



Sun StorEdge network FC switch-8 and switch-16 Field Troubleshooting Guide

Sun Microsystems, Inc.
901 San Antonio Road
Palo Alto, CA 94303
U.S.A. 650-960-1300

Part No.816-0252-10
April 2001, [Revision A](#)

[Send comments about this document to: docfeedback@sun.com](mailto:docfeedback@sun.com)

Copyright 2001 Sun Microsystems, Inc., 901 San Antonio Road • Palo Alto, CA 94303-4900 USA. All rights reserved.

This product or document is protected by copyright and distributed under licenses restricting its use, copying, distribution, and decompilation. No part of this product or document may be reproduced in any form by any means without prior written authorization of Sun and its licensors, if any. Third-party software, including font technology, is copyrighted and licensed from Sun suppliers.

Parts of the product may be derived from Berkeley BSD systems, licensed from the University of California. UNIX is a registered trademark in the U.S. and other countries, exclusively licensed through X/Open Company, Ltd. For Netscape Communicator™, the following notice applies: Copyright 1995 Netscape Communications Corporation. All rights reserved.

Sun, Sun Microsystems, the Sun logo, AnswerBook2, docs.sun.com, Sun StorEdge network FC switch-8, and Solaris are trademarks, registered trademarks, or service marks of Sun Microsystems, Inc. in the U.S. and other countries. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. in the U.S. and other countries. Products bearing SPARC trademarks are based upon an architecture developed by Sun Microsystems, Inc.

The OPEN LOOK and Sun™ Graphical User Interface was developed by Sun Microsystems, Inc. for its users and licensees. Sun acknowledges the pioneering efforts of Xerox in researching and developing the concept of visual or graphical user interfaces for the computer industry. Sun holds a non-exclusive license from Xerox to the Xerox Graphical User Interface, which license also covers Sun's licensees who implement OPEN LOOK GUIs and otherwise comply with Sun's written license agreements.

RESTRICTED RIGHTS: Use, duplication, or disclosure by the U.S. Government is subject to restrictions of FAR 52.227-14(g)(2)(6/87) and FAR 52.227-19(6/87), or DFAR 252.227-7015(b)(6/95) and DFAR 227.7202-3(a).

DOCUMENTATION IS PROVIDED "AS IS" AND ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS AND WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT, ARE DISCLAIMED, EXCEPT TO THE EXTENT THAT SUCH DISCLAIMERS ARE HELD TO BE LEGALLY INVALID.

Copyright 2001 Sun Microsystems, Inc., 901 San Antonio Road • Palo Alto, CA 94303-4900 Etats-Unis. Tous droits réservés.

Ce produit ou document est protégé par un copyright et distribué avec des licences qui en restreignent l'utilisation, la copie, la distribution, et la décompilation. Aucune partie de ce produit ou document ne peut être reproduite sous aucune forme, par quelque moyen que ce soit, sans l'autorisation préalable et écrite de Sun et de ses bailleurs de licence, s'il y en a. Le logiciel détenu par des tiers, et qui comprend la technologie relative aux polices de caractères, est protégé par un copyright et licencié par des fournisseurs de Sun.

Des parties de ce produit pourront être dérivées des systèmes Berkeley BSD licenciés par l'Université de Californie. UNIX est une marque déposée aux Etats-Unis et dans d'autres pays et licenciée exclusivement par X/Open Company, Ltd. La notice suivante est applicable à Netscape Communicator™: Copyright 1995 Netscape Communications Corporation. Tous droits réservés.

Sun, Sun Microsystems, the Sun logo, AnswerBook2, docs.sun.com, Sun StorEdge network FC switch-8, et Solaris sont des marques de fabrique ou des marques déposées, ou marques de service, de Sun Microsystems, Inc. aux Etats-Unis et dans d'autres pays. Toutes les marques SPARC sont utilisées sous licence et sont des marques de fabrique ou des marques déposées de SPARC International, Inc. aux Etats-Unis et dans d'autres pays. Les produits portant les marques SPARC sont basés sur une architecture développée par Sun Microsystems, Inc.

L'interface d'utilisation graphique OPEN LOOK et Sun™ a été développée par Sun Microsystems, Inc. pour ses utilisateurs et licenciés. Sun reconnaît les efforts de pionniers de Xerox pour la recherche et le développement du concept des interfaces d'utilisation visuelle ou graphique pour l'industrie de l'informatique. Sun détient une licence non exclusive de Xerox sur l'interface d'utilisation graphique Xerox, cette licence couvrant également les licenciés de Sun qui mettent en place l'interface d'utilisation graphique OPEN LOOK et qui en outre se conforment aux licences écrites de Sun.

CETTE PUBLICATION EST FOURNIE "EN L'ETAT" ET AUCUNE GARANTIE, EXPRESSE OU IMPLICITE, N'EST ACCORDEE, Y COMPRIS DES GARANTIES CONCERNANT LA VALEUR MARCHANDE, L'APTITUDE DE LA PUBLICATION A REPOUDRE A UNE UTILISATION PARTICULIERE, OU LE FAIT QU'ELLE NE SOIT PAS CONTREFAISANTE DE PRODUIT DE TIERS. CE DENI DE GARANTIE NE S'APPLIQUERAIT PAS, DANS LA MESURE OU IL SERAIT TENU JURIDIQUEMENT NUL ET NON AVENU.



Preface

The *Sun StorEdge network FC switch-8 and switch-16 Field Troubleshooting Guide* describes how to diagnose and troubleshoot the Sun StorEdge network FC switch-8 and switch-16 hardware. It provides information and pointers to additional documentation you may need for installing, configuring, and using the configuration. The book is primarily intended for use by experienced system support engineers who already have a good understanding of the product.

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

Shell Prompts

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

Related Documentation

| Application | Title | Part Number |
|--|---|-------------------|
| Installer's information | <i>Sun StorEdge network FC switch-8 and switch-16 Installation, and Configuration Guide</i> | 806-6922-10 |
| Installer/User's information | <i>SANbox-8/16 Segmented Loop Switch Management and User's Manual</i> | 875-3060-10 Rev.X |
| GUI and User | <i>Sun SANbox 16 Segmented Loop Switch User's Manual</i> | 875-3059-10 Rev.X |
| Late news | <i>Sun StorEdge network FC switch-8 and switch-16 Release Notes</i> | 806-6924-10 |
| Software | <i>CD</i> | 724-7491-01 |
| T3 Installation, Operations, and Service | <i>Sun StorEdge T3 Disk Tray Installations, Operations and Service Manual</i> | 806-1062-11 |
| T3 Administration | <i>Sun StorEdge T3 Disk Tray Administrator's Guide</i> | 806-1063-11 |
| A5x00 installation and service | <i>Sun StorEdge A5000 Installation and Service Guide</i> | 802-7573-16 |
| A5x00 configuration information | <i>Sun StorEdge A5000 Configuration Guide</i> | 802-0264-15 |
| RAID software | <i>RAID Manager 6.22 User's Guide</i> | 806-0478-10 |

Accessing Sun Documentation Online

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

`http://docs.sun.com`

Ordering Sun Documentation

Fatbrain.com, an Internet professional bookstore, stocks select product documentation from Sun Microsystems, Inc.

For a list of documents and how to order them, visit the Sun Documentation Center on Fatbrain.com at:

<http://www.fatbrain.com/documentation/sun>

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 (for example, *806-6923-10*) of your document in the subject line of your email.

Contents

1. The Sun StorEdge Network FC Switch-8 and Switch-16 Troubleshooting Guide **1**

Introduction 1

 Supported Configurations 2

 Sun StorEdge network FC switch-8 and FC switch-16 Configuration 2

 Zoning 3

Supported Hardware Configurations 4

 Required Solaris Level 5

 Guidelines for Configuration 5

 Multi-Host 13

Diagnostic Tools 16

 Hardware Tools 16

 Helpful Failure Information 17

FC Switch LEDs and Back Panel Controls 18

 AC Input Power Connector and Fuses 22

Diagnosing and Troubleshooting the Switch 23

 Power Checks and Troubleshooting 23

 Power-On-Self-Test (POST) 23

 Using the Test Mode Switch 25

| | |
|---|------------|
| Heartbeat LED Blink Patterns | 27 |
| Cable Continuity Tests | 32 |
| Switch Counter Information | 33 |
| Counter Descriptions | 35 |
| Diagnostic Information and Isolation | 41 |
| Sun StorEdge StorTools 4.x qlctest | 41 |
| Sun StorEdge StorTools 4.x switchtest | 42 |
| Examples of Fault Isolation | 46 |
| Scenario 1a—Bad Cable Between Host and Switch (Using StorEdge Expert) | 46 |
| Scenario 2—Bad GBIC in Switch | 48 |
| Scenario 1b—Bad Cable Between Host and Switch (Using Functional Test) | 51 |
| A Quick Functional Test (a5ksestest) to Test Full Loop | 54 |
| Scenario 3—Catastrophic Switch Failure | 56 |
| Scenario 4—Bad Cable from Switch to Storage | 59 |
| Scenario 5—Bad GBIC in Storage (A5200) | 67 |
| A. Mamba Field Troubleshooting Guide FAQ | 73 |
| B. Isolation of SAN Components Flowchart | 89 |
| C. Brocade Troubleshooting | 99 |
| Introduction | 100 |
| Troubleshooting Overview | 117 |
| Glossary | 131 |
| Index | 135 |

List of Figures

| | | |
|-----------|---|----|
| FIGURE 1 | Switch and Interconnections | 1 |
| FIGURE 2 | Example: Single Host Connected to One Sun StorEdge A3500FC Controller Module Using Switches | 7 |
| FIGURE 3 | Example: Single Host Connected to One Sun StorEdge A5200 Controller Module Using Switches | 7 |
| FIGURE 4 | Example: Single Host Connected to One Sun StorEdge T3 Partner Pair Using Switches | 8 |
| FIGURE 5 | Example: Single Host to Multiple A3500-FC Controller Modules Using switches | 9 |
| FIGURE 6 | Example: Single Host to Multiple A5200 Controller Modules Using switches | 10 |
| FIGURE 7 | Example: Single Host to Two StorEdge T3 Partner Pairs using switches | 11 |
| FIGURE 8 | Example: Single Host Connected to Multiple StorEdge T3 Partner Pairs, Using Switches | 12 |
| FIGURE 9 | Two Hosts Connected to up to Four Sun StorEdge A3500-FC Controller Modules using switches | 13 |
| FIGURE 10 | Example: Two Hosts Connected to Three Sun StorEdge A5200 Controller Modules using Switches | 14 |
| FIGURE 11 | Example: Two Hosts Connected to Four Sun StorEdge T3 Partner Pairs Using Switches | 15 |
| FIGURE 12 | Chassis Back (8-Port Switch) | 18 |
| FIGURE 13 | Chassis Back (16-Port Switch) | 19 |
| FIGURE 14 | Test Mode Switch Functions and Positions | 26 |
| FIGURE 15 | Heartbeat LED—Normal | 27 |
| FIGURE 16 | Heartbeat LED—Failure Blink Patterns | 28 |
| FIGURE 17 | Port Display | 34 |

| | | |
|-----------|---|----|
| FIGURE 18 | Web GUI | 38 |
| FIGURE 19 | Sun StorEdge StorTools 4.x qlctest | 41 |
| FIGURE 20 | Sun StorEdge StorTools 4.x Switch Test or SANSurfer GUI Start Test | 42 |
| FIGURE 21 | Sun StorEdge StorTools 4.x Array Tests | 43 |
| FIGURE 22 | Isolation in Areas 1, 2, and 3 | 44 |
| FIGURE 23 | Functional Test of Switch window | 57 |
| FIGURE 24 | Switch GUI window | 58 |
| FIGURE 25 | Functional Test (switchtest) on Initiator Port to Test Host-Switch Link window | 60 |
| FIGURE 26 | Functional Test (switchtest) on Destination Port to Test Switch-Storage Link window | 62 |
| FIGURE 27 | Insert Loopback in Destination Port to Test Switch's GBIC window | 64 |
| FIGURE 28 | Rerun a5ksesTest window | 66 |
| FIGURE 29 | Run Snapshot DIFF window | 68 |
| FIGURE 30 | Systematic Isolation of the Various SAN Components | 90 |

List of Tables

| | | |
|---------|--|----|
| TABLE 1 | Supported Hardware | 4 |
| TABLE 2 | Arrays, Zones, and Initiators | 6 |
| TABLE 3 | Dynamic Addition to a Zone* (without reboot of host) | 6 |
| TABLE 4 | Port Display Window Counters | 35 |
| TABLE 5 | Counter Names and Descriptions (Faceplate Window) | 39 |

The Sun StorEdge Network FC Switch-8 and Switch-16 Troubleshooting Guide

Introduction

The scope of this document includes the switch and the interconnections (HBA, GBIC, cables) on either side of the switch, as shown in the following diagram.

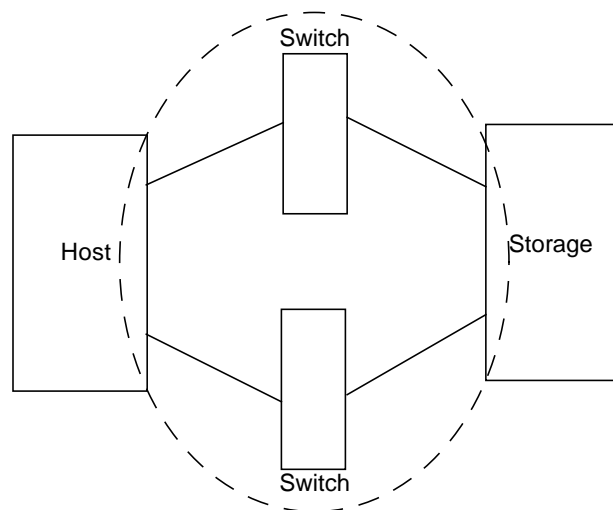


FIGURE 1 Switch and Interconnections

This troubleshooting guide is intended to provide basic guidelines that can be used for isolating problems for the supported configurations identified in this document. It also assumes you have been trained on all the components that comprise storage and switch configurations.

Sun StorEdge StorTools 4.01 or above is required to support the configurations in this document. Throughout this document, the newest version will be referred to as *Sun StorEdge StorTools 4.x*.

Additional information and resources are available at

<http://www.sun.com/service/support/sunsolve/index.html>

The website contains information on software versions, and provides necessary patches for customers.

Supported Configurations

Note –

Be sure that all systems are running Solaris 8 (10/00 release and later) and that the necessary patches for switch support are installed.

Sun StorEdge network FC switch-8 and FC switch-16 Configuration

The Sun StorEdge network FC switch-8 and switch-16 can be configured into multiple zones. Each zone forms an arbitrated loop, and each zone is isolated from other zones on the same switch. Sun supports one or two hosts and up to four devices per zone (see FIGURE 2 through FIGURE 11).

