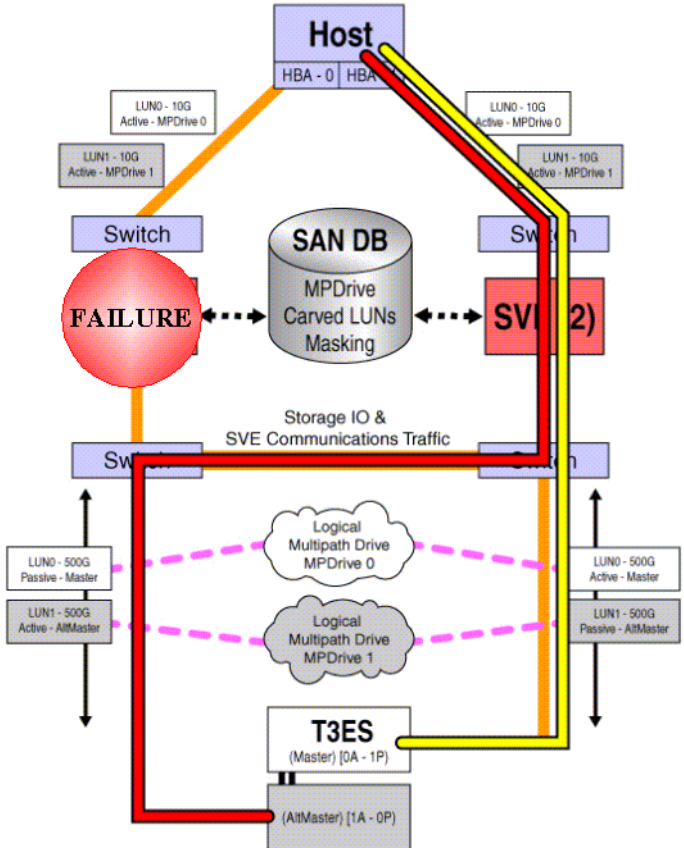

FIGURE 7-5 Path Failure—Before the Second Tier of Switches

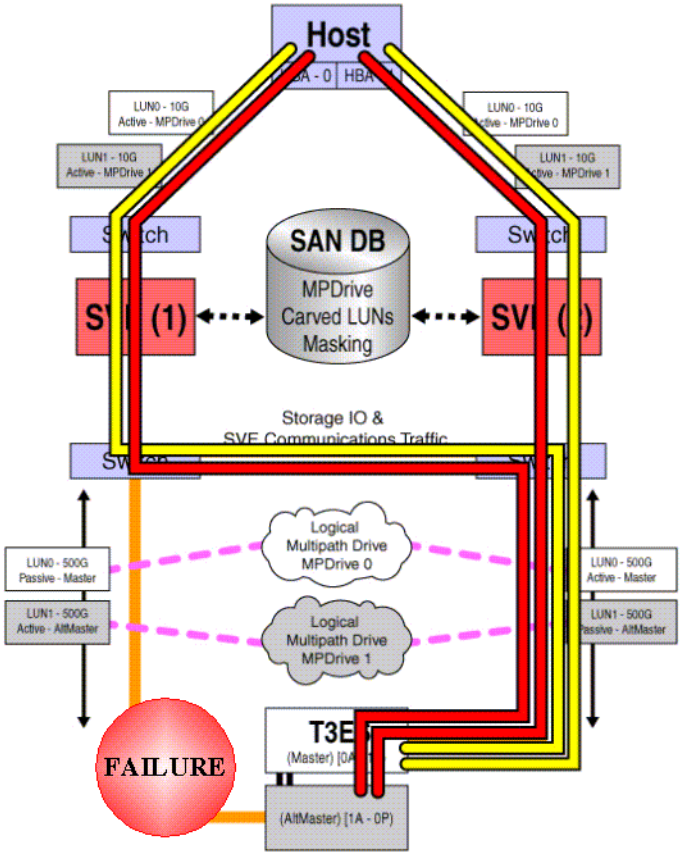

FIGURE 7-6 Path Failure —I/O Routed through Both HBAs

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, whether action is required, a description of the event, and the recommended action. Refer to the *Storage Automated Diagnostic Environment User's Guide* Help section for more information.

▼ Using the Virtualization Engine 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 7-7**.**

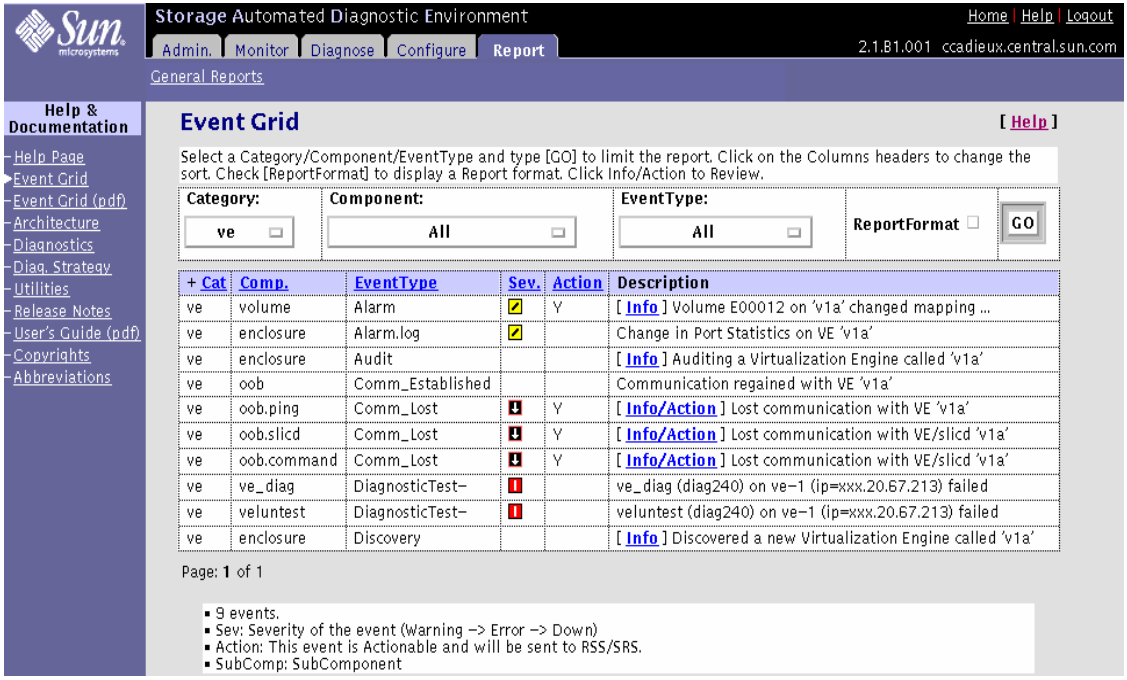

FIGURE 7-7 Virtualization Engine Event Grid

TABLE 7-5 lists the Virtualization Engine Events.