Each zone must have at least two ports and may have up to the number of ports on the switch. For example, the 8-port switch may have four zones; the 16-port switch may have eight zones. Typical zone configurations are sized for the number of hosts and devices to be connected. The number of devices supported per zone depends on the device type. Unconfigured ports default to the orphan zone and may be added to an active zone later, as needed. For more information see the *Sanbox 8/16 Segmented Loop Switch Management User's Manual*, which is packaged with the switch.

Different adapter ports on a host can be connected to different loops. This allows a host to participate on multiple loops.

For more information on loop configurations and zoning, refer to the *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide* and the *SANbox 8/16 Segmented Loop Switch Management User's Manual*, which are shipped with your system.

Note – No more than one adapter port from any given host should be connected to the same zone. This provides redundancy. For more information on supported configurations, refer to the *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide*, which is shipped with your switch.

Zoning

For the 8-port switch you can configure a maximum of four zones, with a minimum of two ports per zone. For the 16-port switch you can configure a maximum of eight zones, with a minimum of two ports per zone.

In both the 8-port and 16-port switches, you can configure a maximum of four Sun StorEdge A3500FC arrays per zone, or three Sun StorEdge A5200 arrays per zone, or four Sun StorEdge T3 Disk Trays per zone.

For more information on zoning, refer to the *Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide* and the *SANbox 8/16 Segmented Loop Switch Management User's Manual*, shipped with your system.

Supported Hardware Configurations

Each switch is connected to the host through a fiber optic cable to a Sun StorEdge PCI Single Fibre Channel Network Adapter. The other end of the switch is connected to storage devices through a fiber optic cable.

TABLE 1 lists supported hardware, including part numbers and a brief description of each item.

Note – The maximum length supported is 500m with shortwave GBICs and multi-mode cable.

TABLE 1 Supported Hardware

| Part Number | Description |
|--------------|--|
| 540-4026 | Sun StorEdge A3500-FC FC-AL controller for A3500 array (with D1000 tray) |
| 540-4027 | Sun StorEdge A3500-FC FC-AL controller for A3000 array (with RSM tray) |
| 501-4158 | Sun StorEdge A5200 array |
| 950-3475 | Sun StorEdge T3 array |
| X6799A | StorEdge PCI Single Fibre Channel Network Adapter |
| X6731A | GBIC Gigabit Interface Converter for the SBus FC-100 Host Adapter |
| X973A | 2M fiber optic cable |
| X978A | 15m fiber optic cable |
| X6746A | Sun StorEdge FC switch-8 Switch |
| SG-XSW16-32P | Sun StorEdge network FC switch-16 Switch |

Required Solaris Level

Be sure that all systems are running Solaris 8 (10/00 release and later) and that the necessary patches for switch support are installed. See <http://www.sun.com/service/support/sunsolve/index.html> for more information.

Guidelines for Configuration

- Hosts
 - Sun Enterprise™ 220, 250, 420, and 450
 - Sun Enterprise 3x00 through Enterprise 6x00
 - Sun Enterprise 10000
- Arrays
 - Sun StorEdge A5200 array
 - Sun StorEdge T3 array
 - Sun StorEdge A3500-FC array
- Switches
 - For High Availability Applications, configure two switches in parallel
- Zones
 - A maximum of four storage arrays per zone is possible with the Sun StorEdge A3500FC Array.
 - A maximum of three storage arrays per zone is possible with the Sun StorEdge A5200 Array.
 - A maximum of four devices per zone is possible with the Sun StorEdge T3 Array.
 - Do not mix different arrays in the same zone. A single zone can contain only Sun StorEdge A3500FC arrays, Sun StorEdge A5200 arrays, or Sun StorEdge T3 arrays.
 - A minimum of 2 ports per zone—for example, a 16-port switch can have a maximum of 8 zones
 - For the maximum arrays and initiators per zone, see TABLE 2.
 - All hosts connected to a zone must be of the same processor family—for example, Enterprise 10000, or Enterprise 3x00-6x00, or Enterprise 220, 250, 420,450.
 - You can dynamically add storage to a zone using `luxadm` procedures for the Sun StorEdge A5200 and Sun StorEdge T3 arrays.
 - Do not dynamically remove storage.

TABLE 2 Arrays, Zones, and Initiators

| Array | Maximum Arrays/Zone | Maximum Initiators/Zone |
|-----------------------|---------------------|---|
| Sun StorEdge A3500-FC | 4 | 2 |
| Sun StorEdge A5200 | 3 | 2 initiators per loop, or a maximum of four per array |
| Sun StorEdge T3 | 4 | 2 |

TABLE 3 Dynamic Addition to a Zone* (without reboot of host)

| Array | ADD First / Additional |
|-----------------------|---------------------------|
| Sun StorEdge A3500-FC | No / Yes |
| Sun StorEdge A5200 | Yes / Yes |
| Sun StorEdge T3 | Yes / Yes |

* **Note:** No dynamic removal. A reconfiguration reboot is required.

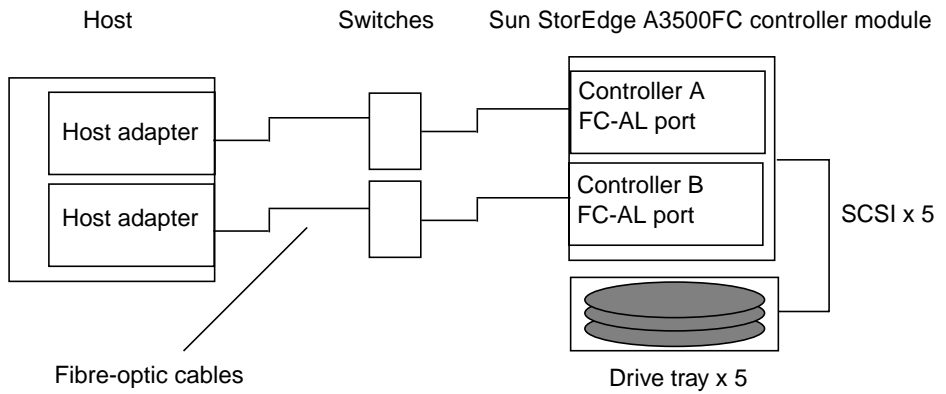


FIGURE 2 Example: Single Host Connected to One Sun StorEdge A3500FC Controller Module Using Switches

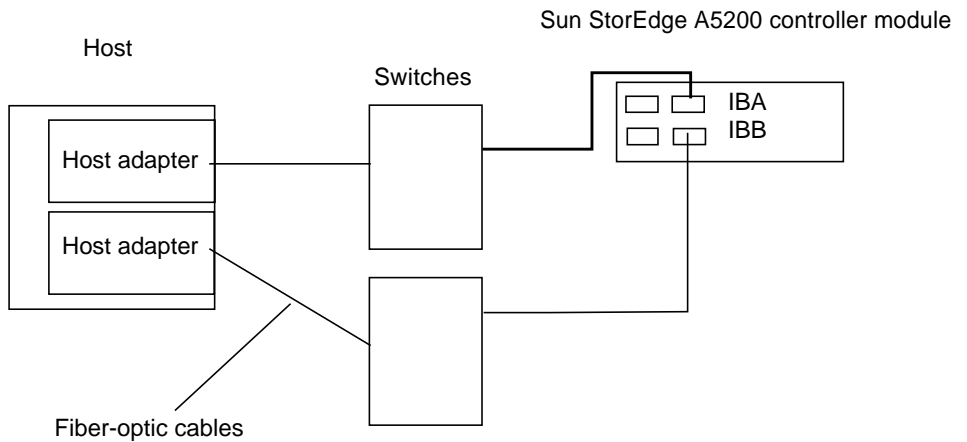


FIGURE 3 Example: Single Host Connected to One Sun StorEdge A5200 Controller Module Using Switches

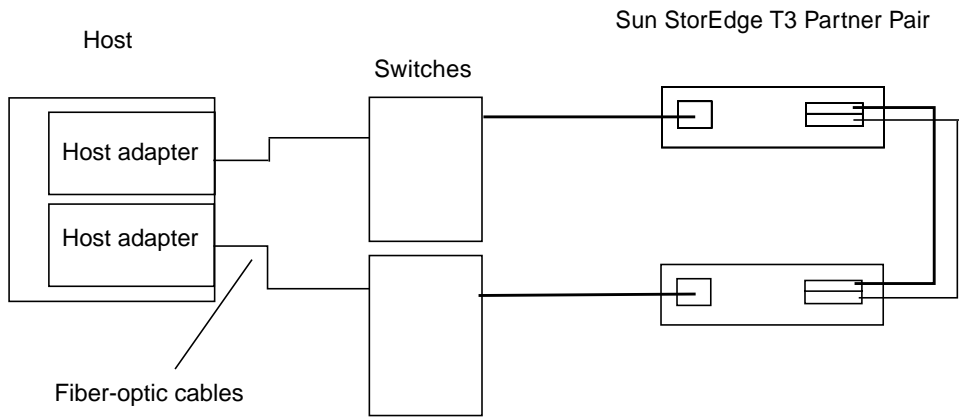


FIGURE 4 Example: Single Host Connected to One Sun StorEdge T3 Partner Pair Using Switches

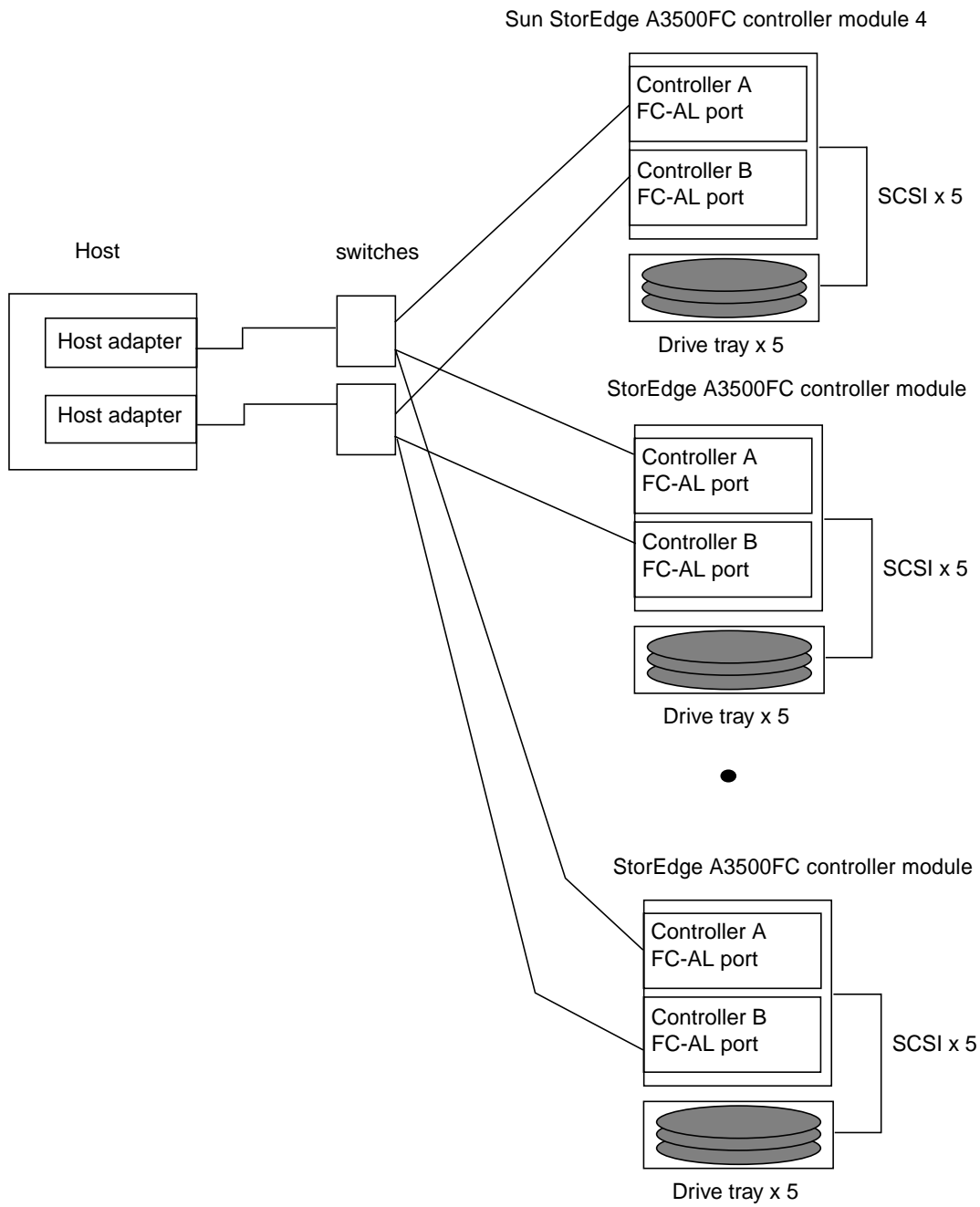


FIGURE 5 Example: Single Host to Multiple A3500-FC Controller Modules Using switches

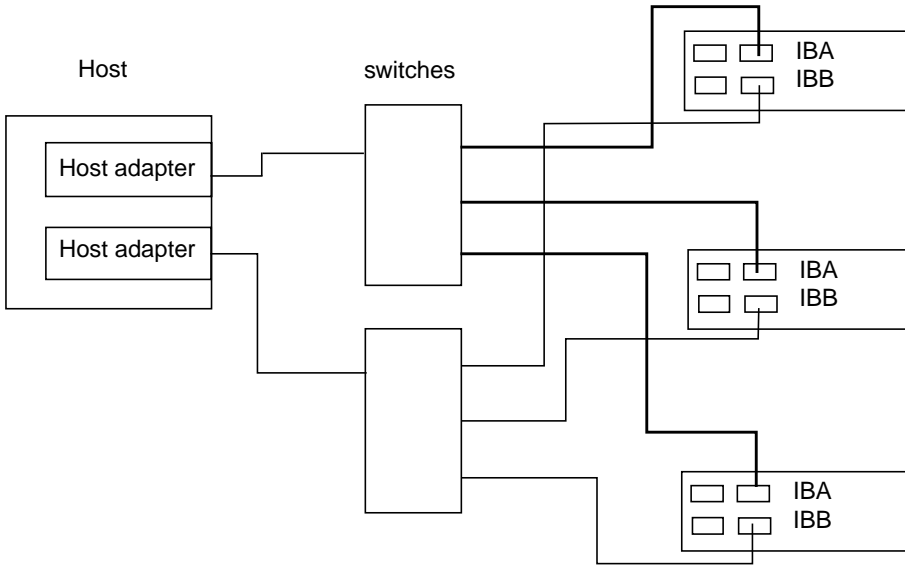


FIGURE 6 Example: Single Host to Multiple A5200 Controller Modules Using switches

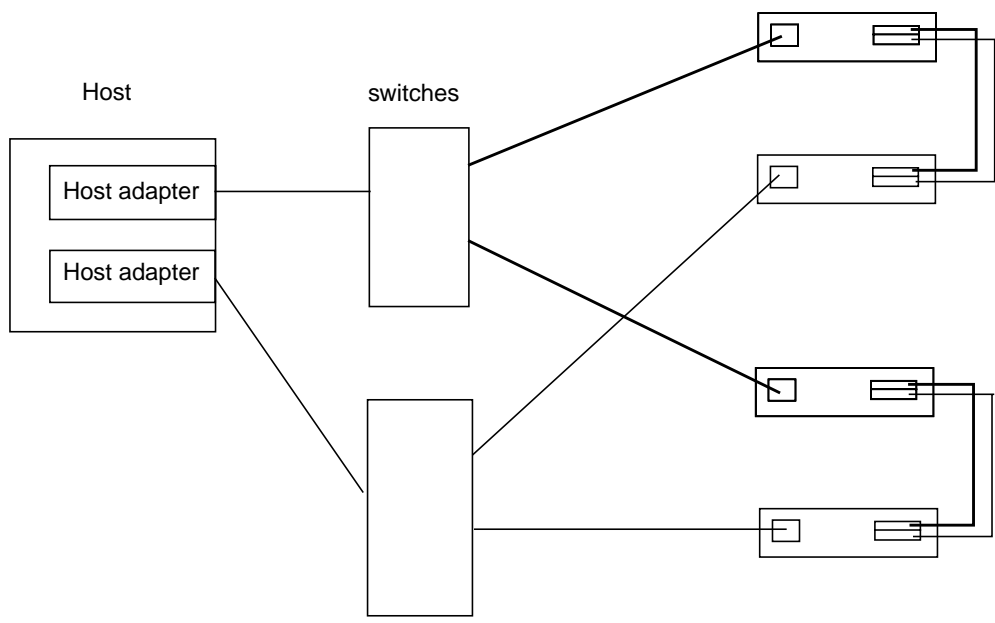


FIGURE 7 Example: Single Host to Two StorEdge T3 Partner Pairs using switches

Sun StorEdge T3 Partner Pairs (4)

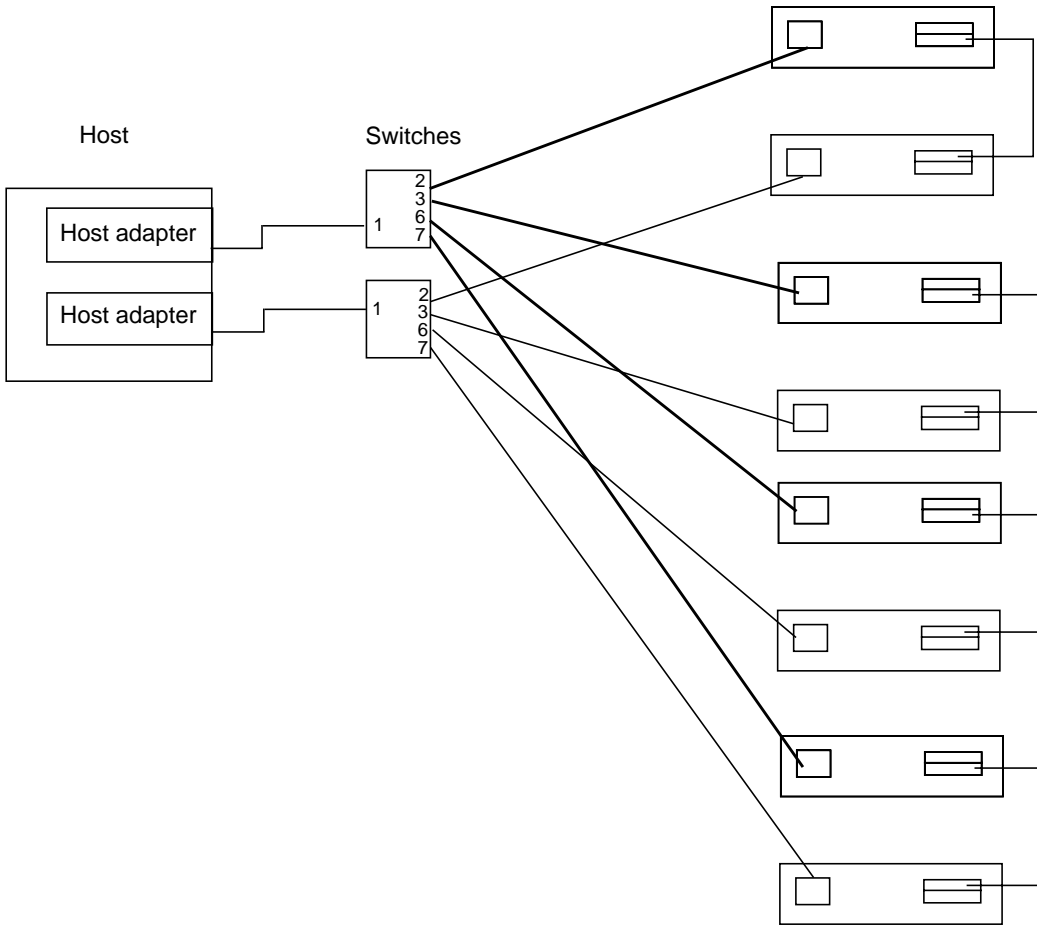


FIGURE 8 Example: Single Host Connected to Multiple StorEdge T3 Partner Pairs, Using Switches

Multi-Host

FIGURE 9 shows an example of a multi-host configuration: two hosts connected through fiber-optic cables to two Sun StorEdge A3500FC controller modules using switches.

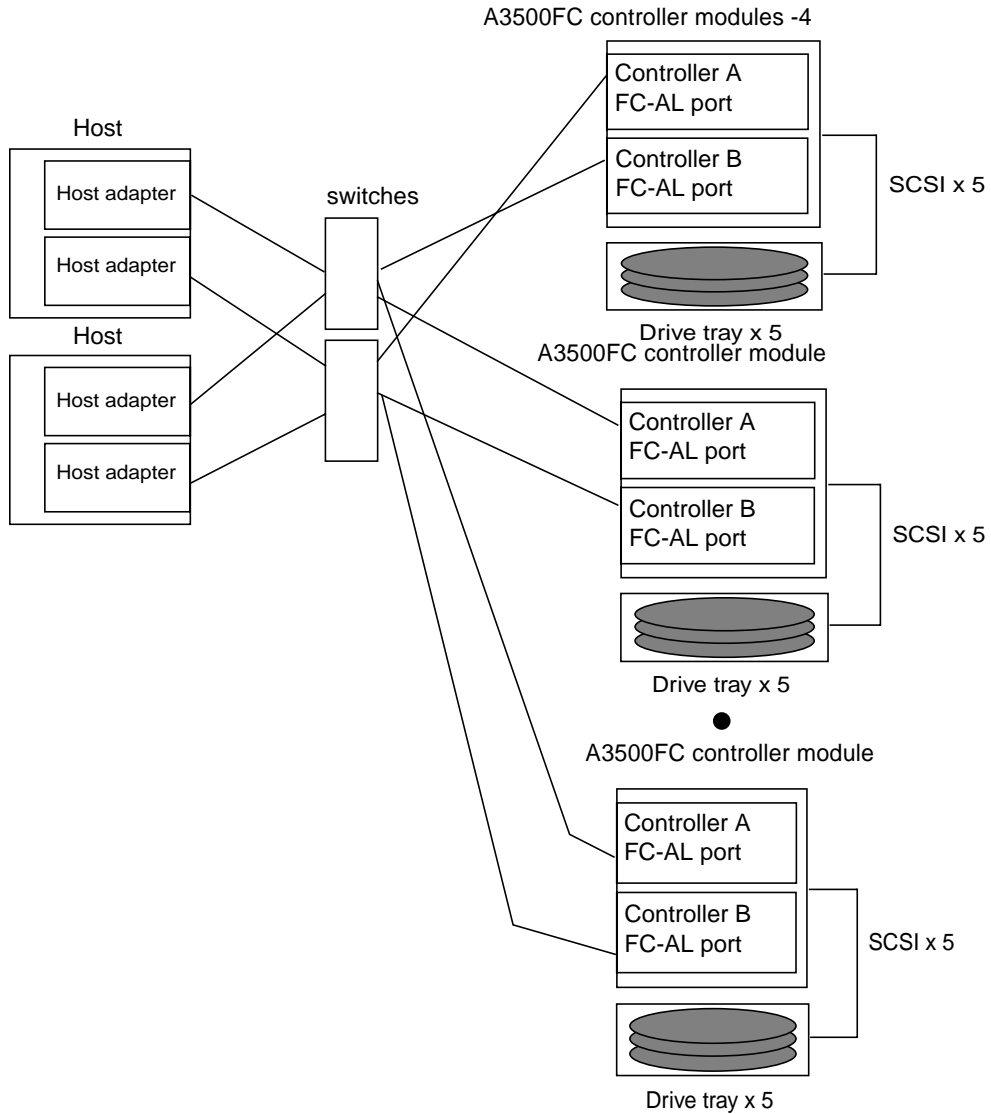


FIGURE 9 Two Hosts Connected to up to Four Sun StorEdge A3500-FC Controller Modules using switches

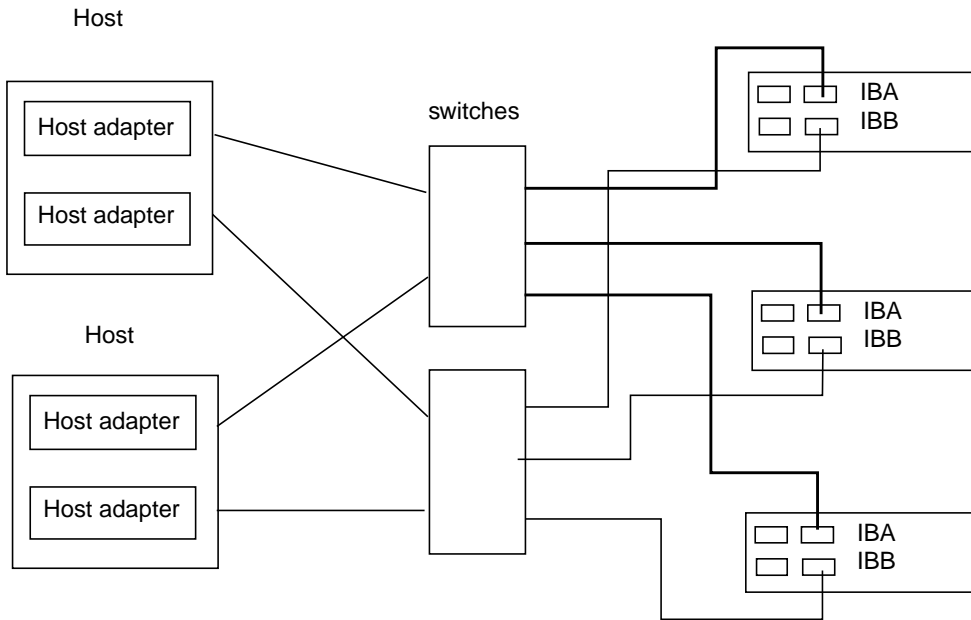


FIGURE 10 Example: Two Hosts Connected to Three Sun StorEdge A5200 Controller Modules using Switches

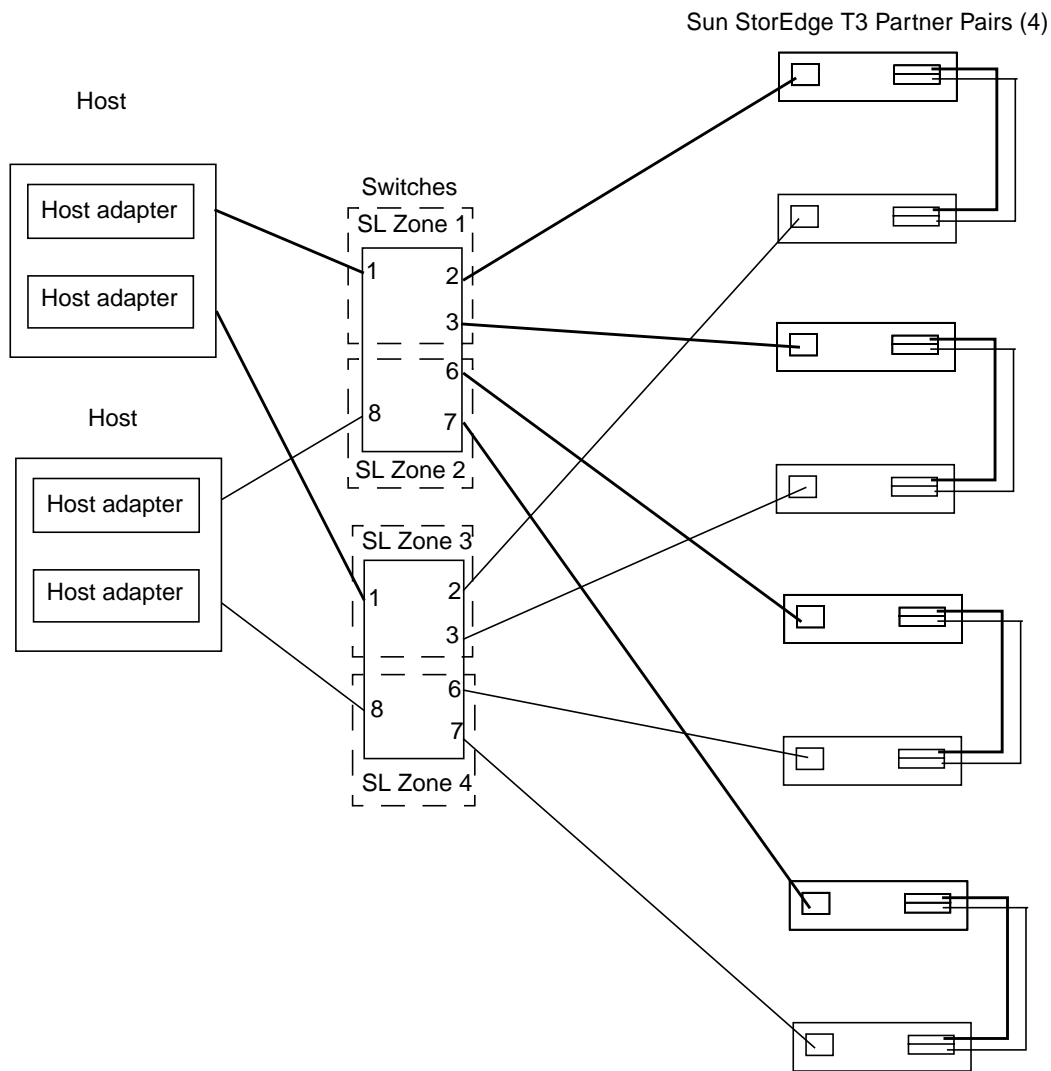


FIGURE 11 Example: Two Hosts Connected to Four Sun StorEdge T3 Partner Pairs Using Switches

Diagnostic Tools

Note – Ensure that all the systems are running Solaris 8 (10/00 or later).