TABLE 7-5 Storage Automated Diagnostic Environment Event Grid for Virtualization Engine

Category	Component	EventType	Sev	Action	Description	
virtualization engine	enclosure	Alarm	Yellow		Volume E00012 on v1a changed mapping.	
virtualization engine	enclosure	Alarm.log	Yellow		Change in Port Statistics on virtualization engine v1a	
virtualization engine	enclosure	Audit			[Info] Auditing a Virtualization Engine called v1a	Information: Audits occur every week and send a detailed description of the enclosure to the Sun Network Storage Command Center (NSCC)
virtualization engine	oob	Comm_ Established			Communication regained with virtualization engine v1a	
virtualization engine	oob	Comm_ Lost	Down	Y	[Info / Action] Lost communication with virtualization engine v1a	Information: Ethernet connectivity to the virtualization engine unit has been lost. Recommended action: 1. Check Ethernet connectivity to the virtualization engine. 2. Make sure the virtualization engine is boosted correctly. 3. Verify that the TCP / IP settings on the virtualization engine are correct. 4. Replace the virtualization engine if necessary.

TABLE 7-5 Storage Automated Diagnostic Environment Event Grid for Virtualization Engine *(Continued)*

Category	Component	EventType	Sev	Action	Description	
virtualization engine	ve_diag	Diagnostic Test-	Red		ve_diag (diag240) on ve-1 (ip=xxx.20.67.213) failed	
virtualization engine	veluntest	Diagnostic Test-	Red		veluntest (diag240) on ve-1 (ip=xxx.20.67.213) failed	
virtualization engine	enclosure	Discovery			[Info] Discovered a new Virtualization Engine called v1a	Information: 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.

CHAPTER 8

Troubleshooting the Sun StorEdge T3+ Array Devices

This chapter contains the following sections:

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 Install Explorer Data Collection Utility on the Storage Service Processor

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

As part of the installation procedure, you will be asked to enter in site-specific information. You can optionally press the Return button to accept the blank defaults.

Do not accept automatic emailing of the Explorer Data Collection Utility output, unless the Storage Service Processor is properly 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
```

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

1. **Type switch information into the `/opt/SUNWexplo/etc/saninput.txt` file. Edit the file with a text editor such as vi.**

CODE EXAMPLE 8-1 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!
```

2. **Type Sun StorEdge T3+ array information into the `/opt/SUNWexplo/etc/t3input.txt` file. Edit the file with a text editor such as `vi`.**

3. **Type the password for your specific site.**

CODE EXAMPLE 8-2 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` to collect 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, which can be used for troubleshooting purposes.
- A `tar/gzip` file will be put into the `/opt/SUNWexplo/output` directory. The `tar/gzip` file can be sent to Sun Service for evaluation.
- The Sun StorEdge network FC switch-8 and switch-16 switch information will be placed in the `san` directory of the tar file.
- Sun StorEdge T3+ array information will be placed in the disk's`/t3` directory.

Troubleshooting the T1/T2 Data Path

Notes

- There are two T Port links for redundancy.
- If one of the two links is lost, no Sun StorEdge T3+ array LUN failover will occur, and no pathing failures will be noted.
- If both T Port links fail, there will be a Sun StorEdge T3+ array LUN failover, as one of the virtualization engines take control of the I/O operations. One of the Sun StorEdge T3+ array LUNs will failover, as all I/O is routed to the controlling virtualization engine.
- The host will notice a pathing failure in its multipathing software.

T1/T2 Notification Events

The example below 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 messages like the following. Note the virtualization engine Event 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
  2. Check Sun StorEdge T3+ array for current LUN ownership. (‘port listmap‘)
  3. Use ‘mpdrive failback‘ if needed to fail LUNs back to
  correct 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@g290000602200419562573 35a30303145 (ssd56): ’


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

```
...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,
PWWN=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
```

FIGURE 8-2 Virtualization Engine Alert

Sun StorEdge T3+ Array Storage Service Processor Verification

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

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

port   targetid   addr_type   lun   volume        owner   access
u1p1      0        hard        0    vol1          u1      primary
u1p1      0        hard        1    vol2          u1      failover
u2p1      1        hard        0    vol1          u1      failover
u2p1      1        hard        1    vol2          u1      primary
```

2. **Compare the virtualization engine configuration to a saved configuration by running `/opt/SUNWsecfg/runsecfg` and choosing 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 has changed for one of the Sun StorEdge T3+ arrays, 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 v1........
ERROR: virtualization engine map for v1 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  v1b      Yes     08.14              0
> I00002     2900006022004186  Unknown  No      Unknown            0
46d45
< Undefined        210000E08B026C0F  I00002     Yes            0
 checkvemap: virtualization engine map v1 verification complete: FAIL.
```

FIGURE 8-3 Manage Configuration Files Menu

T1 / T2 FRU Tests Available

- Switch - `switchtest`
- Link - `linktest`

  Running `linktest` from the Storage Automated Diagnostic Environment GUI will guide the Service Engineer to discover the failed FRU.