The tools available for troubleshooting:

Switch

- Sun StorEdge Network FC switch 2.0 GUI

Host

- Sun StorEdge StorTools 4.x (offline/online)
- Sun StorEdge RASAgent 1.1
- Explorer 3.4
- Sun StorEdge T3 array extractor script

Storage

- CM 2.1 - Sun StorEdge T3 array
- RAID Manager 6.2.2 - Sun StorEdge A3500-FC array
- Sun StorEdge StorTools 4.x - Sun StorEdge A5200 array

Hardware Tools

A loopback cable is required when you use Sun StorEdge StorTools 4.x CLI `stexpert`.

Helpful Failure Information

The following information should be gathered and reviewed before you start any troubleshooting effort. The information you gather may point you in the right direction or support other failure data.

- `/var/adm/messages`
- Sun StorEdge RASAgent 1.1 e-mail messages
- `Weblog.file`
- Explorer
- LED indicators
- Counters
- Customer input
- Component Manager alert messages
- Sun StorEdge StorTools 4.x logs (`/var/opt/SUNWvtsst/logs`)
- Capture utility output

FC Switch LEDs and Back Panel Controls

FIGURE 12 and FIGURE 13 identify the parts of the switch chassis back. Port numbers are marked on the chassis.

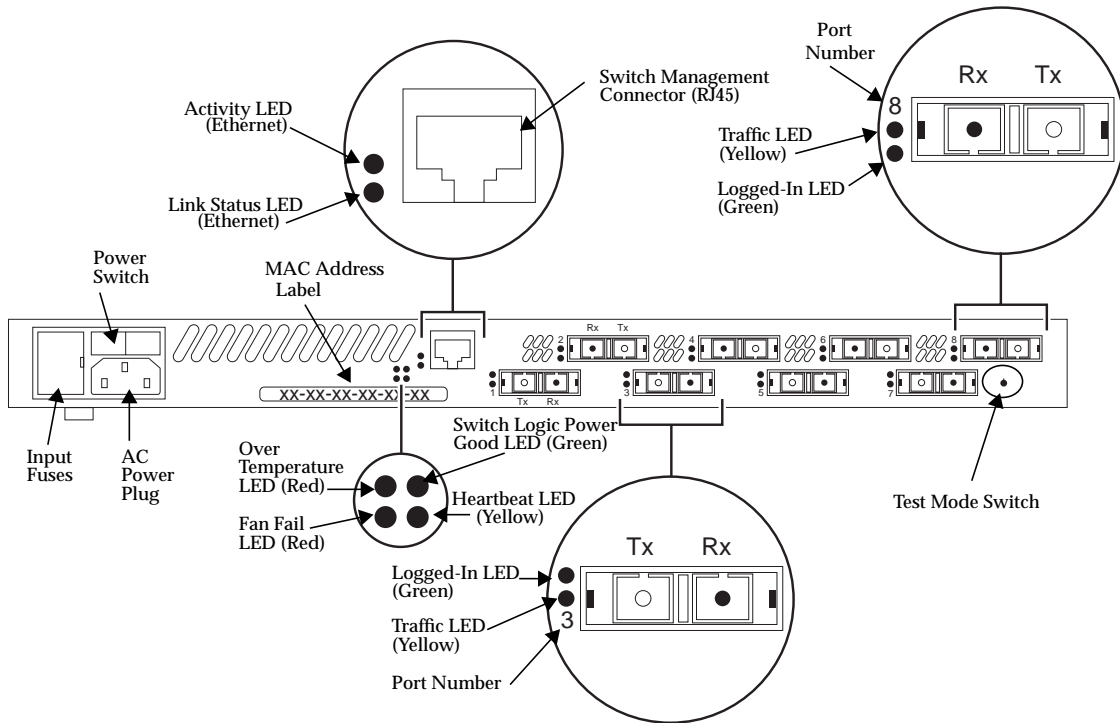


FIGURE 12 Chassis Back (8-Port Switch)

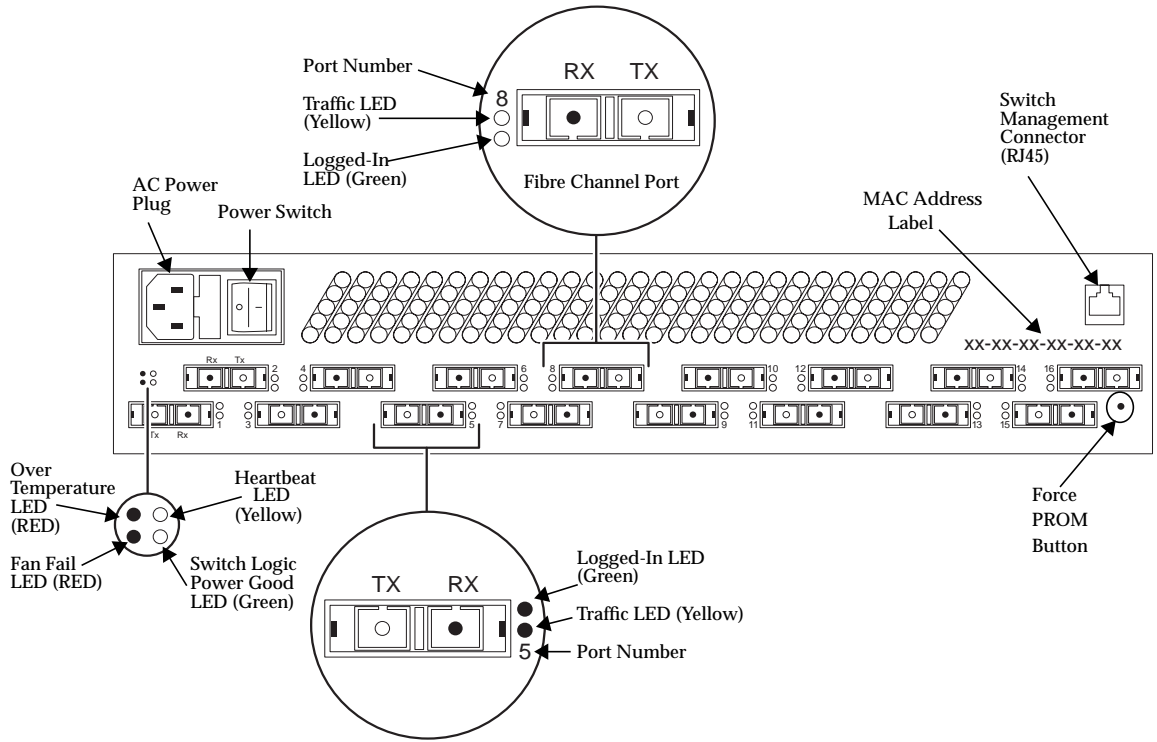


FIGURE 13 Chassis Back (16-Port Switch)

Power Switch

“Chassis Back (8-Port Switch)” on page 18 and “Chassis Back (16-Port Switch)” on page 19 shows the location of the power switch. The power switch is a rocker switch. Press the right side (labeled 1) to turn it ON; press the left side (labeled 0) to turn it OFF.

When you press the power switch and turn it ON, there is a two-second delay before the fans start and the Power Good LED on the back of the chassis illuminates. The Power Good light indicates that the switch logic is receiving power within the proper voltage range.

Back Panel LEDs

LEDs visible through lenses in the back of the chassis indicate chassis and port status. During a reset operation (for about two seconds at the beginning of power-on) all LEDs are forced ON. The following definitions are valid following the POST when the POST finds no errors. See “Diagnosing and Troubleshooting the Switch” on page 23 for more information about the heartbeat LED error codes.

Heartbeat LED (Yellow)

The heartbeat LED indicates the status of the internal switch processor and the results of POSTs run at power-on.

Following a normal power-on, the heartbeat LED blinks about once per second to indicate that the switch has passed the POSTs and the internal switch processor is running.

See “Diagnosing and Troubleshooting the Switch” on page 23 for more information about heartbeat LED error codes.

Switch Logic Power Good LED (Green)

This LED is ON when the power supply is delivering power within normal limits to the switch logic (the power switch must be ON).

Fan Fail LED (RED)

This LED is normally OFF. It comes ON only when the speed of a fan drops below operational level.

Over Temperature LED (Red)

This LED is normally OFF. The over temperature LED lights to indicate that the air temperature inside the switch has exceeded a certain limit. If this LED lights, inspect the following:

- Ambient air temperature: maximum 40°C (104°F)
- Proper clearance: 163 mm (6.5") back, right side, and front
- Fan Operation
- Power supply operation

Logged-In LED (Green)

Each port has its own Logged-In LED. The Logged-In LED indicates the logged-in or initialization status of the connected device or loop of devices. Initially (immediately after the switch completes the POST successfully, the switch holds all Logged-In LEDs OFF (no light). Each remains OFF until the port and its attached devices are able to perform a loop initialization (LIP) successfully. Following a successful LIP on a given port, the switch turns the Logged-In LED ON (lit) for that port. This shows that the port is properly connected and able to communicate with its attached devices. The LED for this port remains ON as long as the port is initialized.

If the established link is broken (a fiber opens or the connected port goes out of service), the Logged-In LED is shut OFF. If the link is replaced or the connected port comes back into service, the port and its attached devices try to regain initialized status. If the initialization is re-established, the switch turns the Logged-In LED back ON and communication continues.

Traffic LED (Yellow)

Each port has its own port traffic LED. The traffic LED for a particular port is ON when Class 2 or 3 frames are entering or leaving the port. The switch turns the LED ON for 50 milliseconds for each frame, so you should be able to see it for one frame. This LED does not light for frames following an arbitrated loop in bypass mode.

AC Input Power Connector and Fuses

A standard 3-wire computer-type AC power cable (supplied with the switch) connects between the AC input power connector and an AC outlet. See FIGURE 12 and FIGURE 13.

An input fuse holder is incorporated into the AC input power connector assembly. It holds two input fuses.

Switch Management Connector

The switch management connector is a 10/100BASE-T Ethernet interface that provides a connection to a management station. See FIGURE 12 and FIGURE 13.

Note – A sticker on the back of the chassis contains the MAC Address. The MAC Address is used for the physical address for ethernet communication.

Ethernet LEDs

Link Status

The green LINK status LED lights only when the Ethernet interface establishes an electronic link. See FIGURE 12 and FIGURE 13.

Activity

The yellow Activity LED lights when the interface is transmitting data to the network or receiving data from the network.

Diagnosing and Troubleshooting the Switch

This section provides information for diagnosing and troubleshooting problems with the switch.

- Power Checks and Troubleshooting help you solve AC power and Power Supply problems.
- Power-On-Self-Test (POST) checks the condition of the Switch, with the exception of the GBICs.
- Cable Continuity tests for open fibers in the cable network.

Power Checks and Troubleshooting

The following procedure assumes the Power Good LED does not light.

Check that:

- The power switch is in the ON (I) position.
- The AC power outlet has the proper voltage.
- The power cable has continuity and is plugged into both the AC power outlet and the switch chassis.
- The input fuses are good.
- If the Logged-in LED is off and the device attached to the port is a host, be sure the host is powered on and booted.
- If the Logged-in LED is off and the device attached to the port is a storage unit, be sure it is powered on and is operating normally. You can verify the status of your array from the array's front LEDs and from RM6. Refer to the Sun StorEdge array manuals for information.

Power-On-Self-Test (POST)

At startup, the switch runs a series of Power-On-Self-Test diagnostics. These POST diagnostics check for proper switch operation, excluding the GBICs. If no fatal errors are encountered, the switch becomes operational.

During the POST, the switch logs any errors encountered. Some POST errors are fatal; others are non-fatal. A fatal error disables the switch so that it does not operate. A non-fatal error allows the switch to operate, but with some decrease in performance until the problem is corrected.

- A PROM checksum failure is an example of a fatal error. It indicates that the PROM firmware is corrupt, and the switch does not operate.
- A failure associated with a Fibre Channel port is an example of a non-fatal error. The switch can isolate the bad port while the other ports continue to operate.

Note – In the following POST error descriptions, note that some errors result in a switch that is operable, but in a degraded way (non-fatal errors). Other errors result in a switch that is not operable (fatal errors). If the problem is non-fatal, you can run in a degraded mode until the problem is fixed.

When POST is complete and errors are encountered, the switch uses the heartbeat LED to blink an error code that describes the first fatal error encountered. The LED blinks in a pattern relating to the failure, pauses, and then restarts the same blinking pattern.

The switch then reads its error log, and if it has encountered non-fatal errors that affect one or more ports (with remaining ports operable), it disables the bad ports and blinks the Logged-in LED of the affected port or ports. If the errors is non-fatal but does not affect a single port or group of ports, only the heartbeat LED blinks an error code. In all cases, the switch displays the POST error indications until you power it off. For example:

- If the POST encounters a PROM checksum error, the entire switch is inoperable. The heartbeat LED blinks the error code for the fatal POROM checksum error. The entire switch is down, and no port Logged-in LEDs are lit because the problem does not affect a port or ports.
- If the POST encounters a bus error, the switch may operate in a degraded mode because it has multiple buses. It can operate with one or more buses in operation, but some normal processing functions, such as in-order delivery, may be adversely affected. The heartbeat blinks the error code for the non-fatal bus error. The switch may operate more slowly, but no port Logged-in LEDs are lit because the problem does not affect the ports.
- If the POST encounters a port error, the switch may operate with the remaining ports. The heartbeat blinks an error code for the non-fatal port error. The switch disables the failing port or ports and blinks their Logged-in LEDs.
- If the heartbeat LED is blinking normally and you cannot access the switch via the SANSurfer GUI, check the IP address and verify that it is set correctly. Refer to the *Sun Switch Management Installer's/User's Manual* for instructions on how to check and set the IP address. Also check the ethernet cable.

The POST diagnostic program performs the following basic tests:

- Checksum tests on the Boot firmware located in a PROM and the main switch firmware located in FLASH memory.
- Functional hardware tests on internal switch memory.
- Various read/write register and loopback data-path tests on the switch logic board.
- Frame bus and auto route logic tests
- Switch management port logic
- Arbitrated loop tests

Using the Test Mode Switch

The test mode switch is a small rotary switch located on the back of the switch chassis as shown in FIGURE 12 and FIGURE 13. The test mode switch enables the switch chassis to perform the following functions:

- Normal Operation: Performs POST diagnostics once at the time of startup and then proceeds to normal operation.
- Force PROM: Used to gain access to the PROM when flash memory or the resident configuration file is disabled.

The test mode switch position determines which functions are performed when the switch chassis is powered on. See FIGURE 14 for test mode switch functions and positions. Normal operation is indicated by the alignment of the small notch on the test mode switch with the dot on the faceplate.



Caution – Use the test mode switch on the back panel while performing maintenance tasks *only*. Data may be corrupted if the test mode switch is used while the switch chassis is operating.

Front Panel Switch Modes

The following are the settings for the 10-position rotary switch:

| | |
|---|--|
| 0 | Normal operations |
| 1 | Continuous test |
| 2 | Test bypass |
| 3 | Operator test |
| 4 | Normal operation/initial test with force PROM mode |
| 5 | Continuous test with force PROM mode |
| 6 | Test bypass with force PROM |
| 7 | Operator test with force PROM |
| 8 | Normal operation/initial test with watchdog timer disabled |
| 9 | Continuous test with watchdog timer disabled |

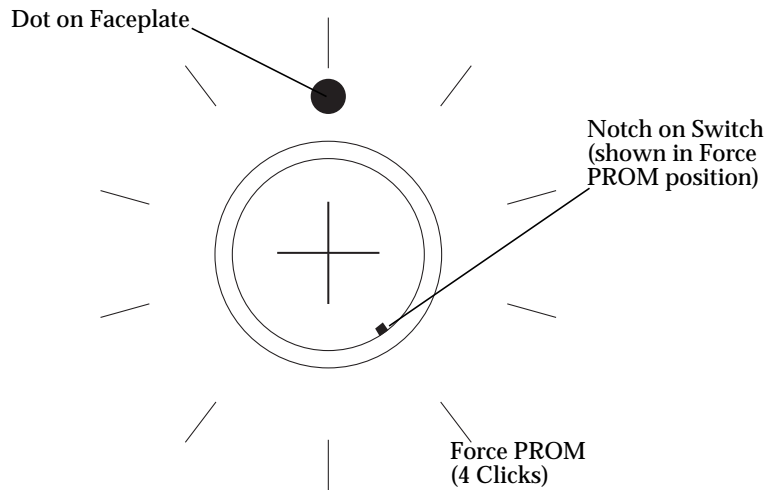


FIGURE 14 Test Mode Switch Functions and Positions

▼ Troubleshooting Test Mode Switch Functions

- 1. Use a small screwdriver to change the test mode switch positions.**
Use the normal position as reference and count the number of clicks (one click per position). These clicks are not audible and are best detected by touch.
- 2. Isolate the switch chassis.**
Data may be lost or corrupted if the test mode switch is used while data is being transmitted.
- 3. Using a small screwdriver, rotate the test mode switch to the desired position.**
- 4. Turn the power off and then back on to reset the switch chassis.**
- 5. Observe the heartbeat LED for error codes (five blinks is normal when in the Force PROM mode).**
Correct conditions or reconfigure the switch as needed.
- 6. Return the test mode switch to the normal position, aligning the small notch with the dot on the faceplate.**
- 7. Turn the switch off and then back on to reset the switch chassis.**

Heartbeat LED Blink Patterns

Normal (all pass)

If all POST diagnostics pass, the switch goes to normal operation and the heartbeat LED blinks at a steady rate of one blink per second.



FIGURE 15 Heartbeat LED—Normal

Failure Blink Patterns

The heartbeat LED indicates the error with a series of blinks, a three-second pause, and then the same series of blinks. The number of blinks between the three-second pause indicates the error. The blinks occur at about twice the speed of the normal heartbeat.

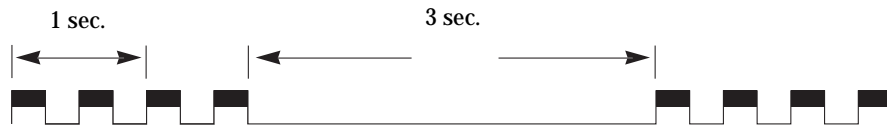


FIGURE 16 Heartbeat LED—Failure Blink Patterns

PROM Checksum Failure (One Blink)

The switch is not operable.

This checksum test of the PROM verifies the integrity of the PROM data. A failure indicates the PROM data is corrupted. The heartbeat LED blinks once between the three-second pauses. No port Logged-in LEDs blink.

RAM Failure (Two Blinks)

The switch is not operable.

This test verifies the data and address buses to the SRAM and verifies SRAM integrity. A failure indicates that the data bus, address bus, or SRAM is failing. The heartbeat LED blinks twice between the three-second pauses. No port Logged-in LEDs blink.

Flash Checksum Failure/Switch Management Port (Ethernet) Tests Good (Three Blinks)

The switch is not operable.

The flash checksum test verifies the integrity of the flash data. If the flash data is corrupt, the POST next checks the Switch Management port to find out if it is functional. The Switch Management port is the load path for loading new flash data. If the Switch Management ports tests good, the heartbeat LED blinks three times between the three-second pauses. No port Logged-in LEDs blink.

You may load new flash control code via the Switch Management port. See the Switch Management manual for a description of how to load new flash code.

Flash Checksum Failure/Switch Management port (Ethernet) Failure (Four Blinks)

The switch is not operable.

The flash checksum test verifies the integrity of the flash data. If the flash data is corrupt, the POST checks the Switch Management port to find out if it is functional. The Switch Management port is the load path for loading new flash data. If the Switch Management ports tests bad, the heartbeat LED blinks four times between the three-second pauses. No port Logged-in LEDs blink. This means that the flash control code is corrupt and the Switch Management port may not operate well enough to load new flash code.

Force PROM Mode in Effect (Five Blinks)

This is an alarm.

Five blinks indicate that the processor is reading the default configuration from PROM instead of from flash memory.

The test mode switch is in the force PROM position. This error never occurs unless you are using the force PROM button. The heartbeat LED blinks five times between the three-second pauses.

Switch ASIC Test Failure (Six Blinks)

The switch is not operable.

The switch ASIC test verifies the base functionality of each switch ASIC, including the control port interface and all functions performable with the confines of an individual ASIC. A failure indicates a faulty switch ASIC. The heartbeat LED blinks six times between three-second pauses. The switch disables the ports associated with the bad ASIC and blinks the ports' Logged-in LEDs. An ASIC that fails this test could affect the operation of the remaining ports.

GBIC Bypass Port Loopback Test Failure (Seven Blinks)

The switch is operable.

The GBIC bypass port loopback test verifies (on a port-by-port basis) the ability of each switch ASIC to loop data out through the Serdes chip on a port and back to the ASIC control port (bypassing the GBIC). A failure indicates either a faulty switch ASIC or an ASIC-to-Serdes interface problem. The heartbeat LED blinks seven times between three-second pauses. The switch disables the failing port or ports and blinks their Logged-in LEDs. The ports whose Logged-in LEDs are not blinking have passed the test and are all usable.

Fibre Channel Port Loopback Test Failure (Eight Blinks)

Note – This test runs in Continuous Test only. Continuous Test is controlled by the test mode switch. Use this test only under the direction of customer support, which will tell you how to activate the test.

The switch is not operable while in continuous test.

In continuous test mode, the switch fibre channel port loopback test verifies the ability of each switch ASIC to loop data out through each fibre channel port, through a loopback plug, and back to the ASIC control port. In order to accomplish this test, you must attach a loopback plug to each GBIC as you test it.

▼ To Test

1. **Place the chassis into Continuous Test.**
2. **Remove all GBICs from the chassis, except the one you want to test.**
The GBIC under test may be in any port. The Continuous Test skips all empty ports.
3. **Insert a loopback plug into the GBIC.**
4. **Cycle the chassis power to cause a reset.**
5. **After a few seconds of testing, if the heartbeat LED is blinking about once per second (normal), the GBIC passes the test. If the heartbeat LED blinks the eight-blink error code, the GBIC failed.**
Repeat steps 2 through 5 to test all the GBICs, one at a time.
6. **When all the tests are complete, place the test mode switch back in the 'Normal Run' position (small dot on the end of the shaft pointing straight up).**
7. **Cycle the chassis power to cause a reset.**

Switch Bus Test Failure (Nine Blinks)

The switch is not operable.

The switch bus test verifies the ability of the switch ASICs to communicate with each other via the buses that interconnect the ASICs. A failure indicates an inability of an ASIC pair to communicate over one or more buses. The heartbeat LED blinks nine times between three-second pauses. No port Logged-in LEDs blink.

Switch Auto-Route Test Failure (10 Blinks)

The switch is operable.

The switch auto-route test verifies the auto-route capability of individual ports to route frames to the other ports in the chassis. The heartbeat LED blinks 10 times between three-second pauses. The switch disables the failing ports or port-pairs and blinks their Logged-in LEDs.

The ports whose Logged-in LEDs are not blinking have passed the test.

Eleven and Twelve Blinks—Not Used

Arbitrated Loop Test Failure (13 Blinks)

The switch is operable.

The arbitrated loop test verifies the ability of the arbitrated loop ports to initialize properly. The heartbeat LED blinks 13 times between three-second pauses. The switch disables the failing ports and blinks their Logged-in LEDs.

The ports whose Logged-in LEDs are not blinking have passed the test.

Switch Management Port Failure (14 Blinks)

The switch is operable.

The switch management port test verifies the functionality of the Ethernet data bus. A failure indicates that communication over the Ethernet port will probably be adversely affected. The heartbeat LED blinks 14 times between three-second pauses. No port Logged-in LEDs blink.

NVRAM Test Failure (15 Blinks)

The switch is not operable.

The Non-Volatile Memory (NVRAM) test verifies the status of the NVRAM battery (not low), performs a checksum on any existing data, and performs a data write/read test on the unused areas of the NVRAM. A test failure in any of these three tests causes the heartbeat LED to blink 15 times between three-second pauses.

Hung Flash Control Code

The switch is not operable.

If the Power Good LED is lit and the heartbeat LED and the remaining front-panel LEDs blink in unison, the flash control code running the processor is hung.

Complete Failure

The switch is not operable.

If the Power Good LED is lit and the heartbeat LED does not blink at all (always ON or always OFF) the switch is not operable.

Cable Continuity Tests

When there is a problem communicating over a particular link and both the switch and the connected device pass their respective tests, check the continuity of the cables. Run the Sun StorEdge StorTools 4.x PCI FC-100 board test (`switchtest`) while using the SW port option. Depending on the configuration, this may be an offline activity.

Switch Counter Information

Sun Engineering is currently investigating how counters can be used to help isolate failure. At this time, counter data should be used only as supporting data. *Do not use this data as the primary source in the troubleshooting process.*

General points to keep in mind when viewing counters follow.

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

Running the QLC test within Sun StorEdge StorTools 4.x increments the following counters:

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

To view any counter, use the Sun StorEdge Network FC Switch 2.0 GUI (see FIGURE 17 on the following page.) You can view the counters non-disruptively.

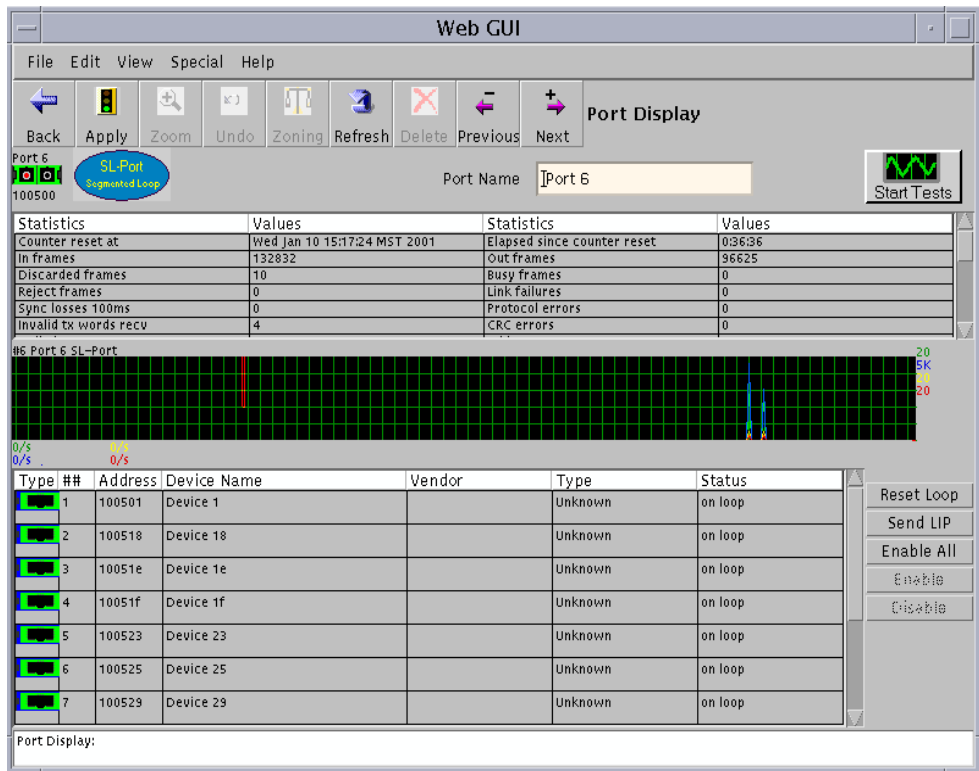


FIGURE 17 Port Display

TABLE 4 on the following page describes the counters from the Port Display window.