Once the test has completed its run, an email message, similar to the following message, will be sent to the Email recipient that was specified in `linktest`.

```
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 2000 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

Notes

- When inserting a loopback connector into the T Port, there will be NO green light indicating a proper insertion. However, the test will run and be valid. There is currently an RFE to address this issue.
- If only one of the links has failed and the I/O is travelling over the remaining link, once the failed link is replaced and recabled, I/O will be automatically be routed over the repaired link by the switch. No manual intervention is required.
- If both links have failed and a LUN failover has occured, after repairing the links and recabling them, the user will have to manually perform a 'mpdrive failback' to return the paths to their optimal state. I/O will then resume as normal over the T Ports.

T1/T2 Isolation Procedures

1. **Run `linktest` from the Storage Automated Diagnostic Environment for a guided isolation procedure.**
2. **After replacing the failed FRU, run `mpdrive failback`, 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 the severity of the event, whether action is required, a description of the event, and the recommended action. Refer to the *Storage Automated Diagnostic Environment User's Guide* for more information.

▼ Using 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**.**

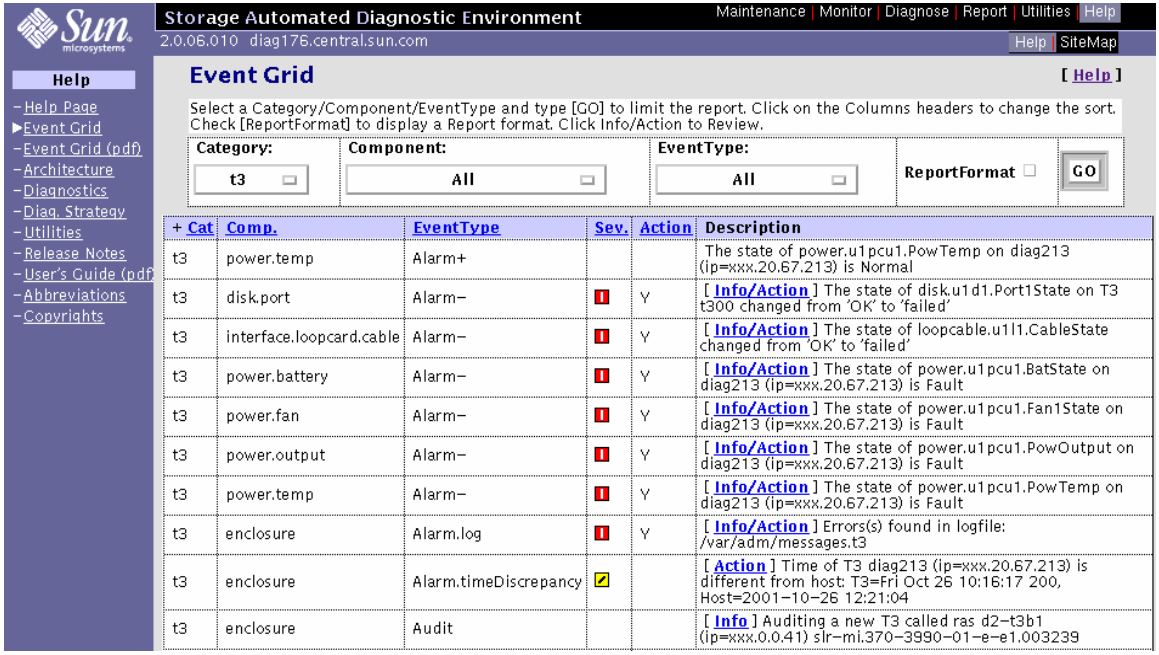

FIGURE 8-5 Sun StorEdge T3+ array Event Grid

The following table lists all of the events for the Sun StorEdge T3+ array.

Category	Component	EventType	Sev	Action	Description	Information
t3	power.temp	Alarm+			The state of power.u1pcu1.PowTemp on diag213 (ip=xxx.20.67.213) is Normal	
t3	disk.port	Alarm-	Red	Y	[Info / Action] The state of `disk.u1d1.Port1State` on Sun StorEdge T3+ array t300 changed from OK to failed.	Information: The Sun StorEdge T3+ array has reported that one port of a dual-ported disk has failed. Recommended action: 1. Telnet to affected Sun StorEdge T3+ array 2. Verify disk state in fru stat, fru list, and vol stat.'
t3	interface. loopcard.cable	Alarm-	Red	Y	[Info / Action] The state of loopcable.u1l1.CableState changed from OK to failed. Drive Status Messages: Value Description 0 Drive mounted 2 Drive present 3 Drive is spun up 4 Drive is disable 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	Information: The Sun StorEdge T3+ array has reported that a loopcard is in a failed state. Recommended action: 1. Telnet to affected Sun StorEdge T3+ array. 2. Verify tje loopcard state with fru stat. 3. Verify the matching firmware with the other loopcard. 4. Re-enable the loopcard if possible (`enable u (encid)|[1|2]`). Replace loopcard if necessary. 5. Re-enable the disk if possible 6. Replace the disk, if necessary.

Category	Component	EventType	Sev	Action	Description	Information
t3	power. battery	Alarm-	Red	Y	[Info / Action] The state of power.u1pcu1.BatState on diag213 (ip=xxx.20.67.213) is Fault Possible causes are: 1. Voltage level on power supply and battery have moved out of acceptable thresholds. 2. The internal PCU temp has exceeded acceptable thresholds. 3. A PCU fan has failed.	Information: The state of the batteries in the Sun StorEdge T3+ array is not optimal. Recommended action: 1. Telnet to the affected Sun StorEdge T3+ array. 2. Run `refresh -s` to verify the battery state. 3. Replace the battery, if necessary
t3	power.fan	Alarm-	Red	Y	[Info / Action] The state of power.u1pcu1.Fan1State on diag213 (ip=xxx.20.67.213) is Fault	Information: The state of a fan on the Sun StorEdge T3+ array is not optimal. Recommended action: 1. Telnet to affected Sun StorEdge T3+ array. 2. Verify the fan state with `fru stat`. 3. Replace the power cooling unit, if necessary.

Category	Component	EventType	Sev	Action	Description	Information
t3	power. output	Alarm-	Red	Y	[Info / Action] The state of power.u1pcu1.PowOutput on diag213 (ip=xxx.20.67.213) is Fault	Information: The state of the power in the Sun StorEdge T3+ array power cooling unit is not optimal. Recommended action: 1. Telnet to affected Sun StorEdge T3+ array. 2. Verify power cooling unit state in fru stat. 3. Replace PCU, if necessary.
t3	power.temp	Alarm-	Red	Y	[Info / Action] The state of power.u1pcu1.PowTemp on diag213 (ip=*xxx*.20.67.213) is Fault	Information: The state of the temperature in the Sun StorEdge T3+ array power cooling unit is either too high or is unknown. Recommended action: 1. Telnet to the affected Sun StorEdge T3+ array. 2. Verify that the power cooling unit state is in 'fru stat' 3. Replace the PCU if necessary.
t3	enclosure	Alarm.log	Red	Y	[Info / Action] Errors(s) found in logfile: /var/adm/messages.t3	Information: This event includes all important errors found. Recommended action: Check the messages file for appropriate action.

Category	Component	EventType	Sev	Action	Description	Information
t3	enclosure	Alarm. time Discrepancy	Yellow		[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`	Recommended action: Fix the date and time on the Sun StorEdge T3+ array using the date command. Date and time should be the same as the monitoring host.
t3	enclosure	Audit			[Info] Auditing a new Sun StorEdge T3+ array called `ras d2-t3b1 (ip=xxx.0.0.41) slr-mi.370-3990-01-e-e1.003239`	Information: Audits occur every week and send a detailed description of the enclosure to the Sun Network Storage Command Center (NSCC).
t3	ib	Comm_ Established			[Info] Communication regained (InBand(ccadieux)) with `diag213 (ip=xxx.20.67.213)` (last reboot was 2001-09-27 15:22:00)	Information: InBand Communication.
t3	oob	Comm_ Established			[Info] Communication regained (OutOfBand with `diag213 (ip=xxx.20.67.213)`	Information: OutOfBand communications.

Category	Component	EventType	Sev	Action	Description	Information
t3	ib	Comm_Lost	Down	Y	[Info / Action] Lost communication (InBand with `diag213 (ip=xxx.20.67.213)` (last reboot was 2001-09-27 15:22:00) Information: InBand. This event is established using `luxadm`. This monitoring may not be activated for a particular Sun StorEdge T3+ array.	Recommended action: 1. Verify `luxadm` via command line (luxadm probe, luxadm display) 2. Verify cables, GBICs and connections along data path. 3. Check the Storage Automated Diagnostic Environment SAN Topology GUI to identify the failing segment of the data path. 4. Verify the correct FC switch configuration, if applicable.
t3	oob	Comm_Lost	Down	Y	[Info / Action] Lost communication (OutOfBand with `diag213 (ip=xxx.20.67.212)` Probable Cause: This problem can also be caused by a very slow network, or because the Ethernet connection to this Sun StorEdge T3+ array was lost. Information: OutOfBand. This means that the Sun StorEdge T3+ array failed to answer to a ping or failed to return its tokens.	Recommended action: 1. Check Ethernet connectivity to the affected Sun StorEdge T3+ array. 2. Verify the Sun StorEdge T3+ array is booted correctly. 3. Verify the correct TCP / IP settings on the Sun StorEdge T3+ array . 4. Increase the http and / or ping timeout in `Utilities-->System-->System-->Timeouts`. The current default timeouts are 10 seconds for ping and 60 seconds for http (tokens).