Counter Descriptions

TABLE 4 Port Display Window Counters

| Counter Name (in port display) | Description |
|-----------------------------------|---|
| Address ID errors | Number of address identifiers (S_ID, D_ID) found to be in error. |
| AL Init Attempts | Number of times the port entered the initialization state. |
| AL Init Errors | Number of times the port entered initialization and the initialization failed. |
| Busy frames | Number class 2 and class 3 fabric busy (F_BSY) frames generated by this port in response to incoming frames. This usually indicates a busy condition on the fabric or N_port that is preventing delivery of this frame. |
| Counter reset at | Show the time and date of the last time the switch was reset. |
| CRC errors | Number of invalid Cyclic Redundancy Check (CRC) frames detected. |
| Delimiter errors | Number of delimiter errors detected. Delimiters, such as SOFc3 (star of frame, class 3), EOFn (end of frame), or others are improper or invalid. |
| Discarded frames | Number of class 2 and class 3 sequences that were discarded by this port. A sequence can be discarded because of detection of a missing frame (based on SEQ_CNT), detection of and E_D_TOV timeout, receiving a reject frame, receiving frames for a stopped sequence, or other causes. |
| Elapsed since counter reset | Length of time that has elapsed since the last switch reset was performed. |
| In frames | Number of class 2 and class 3 frames received by this port. |
| Invalid tx words recv | Number of invalid transmission words detected during decoding. Decoding is from the 10-bit characters and special K characters. |
| Laser Faults | Number of times a laser fault was detected. |
| LIP Flow Cntrl Errors | This is a switch internal error condition (for factory use only). |
| Link Failures | Number of optical link failures detected by this port. A link failure is a loss of synchronization for a period of time greater than the value of R_FT_FTOV or by loss of signal while not in the offline state. A loss of signal causes the switch to attempt to re-establish the link. If the link is not re-established by the time specified by R_T_TOV, a link failure is counted. A link reset is performed after a link failure. |
| Link reset in | Number of link reset primitives received from an attached device. |

TABLE 4 Port Display Window Counters

| Counter Name (in port display) | Description |
|-----------------------------------|---|
| Link reset out | Number of link reset primitives sent from this port to an attached port. |
| LIP AL_PD AL_PS | Number of F7, AL_PS LIPs, or AL_PD (vendor specific) resets performed. |
| LIP during INit | Number of times the switch received a LIP while it was already in the initialization state. |
| LIP F7 AL_PS | This LIP is used to re initialize the loop. An L_port, identified by AL_PS, may have noticed a performance degradation and is trying to restore the loop. |
| LIP F7F7 | A loop initialization primitive frame used to acquire an AL_PA. |
| LIP F8 AL_PS | This LIP denotes a loop failure detected by the L_port identified by AL_PS. |
| LIP F8F7 | Currently not used. |
| LIP Total Received | Number of loop initialization primitive frames received. |
| LISM Failed | The LISM primitive is used to select a temporary loop master for initialization. This counter shows the number of times the switch was unable to establish itself as the loop master. |
| LOF Timeout ELS | Currently undefined. |
| LOF Timeouts | Number of times the switch was unable to transmit a frame within the R_T_TOV value. |
| Long Frame Errors | Number of times a frame longer than the maximum frame size was received. |
| Loss of Signal | Number of signal losses detected for this port. |
| OLS in | Number of offline sequences received. An OLS is issued for link initialization, a Receive & Recognize Not_Operation (NOS) state, or to enter the offline state. |
| OLS out | Number of offline sequences issued by this port. An OLS is issued for link initialization, a Receive & Recognize Not_Operation (NOS) state, or to enter the offline state. The switch may issue an OLS to perform offline diagnostics or to power down. |
| OPN Returns | Number of times a device on the loop didn't accept an open primitive. This usually indicates a device error. |
| Out Frames | Number of class 2 and class 3 frames transmitted by this port. |
| Protocol errors | Number of primitive sequence protocol errors. An error indicates that a sequence protocol violates the FC-2 signaling protocol. |

TABLE 4 Port Display Window Counters

| Counter Name (in port display) | Description |
|---|--|
| Reject Frames | Number of frames, from devices, that have been rejected. Frames can be rejected for any of a large number of reasons. |
| Reserved | N/A |
| Retry LIPs | Currently not used. |
| Short Frame Errors | Number of times a frame shorter than 36 bytes was received. |
| Smoothing Overflow Errors | Number of times that a violation of FC rules on the incoming signal were detected. An example of a violation is an insufficient number of idles received between frames. |
| Sync Loss | Number of synchronization losses detected through reception of invalid transmission words on the port. |
| Sync losses 100 ms | Number of synchronization losses (>100 ms) detected by this port. A loss of synchronization is detected by receipt of an invalid transmission word. |

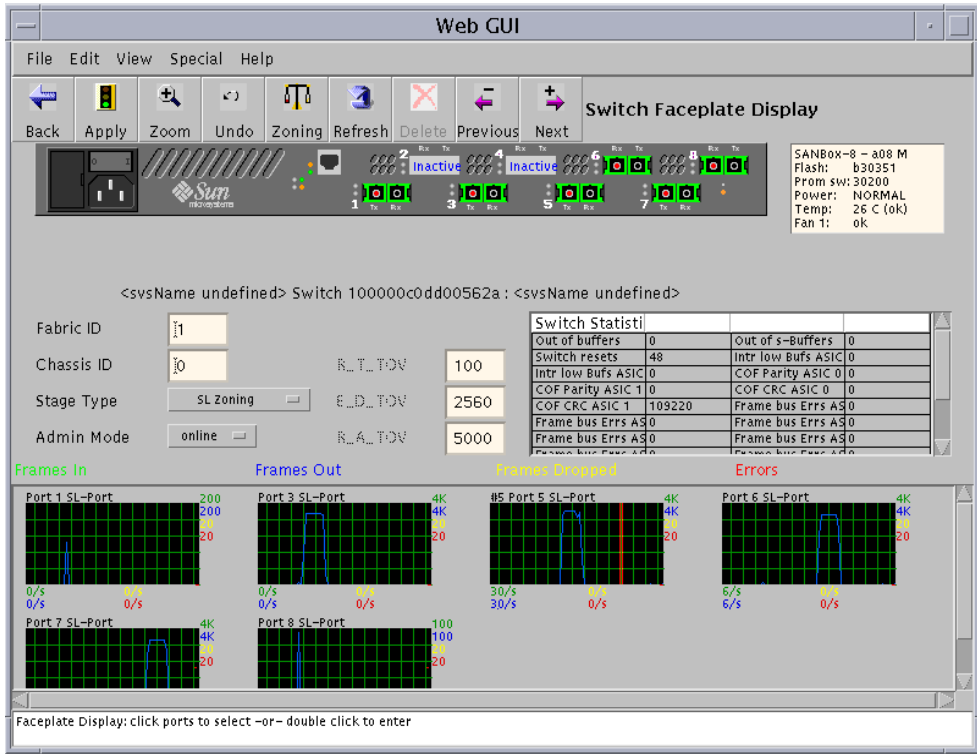


FIGURE 18 Web GUI

TABLE 5 on the following page lists the counter names and briefly describes them.

TABLE 5 Counter Names and Descriptions (Faceplate Window)

| Counter | Description |
|--|---|
| COF CRC ASIC 0 COF CRC ASIC 1 COF CRC ASIC 2* COF CRC ASIC 3* | Internal switch counter that tracks errors during frame outputs from the specified ASIC. A non-zero value may indicate an internal problem with the switch. |
| COF Parity ASIC 0 COF Parity ASIC 1 COF Parity ASIC 2* COF Parity ASIC 3* | Parity error detected during reading of the frame in the CPORT OUt FIF (COF) for the specified ASIC. A non-zero value may indicate an internal problem with the switch. |
| Frame bus Errs ASIC 0 Port 1 Frame bus Errs ASIC 0 Port 2 Frame bus Errs ASIC 0 Port 3 Frame bus Errs ASIC 0 Port 4 Frame bus Errs ASIC 1 Port 1 Frame bus Errs ASIC 1 Port 2 Frame bus Errs ASIC 1 Port 3 Frame bus Errs ASIC 1 Port 4 Frame bus Errs ASIC 2 Port 1 Frame bus Errs ASIC 2 Port 2 Frame bus Errs ASIC 2 Port 3 Frame bus Errs ASIC 2 Port 4 Frame bus Errs ASIC 3 Port 1 Frame bus Errs ASIC 3 Port 2 Frame bus Errs ASIC 3 Port 3 Frame bus Errs ASIC 3 Port 4 | Errors detected in the data being sent over the frame bus between ASICs. A non-zero value may indicate an internal problem with the switch. |
| Internal Parity ASIC 0 Port 1 Internal Parity ASIC 0 Port 2 Internal Parity ASIC 0 Port 3 Internal Parity ASIC 0 Port 4 Internal Parity ASIC 1 Port 1 Internal Parity ASIC 1 Port 2 Internal Parity ASIC 1 Port 3 Internal Parity ASIC 1 Port 4 Internal Parity ASIC 2 Port 1* Internal Parity ASIC 2 Port 2* Internal Parity ASIC 2 Port 3* Internal Parity ASIC 2 Port 4* Internal Parity ASIC 3 Port 1* Internal Parity ASIC 3 Port 2* Internal Parity ASIC 3 Port 3* Internal Parity ASIC 3 Port 4* | Parity error detected with data transfer internal to the switch. A non-zero value may indicate an internal problem with the switch. |

TABLE 5 Counter Names and Descriptions (Faceplate Window)

| Counter | Description |
|--|---|
| Intr low Bus ASIC 0 Intr low Bus ASIC 1 Intr low Bus ASIC 2* Intr low Bus ASIC 3* | Number of times a low buffer condition has occurred on the specific ASIC. |
| Out of buffers | Number of large frames that have been sent by this switch. |
| Out of s-buffers | Number of small frames that have been sent by this switch. |
| Switch resets | Number of times the switch has been reset since it was manufactured. |

* Available only for switches with more than 8 ports.

Diagnostic Information and Isolation



Caution – When running in online mode, deselect system board and HBA tests.

Sun StorEdge StorTools 4.x qlctest

You can run the Sun StorEdge StorTools 4.x PCI FC-100 Board Test (`qlctest`) or SunVTS 4.1 `qlctest` to test the following portion of the SAN configuration:

- HBA to switch and return path

FRUs tested: HBA, cable between HBA and switch, and Switch GBIC



Caution – Use the Sun StorEdge StorTools 4.x `qlctest` for offline testing only.

- Do not run customer applications while running `qlctest`, as the `qlctest` will take priority over customer data requests. The customer will be unable to access data while `qlctest` is running.
- Do not run other tests while `qlctest` is running. `qlctest` might cause other tests to fail.
- `qlctest` is an intervention mode test. No subtests can be selected unless intervention is set.

For more information about Sun StorEdge StorTools 4.x `qlctest`, refer to the *Sun StorEdge StorTools User's Guide, Version 4.x, part number 806-6235-10*.

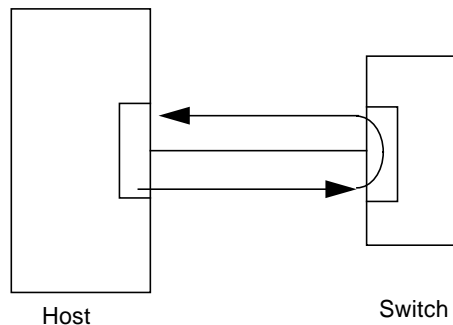


FIGURE 19 Sun StorEdge StorTools 4.x `qlctest`

Sun StorEdge StorTools 4.x `switchtest`

You can run Sun StorEdge StorTools 4.x (`switchtest`) or SANSurfer GUI Start Test to test the following portion of the SAN configuration. Both tests can be run online.

- Switch to HBA and return path when running on a selected port. See #1 in FIGURE 20.
- Switch to array and return path when running on a selected port. See #2 in FIGURE 20.

FRUs Tested:

- Cable between HBA and Switch
- Cable between Switch and array
- GBICs in switch
- GBICs in array

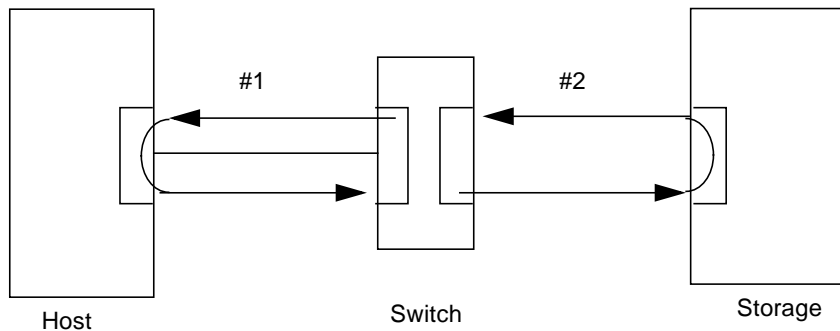


FIGURE 20 Sun StorEdge StorTools 4.x Switch Test or SANSurfer GUI Start Test

Sun StorEdge StorTools 4.x Array Tests (`t3test` , `a5ktest` , `a3500fctest`)

You can run Sun StorEdge StorTools 4.x Array Tests (`t3test` , `a5ktest` , `a3500fctest`) to test the following portion of the Sun StorEdge Network FC Switch-8 and Switch-16 configuration:

- Entire path
This is online testing but may affect performance.

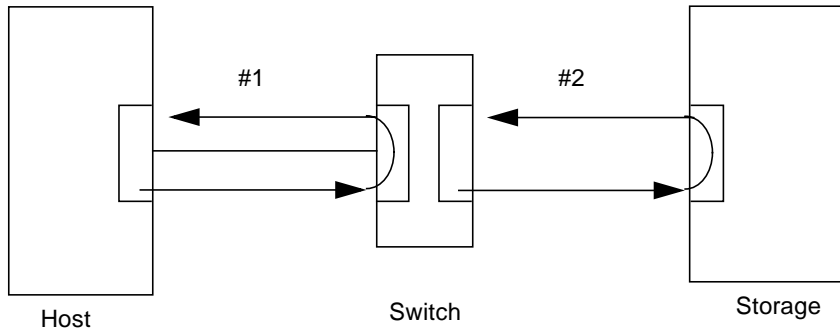


FIGURE 21 Sun StorEdge StorTools 4.x Array Tests

If you cannot determine the problem path or component from the failure data you gathered or from the tests, proceed with the following isolation.

- To isolate further in offline testing, run Sun StorEdge StorTools 4.x Functional Tests on one or more components in the path.



Caution – When running in online mode, deselect system board and HBA tests.

Diagnostic Isolation

Use the following diagram and accompanying information to help you with the isolation process. See Appendix B, “Isolation of SAN Components.” This appendix contains a generic flowchart, which describes how to isolate Mamba phase faults.



Caution – Be sure only the path under test is selected.

For more information about Sun StorEdge StorTools 4.x, refer to the *Sun StorEdge StorTools User's Guide, Version 4.x, part number 806-6235-10*.

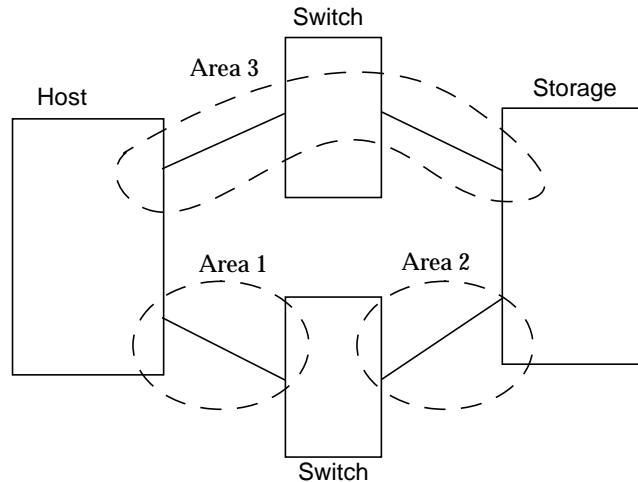


FIGURE 22 Isolation in Areas 1, 2, and 3

Area 1

If failure data indicate a problem in Area 1, execute Sun StorEdge StorTools 4.x and one of the following tests:

- `switchtest` for initiator port (online)
- Appropriate HBA test
 - `qlctest` (offline)
 - `soctest` (offline)

These tests may indicate a failure and isolate to multiple FRUs (HBA, cable, switch GBIC or switch).