Category	Component	EventType	Sev	Action	Description	Information
t3	t3ofdg	Diagnostic Test-	Red		t3ofdg (diag240) on diag213 (ip=xxx.20.67.213) failed	
t3	t3test	Diagnostic Test-	Red		t3test (diag240) on diag213 (ip=xxx.20.67.213) failed	
t3	t3volverify	Diagnostic Test-	Red		t3volverify (diag240) on diag213 (ip=xxx.20.67.213) failed	
t3	enclosure	Discovery			[Info] Discovered a new Sun StorEdge T3+ array called ras d2-t3b1 (ip=xxx.0.0.41) slr-mi.370-3990-01-e-e1.003239	Information: Discovery events occur the first time the agent probes a storage device. The Discovery event creates a detailed description of the device monitored and sends it using any active notifier, such as NetConnect or Email.
t3	controller	Insert Component			[Info] controller.u1ctr (id) was added to T3 diag213 (ip=xxx.20.67.213)	Information: A new Controller, as identified by its serial number, has been installed on the Sun StorEdge T3+ array.
t3	disk	Insert Component			disk.u2d3(SEAGATE .ST318203FSUN18G .LRG07139) was added to diag158 (ip=xxx.20.67.158)	
t3	interface. loopcard	Insert Component			[Info] A new LoopCard, as identified by its serial number, has been installed on the Sun StorEdge T3+ array .	

Category	Component	EventType	Sev	Action	Description	Information
t3	power	Insert Component			[Info] 'power.u1pcu2'(TECTROL-CAN.300-1454-01(50).008275) was added to T3 diag213 (ip=xxx.20.67.213)	
t3	enclosure	Location Change			Location of t3 rasd2-t3b0 (ip=xxx.0.0.40) was changed	
t3	enclosure	QuiesceEnd			Quiesce End on t3 d2-t3b1 (ip=xxx.0.0.41)	
t3	enclosure	QuiesceStart			Quiesce Start on t3 d2-t3b1 (ip=xxx.0.0.41)	
t3	enclosure	Removal			Monitoring of t3 d2-t3b1 (ip=xxx.0.0.41) ended	
t3	controller	Remove Component	Red	Y	[Info / Action] 'controller.u1ctr'(id) was removed from T3 diag213 (ip=xxx.20.67.213)	Information: The Sun StorEdge T3+ array has reported that a controller was removed from the chassis. Recommended action: Replace the Controller within 30 minute power shutdown window.

Category	Component	EventType	Sev	Action	Description	Information
t3	disk	Remove Component	Red	Y	[Info / Action] disk.u2d3(SEAGATE.ST318203FSUN18G.LRG07139) was removed from diag158 (ip=xxx.20.67.158)	Information: The Sun StorEdge T3+ array has reported a disk has been removed from the chassis. Recommended action: Replace the disk within the 30-minute power shutdown window.
t3	interface. loopcard	Remove Component	Red	Y	[Info / Action] Information: The Sun StorEdge T3+ array has reported that a loopcard has been removed from the chassis.	Recommended action: Replace the loopcard within the 30-minute power shutdown window
t3	power	Remove Component	Red	Y	[Info / Action] 'power.u1pcu2'(TECTROL-CAN.300-1454-01(50).008275) was removed from T3 diag213 (ip=xxx.20.67.213)	Information: The Sun StorEdge T3+ array has reported that a power cooling unit has been removed from the chassis. Recommended action: Replace the PCU within 30-minute shutdown window.
t3	controller	State Change+			'controller.u1ctr' in T3 diag213 (ip=xxx.20.67.213) is now Available (status-state changed from disabled to ready-enabled)	

Category	Component	EventType	Sev	Action	Description	Information
t3	disk	State Change+			disk.u1d5 in Sun StorEdge T3+ array rasd3-t3b1 (ip=xxx.0.0.41) is now Available (status-state changed from fault-disabled to ready-enabled)	
t3	interface. loopcard	State Change+			[Info] loopcard.u1l1(SLR-MI.375-0085-01-G-G4.070924) in T3 msp0-t3b0	Information: The Sun StorEdge T3+ array has reported that a loopcard has been replaced or brought back online.
t3	volume	State Change+			'volume.u1vol1 (slr-mi.370-3990-01-e-f0.022542.u1vol1) in T3 dvt2-t3b0 (ip=192.168.0.40) is now Available status-state changed from unmounted to mounted)	
t3	power	State Change+			power.u1pcu2'TECTROL-CAN.300-1454-01(50).008275) in T3 rasd2-t3b1 (ip=xxx.0.0.41) is now Available status-state changed from ready-disable to ready-enable).	

Category	Component	EventType	Sev	Action	Description	Information
t3	controller	State Change-	Red	Y	[Info / Action] `controller.u1ctr` in `T3 diag213` (ip=xxx.`20.67.213`) is now Not-Available (status-state changed from `unknown` to `ready-disabled`) Information: The Sun StorEdge T3+ array controller has been disabled.	Recommended action: 1. Telnet to affected Sun StorEdge T3+ array. 2. Verify the controller state with 'fru stat' and 'sys stat'. 3. Run 'logger -dmprstlog' to capture controller information. 4. Re-enable the controller if possible (enable u) 5. Replace the controller, if necessary.
t3	disk	StateChange-	Red	Y	[Info / Action] `disk.u1d5` in T3 `rasd3-t3b1` (ip=xxx.`0.0.41`) is now Not-Available (status-state changed from `unknown` to `fault-disabled`).	Information: The Sun StorEdge T3+ array has reported that a disk has failed. Recommended action: 1. Telnet to the affected Sun StorEdge T3+ array 2. Verify that the disk state is in `fru stat`, `fru list`, and `vol stat`. 3. Replace the disk, if necessary.

Category	Component	EventType	Sev	Action	Description	Information
t3	interface. loopcard	StateChange-	Red	Y	[Info / Action] Information: The Sun StorEdge T3+ array has indicated that the loopcard is no longer in an optimal state.	Recommended action: 1. Telnet to the affected Sun StorEdge T3+ array. 2. Verify loopcard state with `fru stat` 3. Verify matching firmware with other loopcard. 4. Re-enable loopcard if possible (enable u(encid)|[1|2|]) 5. Replace the loopcard if necessary.

Category	Component	EventType	Sev	Action	Description	Information
t3	volume	StateChange-	Red	Y	[Info / Action]	Information: The Sun StorEdge T3+ array has reported that a power cooling unit has been disabled. Recommended action: 1. Check the Sun StorEdge T3+ array syslog for battery hold times. 2. If < 6 minutes, replace the battery, or the entire PCU, as required.
t3	power	StateChange-	Red	Y	[Info / Action] `power.u1pcu2(TECTROL-CAN.300-1454-01(50).008275)` in `T3 rasd2-t3b1` (ip=xxx.0.0.41) is now Not-Available (status-state changed from ready-enabled to ready-disable).	Information: The Sun StorEdge T3+ array has reported that a LUN has changed state. Recommended action: 1. Telnet to the affected Sun StorEdge T3+ array 2. Check the status of LUNs via `vol mode` or `vol stat`.
t3	enclosure	Statistics			Statistics about `T3 d2-t3b1` (ip=xxx.0.0.41)	

Replacing the Master Midplane

Follow this procedure when replacing the master midplane in a Sun StorEdge T3+ array. This procedure is detailed in the *Storage Automated Diagnostic Environment User's Guide*.

▼ To Replace the Master Midplane

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

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

2. **In the Maintain Devices window, delete the device that is to be replaced.**
3. **Choose Maintenance -- > General Maintenance -- > Discovery.**