For possible isolation to a single FRU, you can run CLI `stexpert` (offline).

Area 2

If failure data indicate a problem in Area 2, execute Sun StorEdge StorTools 4.x and one of the following tests.

- `switchtest` for destination port (online)
- `stexpert` (offline) for possible isolation to a single FRU

These tests may indicate a failure and isolate to multiple FRUs (cable, switch GBIC, or array).

Area 3

If failure data indicate a problem in Area 2 or Area 3, execute Sun StorEdge StorTools 4.x and one of the following tests:

- `a5ksestest` and/or `a5ktest` for A5k (both tests can be online)
- `t3test` for T3 (online)
- `a3500fctest` for A3500FC (online)

These tests apply to the storage and the entire path.

For possible isolation to a single FRU, you can run `stexpert` (offline).

Examples of Fault Isolation

This section contains examples of failures and subsequent isolation techniques. In general, the following items must be kept in mind before starting.

- A Snapshot Create must be taken after the installation is complete. Then a Snapshot Diff can be taken as part of the isolation process.
- Sun StorEdge StorTools 4.x must be kept up and running to maintain the path state. If a path fails it is not detected if Sun StorEdge StorTools 4.x is stopped. Then the path cannot be tested until it has been fixed. Other tools are then required for isolation (`/var/adm/messages`, Switch GUI, etc.).
- StorEdge Expert incurs long running times: up to twenty minutes per test and as long as sixty minutes overall.
- StorEdge Expert Tests are offline tests.

Options examples follow.

Scenario 1a—Bad Cable Between Host and Switch (Using StorEdge Expert)

In this example, the loss of two full A5200 arrays was seen in format and `/var/adm/messages`. This can also be verified by doing a Snapshot diff in Sun StorEdge StorTools 4.x and by using the SANSurfer GUI.

Note – Some output is abbreviated.

A functional test (`a5ktest`) was initially run on one of the A5200s to test the loop. The StorEdge Expert was then used to isolate down to the `IPOINT_FIBER` FRU. Replacing the `IPOINT_FIBER` fixed the condition.

Functional a5ktest from Sun StorEdge StorTools 4.x GUI

```
02/08/01 15:54:12 diag233.Central.Sun.COM Sun VTS4.1: VTSID 1 a5ktest. VERBOSE
:"Options:
selftest=Enable,wrdevbuf=Enable,wrdevbufpasses=100,wrdevbufptn=0x7e7e73,allwrdevbufptn=Enable,partition=0,rawsub=Enable,method=SyncIO+AsyncIO,rawcover=1,rawiosize=32KB,fssub=Disable,fssize=512KB,fsiosize=512B,fspattern=sequential,dev=c2t32d0-f0)"
02/08/01 15:54:12 diag233.Central.Sun.COM Sun VTS4.1: VTSID 8014 a5ktest. FATAL
c2t32d0: "Couldn't open /dev/rdisk/c2t32d0s0: No such device or address"
Probable_Causes(s):
(1) Cable loose or disconnected
(2) Device off-line or missing
(3) Device not configured
(4) Device bypassed
Recommended_Actions(s):
(1) Check cable
(2) Check device on-line
(3) Configure device
(4) Check A5k panel to see if drive is bypassed
```

Run StorEdge Expert on One Drive in Path

```
02/08/01 15:54:12 diag233.Central.Sun.COM Sun VTS4.1: VTSID 2100
a5ktest.expert.INFO c2t32d0: "Expert Started."
02/08/01 15:54:12 diag233.Central.Sun.COM Sun VTS4.1: VTSID 6100
a5ktest.expert.
ERROR c2t32d0: "Expert error(s):reference Expert Log

<<Feb082001_15:58:23>> STARTED:diagnosis expert session on /dev/rdisk/c2t32d0s2
<<Feb082001_15:58:23>> FAILED: for details see:
/var/opt/SUNWvts/gogs/Feb082001_15:58:23_c2t32d0-f0.errlog
<<Feb082001_15:58:23>> NOTICE: todo manual Fault Isolation, type in
'/opt/SUNWvts/bin/sparcv9/stexpert -i -t /dev/rdisk/c2t32d0s2'

<<Feb082001_16:20:04>> FAILED: for details see:
/var/opt/SUNWvts/logs/Feb082001_16:20:04_fc-8p-sw1-ip5[q1c-0].errlog
<<Feb082001_16:20:04>> NOTICE: IPORT_GBIC is a suspect component
<<Feb082001_16:20:04>> NOTICE: IPORT_FIBER is a suspect component
<<Feb082001_16:20:04>> NOTICE: HBA is a suspect component
<<Feb082001_16:20:04>> NOTICE: SWITCH is a suspect component
<<Feb082001_16:20:04>> COMPLETED:diagnosis expert session on /dev/rdisk/c2t32d0s2
```

From the Command Line

```
/opt/SUNWvts/bin/sparv9/stexpert -i -t /dev/rdisk/c2t32d)s2
stexpert: Diagnosis Begins
<snip>
stexpert: Component replaced or Intermittent condition might exist
stexpert: Type ok to restart testing or exit to quit: quit
<<Feb082001_17:40:13>> NOTICE:IPORT_FIBER is a suspect component
<<Feb082001_17:40:13>> COMPLETED:diagnosis expert session on /dev/rdisk/c2t32d0s2
stexpert: Diagnosis Complete
```

Scenario 2—Bad GBIC in Switch

In this example, the loss of a single A5200 loop was noted in format and /var/adm/messages. Sun StorEdge StorTools 4.x Functional tests were used to verify the loop quickly. The Sun StorEdge StorTools 4.x StorEdge Expert tests were used to isolate down to a single failed GBIC on the switch. Replacing the GBIC fixed the error condition.

/var/adm/messages

```
@0,0/ssd@w210000203719f810,0 (ssd107) offline
Feb 8 14:55:56 diag233.Central.Sun.COM genunix: [ID 408114 kern.info]
/pci@1f,4000/pci@4/SUNW,qlc@4/fp
@0,0/ssd@w21000002037450d71,0 (ssd120) offline
<snip>
Feb 8 14:55:56 diag233.Central.Sun.COM genunix: [ID 408114 kern.info]
/pci@1f,4000/pci@4/SUNW,qlc@4/fp
@0,0/ssd@w210000020373ccelc,0 (ssd109) offline
```

Run a5ktest from GUI

```
02/08/01 14:58:53 diag233.Central.Sun.COM Sun VTS4.1: VTSID 1 a5ktest. VERBOSE
: "Options:
selftest=Enable,wrdevbuf=Enable,wrdevbufpasses=100,wrdevbufptn=0x7e7e7e73,allwrdevbufptn=Enable,partition=0,rawsub=Enable,method=SyncIO+AsyncIO,rawcover=1,rawiosize=32KB,fssub=Disable,fssize=512KB,fsiosize=512B,fspattern=sequential,dev=c2t32d0-f0)
02/08/01 14:58:53 diag233.Central.Sun.COM Sun VTS4.1: VTSID 8014 a5ktest. FATAL
c2t0d0: "Couldn't open /dev/rdisk/c2t0d0s0: No such device or address"
Probable_Causes(s):
(1) Cable loose or disconnected
(2) Device off-line or missing
(3) Device not configured
(4) Device bypassed
Recommended_Actions(s):
(1) Check cable
(2) Check device on-line
(3) Configure device
(4) Check A5k panel to see if drive is bypassed
```

Run GUI StorEdge Expert on Same Disk

```
02/08/01 15:01:55 diag233.Central.Sun.COM Sun VTS4.1: VTSID 2100
a5ktest.expert.INFO c2t0d0: "Expert Started."
02/08/01 15:01:56 diag233.Central.Sun.COM Sun VTS4.1: VTSID 6100
a5ktest.expert.
ERROR c2t02d0: "Expert error(s):reference Expert Log

<<Feb082001_15:01:55>> STARTED:diagnosis expert session on /dev/rdisk/c2t32d0s2
<<Feb082001_15:01:56>> FAILED: for details see:
/var/opt/SUNWvts/gogs/Feb082001_15:01:56_c2t0d0-f0.errlog
<<Feb082001_15:01:56>> NOTICE: to do manual Fault Isolation, type in
'/opt/SUNWvts/bin/sparcv9/stexpert -i -t /dev/rdisk/c2t0d0s2'

<<Feb082001_15:01:56>> FAILED: for details see:
/var/opt/SUNWvts/logs/Feb082001_15:01:56_fc-8p-sw1-dp8[q1c-0].errlog
<<Feb082001_15:01:57>> NOTICE: DISK is a suspect component
<<Feb082001_15:01:57>> NOTICE: DPORT_GBIC is a suspect component
<<Feb082001_15:01:57>> NOTICE: IPORT_FIBER is a suspect component
<Feb082001_15:01:57>> NOTICE: DEV_GBIC is a suspect component
<Feb082001_15:01:57>> NOTICE: SWITCH is a suspect component
<Feb082001_15:01:57>> COMPLETED:diagnosis expert session on /dev/rdisk/c2t0d0s2
```

Run StorEdge Expert from Command Line

```
/opt/SUNWvts/bin/sparv9/stexpert -i -t /dev/rdisk/c2t0d)s2
stexpert: Diagnosis Begins
<snip>
stexpert: Remove fiber cable from DPORT GBIC in port 8
stexpert: Type ok to restart testing or exit to quit: ok
Waiting 20 seconds for loopback to initialize
<<Feb082001_15:05:19>> STARTED: fc-8p-sw1-dp8[qlc-01]
<<Feb082001_15:05:19>> NOTICE: Executing switch_dport [64 bit version]
<<Feb082001_15:05:19>> COMPLETED:fc-8p-sw1-dp8[qlc-01]
<<Feb082001_15:05:19>> FAILED: for details see:
/var/opt/SUNWvts/gogs/Feb082001_15:05:19_fc-8p-sw1-dp8[qlc-01].errlog
stexpert: Remove the GBIC in port 8
stexpert: Insert anew GBIC in port 8
stexpert: Type ok to continue or exit to quit: ok
stexpert: Insert a loopback cable in DPORT GBIC in port 8
stexpert: Type ok to continue or exit to quit:ok
Waiting 20 seconds for loopback to initialize.
<<Feb082001_15:07:18>> STARTED: fc-8p-sw1-dp8[qlc-01]
<<Feb082001_15:07:18>> NOTICE: Executing switch_dport [64 bit version]
stexpert: Remove loopback cable connected to DPORT GBIC in port 8
stexpert: Type ok to continue or exit to quit: ok
stexpert: Install original DPORT fiber cable into DPORT GBIC port 8
stexpert: Type ok to continue or exit to quit: ok
stexpert: Component replaced or Intermittent condition might exist

GBIC WAS REPLACED!

stexpert: Type ok to restart testing or exit to quit:ok
<<Feb082001_15:31:40>> STARTED: c2t0d0-f0
<<Feb082001_15:31:40>> NOTICE: Executing SCSIBIT stress_test

ONLY IF YOU WANT TO STRESS TEST!

<<Feb082001_15:33:21>> NOTICE:Completed SCSIBIT stress_test
<<Feb082001_15:33:21>> NOTICE:Executing DEX stress_test
<<Feb082001_15:36:34>> NOTICE:Completed DEX stress_test
<<Feb082001_15:36:34>> STARTED: fc-8p-sw1-dp8[qlc-01]
<<Feb082001_15:36:34>> NOTICE: Executing switch_dport [64 bit version]
```

The disks have reappeared in format.

Scenario 1b—Bad Cable Between Host and Switch (Using Functional Test)

In this example, the loss of all storage connected to a switch was noted in `/var/adm/messages` and `format` (all disks labeled `c2*` were missing). A Snapshot diff was run to determine the extent of the problem. Functional tests were used to isolate individual subsection of the SAN to identify likely failed FRUs.

```
#format
Searching for disks. . .done

AVAILABLE DISK SELECTIONS:
 0. c0t0d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
    /pci@1f,4000/scsi@3/sd@0,0
 1. c0t8d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
    /pci@1f,4000/scsi@3/sd@8,0
 2. c2t1d0 <drive type unknown>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f810,0
 3. c2t2d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f803,0
 4. c2t3d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f7d0,0
 5. c2t4d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f6f4,0
 6. c2t5d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719eb58,0
 7. c2t6d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f7b0,0
 8. c2t8d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203745060f,0
 9. c2t9d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203745d60b,0
10. c2t16d0 <drive not available:formatting>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w21000020373ccelc,0
- hit space for more or s to select -
```

Snapshot Diff Results

```
Timestamp: Fri Feb 9 13:04:48 2001

Detected missing Host Bus Adapter Card.
```

Either the card was removed or we can no longer see storage attached to this card.

```
Registername = qlc-0
LGroup      = StorEdge-QLC-HostBusadapters
Pgroup      = /StorEdge
Node WWN    = 200000e08b026c2a
Port WWN    = 20000e08b026c2a
DriverName  = fp

Detected missing device:
Switch
Switch ip address = 172.20.67.194
Switch port number = 5
Register Name      = fc-8p-sw1-ip5(qlc-0)
Logical Group      = StorEdge-8p-Switches(qlc-0)
Physical Group     = /StorEdge/qlc-0
Node WWN           = 200000e08b026c2a
Port WWN           = 210000e08b026c2a

Detected missing device:
Switch
Switch ip address = 172.20.67.194
Switch port number = 7
Register Name      = fc-8p-sw1-ip7(qlc-0)
Logical Group      = StorEdge-8p-Switches(qlc-0)
Physical Group     = /StorEdge/qlc-0
Node WWN           = 200000e08b026c2a
Port WWN           = 210000e08b026c2a

Detected missing device:
Switch
Switch ip address = 172.20.67.194
Switch port number = 8
Register Name      = fc-8p-sw1-ip5(qlc-0)
Logical Group      = StorEdge-8p-Switches(qlc-0)
Physical Group     = /StorEdge/qlc-0
Node WWN           = 200000e08b026c2a
Port WWN           = 210000e08b026c2a

Detected missing device:
A5x000 Enclosure
Box Name          =
LogicalPath       = /dev/es/ses9
PhysPath         =
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ses@w5080020000083cb1,0:0
Register Name     = a5k-ses9
Logical Group     = StorEdge-A5200-(qlc-0)
Physical Group    = /StorEdge/qlc-0/fc-8p-sw1-ip5(qlc-0)/fc-8p-sw1-dp8(qlc-0)/(qlc-0)
NodeWWN           = 5080020000083cb0
PortWWN           = 5080020000083cb1

...

(continued next page)
```



```
...
Detected Missing device:
A5x00 Drive
Box Name =
Logical Path = /dev/rdisk/c2t0d0s2
PhysPath =
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f7e0,0:c,raw
Register Name =c2r0d0-f0
Logical Group =StorEdge-A5200-(qlc-0)
Physical Group =/StorEdge/qlc-0/fc-8p-sw1-ip5(qlc-0)/fc-8p-sw1-dp8(qlc-0)/qlc-0)
NodeWWN =200000203719f7e0
PortWWN =210000203719f7e0
<snip>
```