4. **In the Device Discovery window, rediscover the device.**
5. **Choose Maintenance -- > Topology Maintenance -- > Topology Snapshot.**

   a. **Select the host that monitors the replaced FRU.**

   b. **Click Create and Retrieve Selected Topologies.**

   c. **Click Merge and Push Master Topology.**

Conclusion

Any time a master midplane is replaced, you must rediscover the device using the procedure described above. 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.

CHAPTER 9

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 are as follows:

- 1—Storage Service Processor (per subsystem)
- 1—for each Fibre Channel Switch
- 1—for each Virtualization Engine
- 2—for each Sun StorEdge T3+ array partner group
- 1—for the Ethernet hub that is installed on the second Sun StorEdge Expansion Cabinet in the Sun StorEdge 3960 and 6960 systems

---

Note – Information about LED Status lights, power information, and front panel settings, can be found in the *SuperStack 3 Baseline Hub 12-Port TP (3C16440A) and 24-Port TP (3C16441A) User Guide,* pn: DUA1644-0AAA03. This is a 3COM document. Log in to `http://www.3com.com` to access the documentation.

APPENDIX **A**

Virtualization Engine References

This Appendix contains the following Tables:

- Table A-1 “SRN and SNMP Reference”
- Table A-2 “SRN/SNMP Single Point of Failure Table”
- Table A-3 “Port Communication”
- Table A-4 “Service Codes”

TABLE A-1 provides an explanation of Service Request Numbers for the virtualization engine.

TABLE A-1 SRN and SNMP Reference

SRN	Description	Corrective Action
1xxxx	Disk drive Check Condition status. xxxx is the Unit Error Code. The Unit Error Codes are returned by the drive in Sense Data bytes 20-21 in response to the SCSI **Request Sense** command.	If too many Check Conditions are returned, then check the link status.
70000	SAN Configuration has changed.	
70001	Rebuild process has started.	
70002	Rebuild is completed without error.	
70003	**Rebuild is aborted with a read error.** This means that the drive copying information cannot read from the primary drive.	If a spare drive is available, it will be brought in and used to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70004	**Write error is reported by follower**. 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, it will be brought in and used to replace the failed drive. If no spare is available, replace the failed drive with a new drive.

TABLE A-1 SRN and SNMP Reference

SRN	Description	Corrective Action
70005	**Write error is detected by master**. 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, it will be brought in and used to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70006	virtualization engine-to-virtualization engine communication has failed.	Internal error. Update firmware.
70007	**Rebuild is aborted with write error**. This means the primary drive cannot write to the drive being built.	If a spare drive is available, it will be brought in and used to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70008	**Read error is reported by follower**. If the initiator is master, then its follower has detected a read error on a member within a mirror drive.	If a spare drive is available, it will be brought in and used to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70009	**Read error is detected by master**. 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, it will be brought in and used to replace the failed drive. If no spare is available, replace the failed drive with a new drive.
70010	CleanUp configuration table is completed.	
70020	SAN physical configuration has changed.	If unintentional, check condition of drives.
70021	Drive is offline.	If unintentional, check condition of drives.
70022	virtualization engine is offline.	If unintentional, check condition of drives.
70023	Drive is unresponsive.	Check condition of drives.
70024	For Sun StorEdge T3+ array pack: Master virtualization engine has detected the partner virtualization engine's IP Address.	
70025	For Sun StorEdge T3+ array pack: Master virtualization engine is unable to detect the partner virtualization engine's IP Address.	Check the Ethernet connection between the two virtualization engines.
70030	SAN configuration changed by SV SAN Builder.	
70040	Host zoning configuration has changed.	
70050	MultiPath drive Failover.	Check MultiPath drive.
70051	MultiPath drive Failback.	
70098	Instant Copy degrade.	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.

TABLE A-1 SRN and SNMP Reference

SRN	Description	Corrective Action
7009A	**Read degrade recorded**. A mirror drive was written to, causing it to enter the degrade state.	Reinsert the missing drive, or replace it with a drive of equal or greater capacity.
7009B	**Write degrade recorded**. If a spare drive is available, it will be brought in and used to replace the failed drive.	The removed drive needs to be (if good) reinserted or (if bad) replaced.
7009C	**Last primary failed during rebuild**. This is a "multi-point failure" and is very rare.	• Backup drive data. • Destroy mirror drive where failure has occurred. • Format (mode 14) drives. • Create new mirror drive. • Re-assign old SCSI ID and LUN to mirror drive. • Restore data.
71000	virtualization engine-to-virtualization engine communication has recovered.	
71001	This is a generic error code for the SLIC. It signifies communication problems between the virtualization engine and the Daemon.	Check the condition of the virtualization engine. Check the cabling between the virtualization engine and Daemon server. Error halt mode also forces this SRN.
71002	This indicates that the SLIC was busy.	Check the condition of the virtualization engine. Check the cabling between the virtualization engine and the Daemon server. Error halt mode also forces this SRN.
71003	SLIC Master unreachable.	Check conditions of the virtualization engines in the SAN.
71010	The status of the SLIC daemon has changed.	
72000	Primary/Secondary SLIC daemon connection is active.	
72001	Failed to read SAN drive configuration.	
72002	Failed to lock on to SLIC daemon.	
72003	Failed to read SAN SignOn Information.	
72004	Failed to read Zone configuration.	

TABLE A-1 SRN and SNMP Reference

SRN	Description	Corrective Action
72005	Failed to check for SAN changes.	
72006	Failed to read SAN event log.	
72007	SLIC daemon connection is down.	Wait for 1-5 minutes for backup daemon to come up. If it doesn't, check the network connection for virtualization engine halt, or hardware failure.

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

SRN	SNMP Description	Corrective Action	SRN after Corrective Action
70020 70030 70050* 70021	• SAN topology has changed • Global SAN configuration has changed. • SAN configuration has changed. • A physical device is missing.	Check SAN cabling and connections between Sun StorEdge T3+ array and virtualization engine. Perform Sun StorEdge T3+ array failback, if necessary.	70020 70030 **70051****
70025	Partner's virtualization engine's IP is not reachable.	Check Ethernet cabling and connections.	None.
70020 70030 70050 70025 70021 70022 **Readings** 72007 72000	• SAN topology has changed • Global SAN configuration has changed. • SAN configuration has changed. • Partner virtualization engine's IP is not reachable. • A physical device is missing. • A SLIC virtualization engine is missing. **When error halt on virtualization engine (not master)** • SLIC daemon connection is inactive. Failed to check for SAN changes, daemon error, check the SLIC virtualization engine. • Secondary daemon connection is active.	• Check cabling and connections between virtualization engine. • Cycle power on failed virtualization engine, if fault LED flashes. • Perform Sun StorEdge T3+ array failback, if necessary. • Enable VERITAS path.	70020 70030 70050 **70024** 70021 70022

* Sun StorEdge T3+ array LUN Failover.
** Sun StorEdge T3+ array LUN Failback.

TABLE A-3 Port Communication

Port	Port	Port Number
Daemon	Management Programs	20000
Daemon	Daemon	20001
Daemon	virtualization engine	25000
virtualization engine	virtualization engine	25001

TABLE A-4 provides service codes for the virtualization engine.

TABLE A-4 Service Codes

Code Number	Cause	Corrective Action
005	PCI bus parity error.	• Replace virtualization engine.
24	The attempt to report one error resulted in another error.	• Cycle power to the virtualization engine.
40	Corrupt database	• Clear SAN database • Cycle power to the virtualization engine. • Import SAN zone configuration
41	Corrupt database	• Clear SAN database • Cycle power to the virtualization engine • Import SAN zone configuration
42	Zone mapping database	• Import SAN zone configuration
050	This message indicates that an attempt to write a value into non-volatile storage failed. It could be a hardware failure, or it could be that one of the databases stored in Flash memory could not accept the entry being added.	• Clear the SAN database. • Cycle power to the virtualization engine.
051	Cannot erase FLASH memory.	• Replace virtualization engine.
53	Unauthorized cabling configuration	• Check cabling. Ensure server/switch connects to host-side and storage connects to device side of virtualization engine virtualization engine. • If necessary, clear SAN database. • If necessary, cycle virtualization engine power. • If necessary, import SAN zone configuration.

TABLE A-4 Service Codes

54	Unauthorized cabling configuration.	• Check cabling.
57	Too many HBAs attempting to log in.	• Check cabling.
60	Node mapping table cleared using SW2.	• No action required.
62	Improper SW2 setting.	• Correct SW2 setting. • Cycle virtualization engine power.
126	Too many virtualization engines in SAN.	• Remove the extra virtualization engine. • Cycle virtualization engine power.
130	Heartbeat connection between virtualization engines is down.	• Correct problem. • Cycle the power on the follower virtualization engine.
400 - 599 Device side interface driver errors:		
409	FC device-side type code invalid.	• Cycle power • If problem persists, replace virtualization engine.
434	Too many elastic store errors to continue. Elastic store errors result from a clock mismatch between transmitter and receiver and indicates an unreliable link. This error can also occur if a device in the SAN loses power unexpectedly.	• Check for faulty component and replace. • Cycle the power on the follower virtualization engine.

APPENDIX **B**

SUNWsecfg Error Messages

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. The information in this appendix expands on that information by providing recommendations for corrective action, should you encounter errors with the command utilities.

The error messages are broken out into the following tables:

- TABLE B-1 lists SUNWsecfg error messages specific to the virtualization engine
- TABLE B-2 lists SUNWsecfg error messages specific to the Sun StorEdge network FC switch-8 and switch-16 switches
- TABLE B-3 lists SUNWsecfg error messages specific to the Sun StorEdge T3+ array
- TABLE B-4 lists miscellaneous SUNWsecfg error messages common to all components

TABLE B-1 Virtualization Engine SUNWsecfg Error Messages

Message	Description and Cause of Error	Suggested Action
Common to virtualization engines	Invalid virtualization engine pair name `$vepair`, or virtualization engine is unavailable. Confirm that the configuration locks are set. This is usually due to the `savevemap` command running.	Try `ps -ef | grep savevemap` or `listavailable -v` (which returns the status of individual virtualization engines).
Common to virtualization engine	No virtualization engine pairs found, or the virtualization engine pairs are offline. Confirm that the configuration locks are set. This is usually due to the `savevemap` command running.	Try `ps -ef | grep savevemap` or `listavailable -v` (which returns the status of individual virtualization engines).
Common to virtualization engine	Unable to obtain lock on `$vepair`. Another command is running.	Another virtualization engine command is updating the configuration. Try `listavailable -v` (which returns the status of individual virtualization engines) and check for lock file directly by using `ls -la /opt/SUNWsecfg/etc` (look for `.v1.lock` or `.v2.lock`). If the lock is set in error, use the `removelocks -v` command to clear.
Common to virtualization engine	Unable to start `slicd` on `${vepair}`. Cannot execute command.	Try running `startslicd` and then `showlogs -e 50` to determine why `startslicd` couldn't start the daemon. You might have to reset or power off the virtualization engine if the problem persists.
Common to virtualization engine	Login failed. The environment variable `VEPASSWD` might be set to an incorrect value. Try again.	A password is required to log in to the virtualization engine. The utility uses the VEPASSWD environment variable to login. Set the VEPASSWD environment variable with the proper value.
Common to virtualization engine	After resetting the virtualization engine, the $VENAME is unreachable. Be aware that after a reset, it takes approximately 30 seconds to boot.	The hardware might be faulty. Check the IP address and netmask that has been assigned to the virtualization engine hardware.

TABLE B-1 Virtualization Engine SUNWsecfg Error Messages *(Continued)*

Message	Description and Cause of Error	Suggested Action
Common to virtualization engine	1. Device-side operating mode is not set properly. 2. Device-side UID reporting scheme is not set properly. 3. Host-side operating mode is not set properly. 4. Host-side LUN mapping mode is not set properly. 5. Host-side Command Queue Depth is not set properly. 6. Host-side UID distinguish is not set properly. 7. IP is not set properly. 8. Subnet mask is not set properly. 9. Default gateway is not set properly. 10. Server port number is not set properly. 11. Host WWN Authentications are not set properly. 12. Host IP Authentications are not set properly. 13. Other VEHOST IP is not set properly.	Log in to the virtualization engine and verify that the device, host, and network settings are correct. Make sure the virtualization engine hardware is not in ERROR 50 mode. If required, power cycle the virtualization engine hardware, or disable the host-side switch port. Run the `setupve -n ve_name` command and enable the switch port.
`checkslicd`	Cannot establish communication with `${vepair}`.	Run `startslicd -n ${vepair}`.
`checkslicd`	Cannot establish communication with virtualization engine pair `${vepair}` initiator `{$initiator}`.	Determine the host name associated with `${initiator}` by using the `showvemap -n ${vepair} -f` command output. Run the command `resetve -n vename`.
`checkvemap`	Cannot establish communication with `${vepair}`	Run the command again. If this fails, check the status of both virtualization engines. If there is an error condition, see Appendix A for corrective action.

TABLE B-1 Virtualization Engine SUNWsecfg Error Messages *(Continued)*

Message	Description and Cause of Error	Suggested Action
`createvezone`	Invalid WWN `$wwn` on `$vepair` initiator `$init`, or virtualization engine is unavailable.	WWN that has already been specified has a SLIC zone and/or an HBA alias assigned. Note that for a WWN to be available for `createvezone`, the zone name in the map file (`showvemap -n ve_pairname`) must be "undefined" and the online status should be "yes." If a zone name is assigned, run the `rmvezone` command. If there are still errors, try `sadapter alias -d $vepair -r $initiator -a $zone -n " "` and then run `savemap -n $vepair`.
`listavailable`	No virtualization engines are available. They are either not found, or the configuration lock is set. Either the components (the Sun StorEdge T3+ array, the switch, or the virtualization engine) are down (cannot be pinged) or another `SUNWsecfg` command is running and is updating the configuration (`ps -ef`)	If no other commands are running and you believe the configuration lock might be set in error, run the `removelocks` command.
`restorevemap`	1. Import zone data failed 2. Restore physical and logical data failed 3. Restore zone data failed	Check the status of both virtualization engines. If there is an error condition, refer to Appendix A for corrective action. Attempt to run the `restorevemap` command again.
`setdefaultconfig`	1. Unable to properly configure the virtualization engine host `${vehost}`. 2. Cannot continue configuration of other components.	Check the status of the virtualization engine and try again.
`setdefaultconfig`	The `setupvecommand` failed.	Try running `setupve -n ve_hostname -v` (verbose mode) and check the errors. Then run `checkve -n ve_hostname`. You can continue to configure VLUNs and zones only if both of these commands work.

TABLE B-2 Sun StorEdge Network FC Switch-8 and Switch-16 Switch SUNWsecfg Error Messages

Message	Description and Cause of Error	Suggested Action
Common Switch	Sun StorEdge system type entered, `${cab_type}`, does not match system type discovered, `${boxtype}`.	Either call the command with the `-f force` option to force the series type, or do not specify the cabinet type (no `-c` option).
Common Switch	1. Unable to obtain lock on switch `${switch}`. Another command is running.	1. Another switch command might be updating the configuration. Check `listavailable -s`. 2. If the switch in question does not appear, check for the existence of the lock file directly by typing `ls -la /opt/SUNWsecfg/etc` (look for `.$switch.lock`). 3. If the lock is set in error, use the `removelocks -s` command to clear it.
`checkswitch`	1. Current configuration on `$switch` does not match the defined configuration. 2. One of the predefined static switch configuration parameters, that can be overridden for special configurations such as NT connect or cascaded switches, is set incorrectly.	1. Select View Logs or directly view `$LOGFILE` for more details. 2. Re-run `setupswitch` on the specified `$switch`.
`listavailable`	No Sun StorEdge network FC switch-8 or switch-16 switch devices are available. They are either not found, or the configuration lock is set. Either the components (the Sun StorEdge T3+ array, the switch, or the virtualization engine) are down (cannot be pinged) or another `SUNWsecfg` command is running and is updating the configuration (`ps -ef`)	If no other commands are running and you believe the configuration lock might be set in error, run the `removelocks` command.

TABLE B-2 Sun StorEdge Network FC Switch-8 and Switch-16 Switch SUNWsecfg Error Messages

Message	Description and Cause of Error	Suggested 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 `showswitch -s $switch` and look for "number of ports." Ensure that this matches the second and third characters of the flash file name; for example: m08030462.fls.
`setswitchflash`	`${switch}` timed out after reset. The switch took longer than two minutes to reset after a configuration change.	The switch might not be set for `rarp`, or `rarp` is not working correctly. Try `ping $switch` after waiting a few more minutes. If errors persist, manually power cycle the switch.
`setupswitch`	Switch `${switch}` timed out after reset.	The switch took longer than two minutes to reset after a configuration change. Try `ping $switch` after waiting a few more minutes. If errors persist, manually power cycle the switch.
`setupswitch`	Could not set chassis ID on switch `${switch}` to `${cid}`.	This should occur only in a SAN environment with cascaded switches. Be aware of the switch chassis IDs of all switches in the SAN and make sure the IDs are all unique. Once the chassis IDs are established, override the switch chassis IDs with the following command: `setupswitch -s $switch_name -i $unique_chassis_id -v`.

TABLE B-3 Sun StorEdge T3+ Array SUNWsecfg Error Messages

Message	Description and Cause of Error	Suggested Action
Common to Sun StorEdge T3+ array	Present configuration does not match Reference configurations	Check the present Sun StorEdge T3+ array configuration with `showt3 -n <t3>` command and verify whether the configuration is corrupted or has changed. If it is not one of the standard configurations, restore the configuration using the `restoret3config` command.
Common to Sun StorEdge T3+ array	1. Could not mount volume `$vol`. 2. `$lun` config does not match	There might be multiple drive failures or corrupted data or parity on the LUN. Replace the failed FRUs and restore the Sun StorEdge T3+ array configuration with the `restoret3config -f -n t3_name` command.
Common to Sun StorEdge T3+ array	The `$fru` status is not ready or enabled. Operations on the Sun StorEdge T3+ array are being aborted.	The disk, controller, or loop interface card in the Sun StorEdge T3+ array might be bad. Replace the failed FRU and rerun the utility.
Common to Sun StorEdge T3+ array	1. The Sun StorEdge T3+ array is not of T3B type, and it cannot continue aborting operations. 2. `t3config` utilities are supported only in the Sun StorEdge T3+ array; the `t3config` utilities are not supported on Sun StorEdge T3+ arrays with 1.*xx* firmware.	The Sun StorEdge T3 array configuration is not a standard configuration (refer to the t3 default/custom configuration table in the *Sun StorEdge 3900 and 6900 Series Hardware Installation and Service Manual*.) Use `showt3 -n t3_name` to display the present configuration. Use the `modifyt3config` and `restoret3config` utility to configure the Sun StorEdge T3+ array.
`checkt3config`	`vol init` command is being executed by another user. Additional `vol` commands cannot run.	Check whether any other `secfg` utility is running. If one is running, allow it to finish.
`checkt3config`	An error occurred while checking proc list, aborting operation on $BRICK_IP{$brick_name}	Check whether any other `secfg` or native Sun StorEdge T3+ commands are being executed on the particular Sun StorEdge T3+ array.

TABLE B-3 Sun StorEdge T3+ Array SUNWsecfg Error Messages *(Continued)*

Message	Description and Cause of Error	Suggested Action
`checkt3config`	Snapshot configuration files are not present. Unable to check configuration.	Make sure that the snapshot files are saved and have read permissions in the `/opt/SUNWsecfg/etc/t3name/` directory. If the snapshot files are not available, , create them by using the `savet3config` command.
`checkt3mount`	1. The `$lun` status reported a bad or nonexistent LUN. 2. While checking the configuration using the `showt3 -n` command, operations abort.	Make sure that the requested LUN exists on the Sun StorEdge T3+ array by using the `showt3 -n` command. Confirm that the Sun StorEdge T3+ array configuration matches standard configurations.
`createvlun`	Invalid diskpool $diskpool on $vepair, or diskpool is unavailable.	Ensure the diskpool was created properly using the `showvemap -n $vepair` command. If the diskpool is unavailable, try `creatediskpools -n $t3name`. If that fails, check the Sun StorEdge T3+ array for unmounted volumes or path failures, by using `checkt3config -n $t3name -v`.
`createvlun`	Unable to execute command. The associated Sun StorEdge T3+ array physical LUN `${t3lun}`, for disk pool `${diskpool}`, might not be mounted.	Run `checkt3mount -n $t3name -l ALL` to see the mount status of the volume. For further information about problems with the underlying Sun StorEdge T3+ array, try `checkt3config -n $t3name -v`.
`listavailable`	No Sun StorEdge T3+ arrays are available. They are either not found, or the configuration lock is set. Either the components (the Sun StorEdge T3+ array, the switch, or the virtualization engine) are down (cannot be pinged) or another `SUNWsecfg` command is running and is updating the configuration (`ps -ef`).	If no other commands are running and you believe the configuration lock might be set in error, run the `removelocks` command.
`modifyt3config`	The lock file clear waiting period expired and the `creatediskpools` command is aborted.	Check to see if the `modifyt3config` and `restoret3config` commands are executing on other Sun StorEdge T3+ arrays. If the commands are executing, wait for them to complete, and then run `creatediskpools -n t3name`.

TABLE B-3 Sun StorEdge T3+ Array SUNWsecfg Error Messages *(Continued)*

Message	Description and Cause of Error	Suggested Action
`restoret3config`	Error while the block size compare command is executing. The `$BRICK_IP{$IPADD}` command is aborted.	The Sun StorEdge T3+ array block size parameter is different from the snapshot file. The Sun StorEdge T3+ array may have been reconfigured. Run `restoret3config`.
`restoret3config`	`$LUN` configuration failed to restore and the force option was used to reinitialize, without success	Check the Sun StorEdge T3+ configuration with the `showt3 -n t3_name` command. Restore the Sun StorEdge T3+ array configuration with the `restoret3config` command.
`restoret3config`	`$LUN` configuration is not found in the `$restore_file`. Cannot restore `$LUN`.	Check for snapshot files in the /opt/SUNWsecfg/etc/t3_name/ directory. If the snapshot files are not found, use the modifyt3config command to configure the Sun StorEdge T3+ array.
`savet3config`	While checking the configuration, the Sun StorEdge T3+ array configuration has not been saved.	Check the Sun StorEdge T3+ array configuration by using the `showt3 -n t3_name` command, if the configuration is different from standard Sun StorEdge T3 configurations. Use the `modifyt3config` command to reconfigure the device.

TABLE B-4 Other SUNWsecfg Error Messages

Message	Description and Cause of Error	Suggested Action
Common to all components	If the Sun StorEdge 3900 or 6900 series has multiple (more than two) failures (for example, both virtualization engines and two switches are down), the `getcabinet` tool might not determine the correct cabinet type. In this example, the `getcabinet` script might determine the device to be a Sun StorEdge 3900 series when, in reality, it is a Sun StorEdge 6900 series.	Set the BOXTYPE variable as follows: BOXTYPE=6910; export BOXTYPE
`checkdefaultconfig`	Could not determine the Sun StorEdge system type. Multiple components might be down and the getcabinet command could not determine the Sun StorEdge series type (3910, 3960, 6910, or 6960).	Try using the command line interface (CLI) by setting the BOXTYPE environment variable to one of the four values. For example, BOXTYPE=3910; export BOXTYPE).
`setdefaultconfig`	The system could not determine the Sun StorEdge system type.	Try using the command line interface (CLI) by setting the BOXTYPE environment variable to one of the four values. For example, BOXTYPE=3910; export BOXTYPE).

setupswitch Exit Values

TABLE 9-1 lists the setupswitch exit values. The associated messages are logged in the `/var/adm/log/SEcfglog` log file.

TABLE 9-1 `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 trying to set the proper switch settings.The switch setting does not match the default configuration or any valid alternatives.
2	WARNING	Errors occurred while trying 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 30462. This is not an error; QLogic periodically releases new versions of the switch Flash code and the new version will not match the default version.
4	WARNING	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 `SUNWsecfg` configuration tools. It should still be flagged as “not the default.” It can imply any of the following alternatives (these messages are printed to the screen and to the Storage Automated Diagnostic Environment GUI): • **INFO—**Some ports have been set to SL mode, but should have been set using the `setswitchs1` command. View and verify this nonstandard configuration setup as required using the `showswitch` command. Refer to the *Sun StorEdge 3900 and 6900 Series Reference Manual* for detailed configuration information. • **INFO—**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. • **INFO—**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.
NOTE: If multiple solutions are connected to a switch, the switch settings might not match the default settings.		

Index

V

W