A Quick Functional Test (a5ksestest) to Test Full Loop

```
02/09/01 13:05:46 diag233,Central.Sun.COM SunVTS4.1:VTSID 1012
a5ksestest,process_photest_argsVERBOSE SES:nws_enatest: called with options:
disk_access=enable,delay=30,dev=a5k-ses11"
02/09/01 13:05:46 diag233,Central.Sun.COM SunVTS4.1:VTSID 0
a5ksestest.VERBOSE: "Started."
02/09/01 13:05:46 diag233,Central.Sun.COM SunVTS4.1:VTSID 1000
a5ksestest.VERBOSE: "Started test on /dev/es/ses11"
02/09/01 13:05:46 diag233,Central.Sun.COM SunVTS4.1:VTSID 8005a5ksestest.
FATAL:"Could not communicate with the enclosure"
Probable_Cause(s):
(1) Faulty connection
Recommended_Action(s):
(1) Ensure the cables are properly connected
(2) Check GBICs if GBICs are present
(3) Run SunVTS host bus adapter tests
(4) Please contact your service representative
```

To further isolate, two passes of the switch test were run: one pass on the port connected to the storage, fc-80-sw1-dp7(qlc-0), which isolates the switch-to-storage path, and one pass on the port connected to the host, fc-80-sw1-ip5(qlc-0), to isolate the host-switch path.

```
02/09/01 13:08:59 diag233,Central.Sun.COM SunVTS4.1:VTSID 0
switchtest.VERBOSE switch0: "Started."
02/09/01 13:08:59 diag233,Central.Sun.COM SunVTS4.1:VTSID 7
switchtest.mmain.VERBOSE switch0: "Testing device fc-80-sw1-dp7(qlc-0)."
<snip>
02/09/01 13:09:49 diag233,Central.Sun.COM SunVTS4.1:VTSID 6033 switchtest.
FATAL switch0: "Switch not Connected on Port: 5 Pattern: 0x7e7e7e7e."
Probable_Cause(s):
(1) Fibre Channel cable disconnected
(2) Bad GBIC or bad Fibre Channel cable
(3) Loss of power to switch
```

The switch-storage link passed, but the host-switch link failed. This indicates that the failure is limited to the host-switch connection. The next step is to isolate the FRUs in this path. A loopback connector is placed in the switch's GBIC on port 5, fc-8p-sw1-ip5(qlc-0) and switchtest on that port is rerun.

```
02/09/01 13:08:59 diag233,Central.Sun.COM SunVTS4.1:VTSID 6
switchtest.process_args.VERBOSE switch0: "switchtest: called with options:
xfer=2000,passes=100000,pattern=0x7e7e7e7e,allpatterns=Disable,wait=2,dev=fc-8p-sw1-
ip5(qlc-0)"
<snip>
02/09/01 13:17:58 diag233,Central.Sun.COM SunVTS4.1:VTSID 0 switchtest.VERBOSE
switch0: "Stopped successfully."
```

This test passing tells us that the GBIC in the switch is functioning.

A `qlctest` on the HBA in the path (`qlc-0` in this example) can then be run to verify the HBA. (For this test, all Test Parameter Options for `qlctest` were disabled, except Online SelfTest and Firmware Checksum Test in the interest of test execution time. Further testing could be done, but the execution time would increase.)

```
02/09/01 13:38:59 diag233,Central.Sun.COM SunVTS4.1:VTSID
6qlctest.process_qlctest_args.VERBOSE qlc: "qlctest: called with options:
run_connect=No,selftest=Enable,mbox=Disable,checksum=Enable,ilb_10=Disable,ilb=
Disable,elb=Disable,xcnt=)x2000,icnt=1,lbfpattern=0x7e7e7e7e,run_all=Disable,dev=
qlc-0"
<snip>
02/09/01 13:39:57 diag233,Central.Sun.COM SunVTS4.1:VTSID 0 qlctest.VERBOSE
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0:devctl: "Stopped successfully."
```

HBA can most likely be ruled out as the faulty component. All that is left is the host-to-switch cable. In this example, the cable was replaced. Watching the `/var/adm/messages` revealed that the disks were rediscovered. A format check revealed that the `c2*` disks were back.

```
Searching for disks...done

AVAILABLE DISK SELECTIONS
 0. c0t0d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
    /pci@1f,4000/scsi@3/sd@0,0
 1. c0t8d0 <SUN18G cyl 7506 alt 2 hd 19 sec 248>
    /pci@1f,4000/scsi@3/sd@8,0
 2. c2t0d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f7e0,0
 3. c2t1d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f810,0
 4. c2t2d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f803,0
 5. c2t3d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f7d0,0
 6. c2t5d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f6f4,0
 7. c2t6d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719eb58,0
 8. c2t8d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f7b0,0
 9. c2t9d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203719f802,0
10. c2t16d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
    /pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203745060f,0
11. c2t9d0 <SUN9.0G cyl 4924 alt 2 hd 27 sec 133>
```

Another a5ksestest to Verify the Full Path—Successful

```
02/09/01 13:44:16 diag233.Central.Sun.COM SunVTS4.1: VTSID 1012
a5ksestest.process_photest_argsVERBOSE SES: "nws_enatest: called with options:
disk_access=enable,delay=30,dev=a5k-ses11"
02/09/01 13:44:16 diag233.Central.Sun.COM SunVTS4.1: VTSID 0
a5ksestest.VERBOSE: "Started."
<snip>
02/09/01 13:44:59 diag233.Central.sun.COM SunVTS: VTSID0 a5ksestest.VERBOSE:
"Stopped successfully."
```

Scenario 3—Catastrophic Switch Failure

In this example, an entire switch has gone offline. Even though this example shows Sun StorEdge StorTools 4.x being used to identify the failure, other methods, such as visual inspection of the switch and checking the switch GUI, would lead to the same conclusion. The scenario was first seen when all storage connected to this switch disappeared from format. A Snapshot Diff was first run to verify the extent of the failure.

```
Detected missing device:
Switch
Switch ip address = 172.20.67.194
Switch port number = 1
Register Name          = fc-8p-sw1-ip1(qlc-1)
Logical Group          = StorEdge-8p-Switches(qlc-1)
Physical Group         = /StorEdge/qlc-1
Node WWN               = 200000e08b026c2a
Port WWN               = 210000e08b026c2a

Detected missing device:
Switch
Switch ip address = 172.20.67.194
Switch port number = 3
Register Name          = fc-8p-sw1-dp3(qlc-1)
Logical Group          = StorEdge-8p-Switches(qlc-1)
Physical Group         = /StorEdge/qlc-1/fc-8p-sw1-ip1(qlc-1)
Node WWN               = 200000e08b026c2a
Port WWN               = 210000e08b026c2a

Detected missing device:
A5x000 Enclosure
Box Name              =
LogicalPath           = /dev/es/ses9
PhysPath              =
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ses@w5080020000083cb1,0:0
Register Name         = a5k-ses9
Logical Group         = StorEdge-A5200-(qlc-0)
Physical Group        = /StorEdge/qlc-0/fc-8p-sw1-ip5(qlc-0)/fc-8p-sw1-dp8(qlc-
0)/(qlc-0)
NodeWWN               = 5080020000083cb0
PortWWN               = 5080020000083cb1
```

Functional Test of Switch (switchtest)

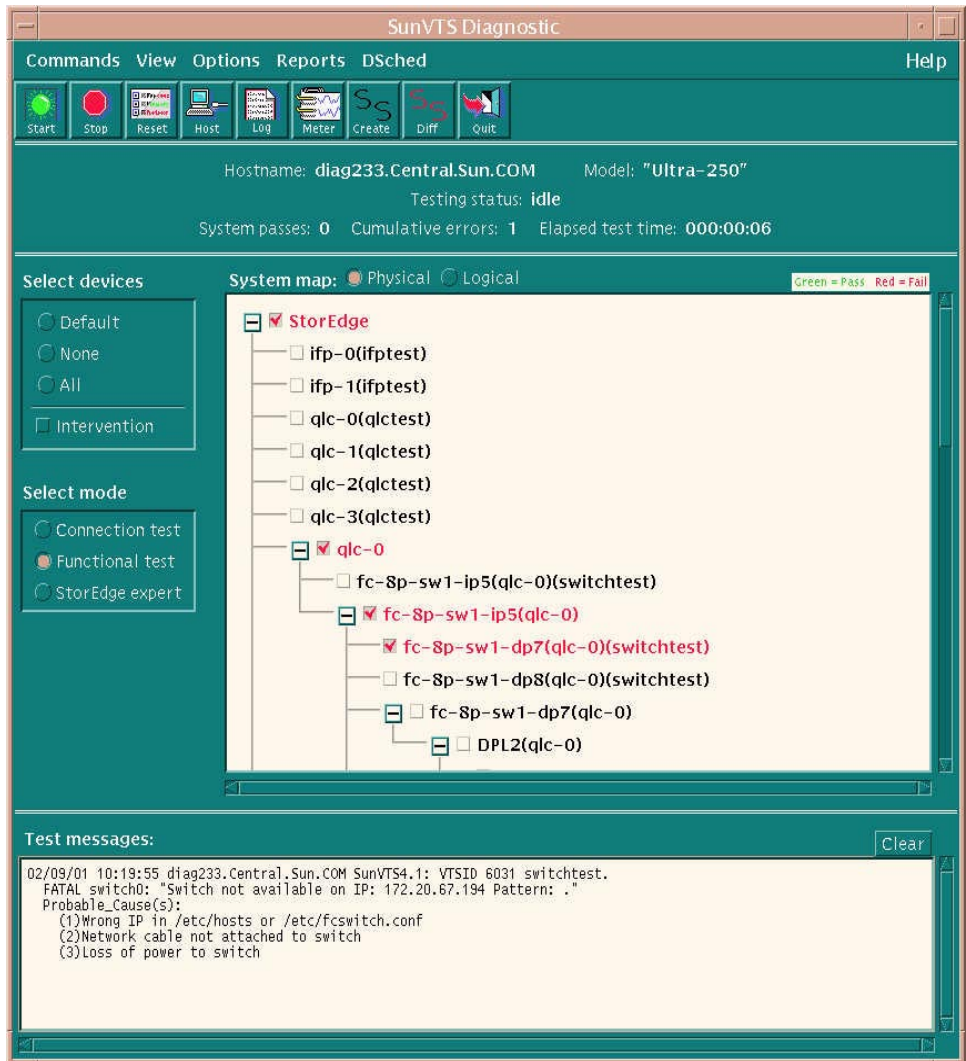


FIGURE 23 Functional Test of Switch window

```
02/09/01 10:19:55 diag233.Central.Sun.COM SunVTS4.1: VTSID 6031 switchtest
FATAL switch0: "Switch not available on IP: 172.20.67.194 Pattern: ."
Probable_Cause(s):
(1)Wrong IP in /etc/hosts or /etc/fcswitch.conf
(2) Network cable not attached to switch
(3) Loss of power to switch
```

Look to Switch GUI

No response from switch GUI, no connection.

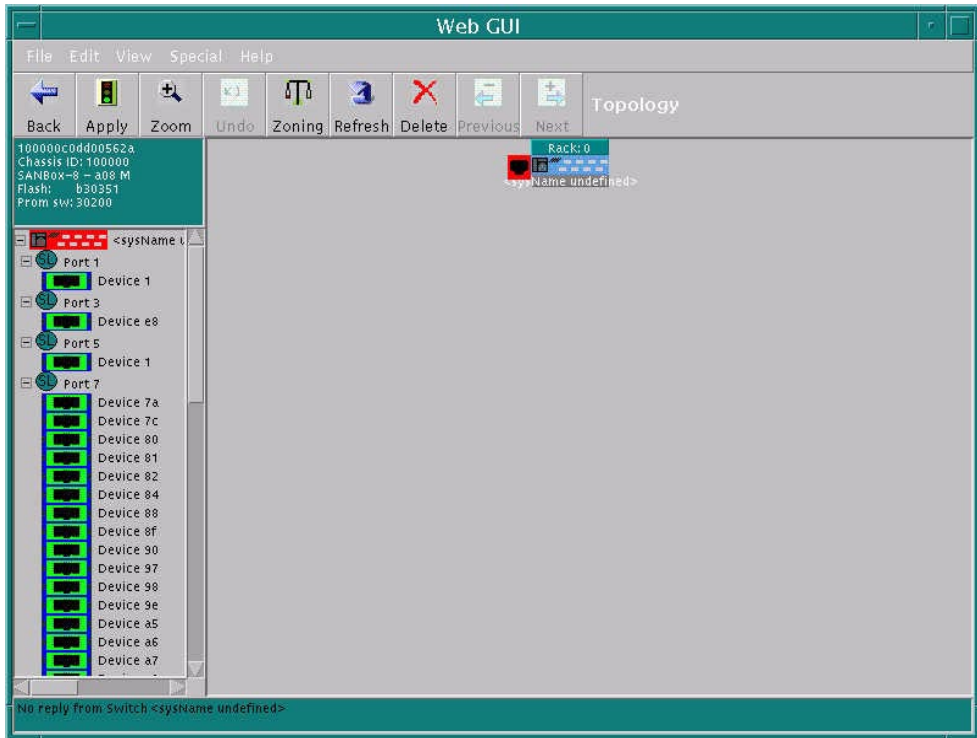


FIGURE 24 Switch GUI window

Check Weblog.gui (/usr/opt/SUNWsmgr/Weblog.gui)

A visual inspection of the switch revealed it was inadvertently powered down, so the switch was repowered.

```
02/09/2001 10:23:47 <sysName undefined> timeout - No replay from Switch
02/09/2001 10:23:47 <sysName undefined> timeout - No replay from Switch
02/09/2001 10:23:47 <sysName undefined> timeout - No replay from Switch
02/09/2001 10:23:47 <sysName undefined> timeout - No replay from Switch
02/09/2001 10:23:47 <sysName undefined> timeout - No replay from Switch
02/09/2001 10:23:47 <sysName undefined> timeout - No replay from Switch
02/09/2001 10:23:47 <sysName undefined> timeout - No replay from Switch
```

Scenario 4—Bad Cable from Switch to Storage

In this example, the loss of one path to an A5200 array was noted in format. A Snapshot Diff was run to determine the extent of the failure. Sun StorEdge StorTools 4.x Functional Tests were used to isolate various subsections of the SAN.

Snapshot Diff shows loss of entire Sun StorEdge A5200 enclosure.

```
Detected missing device:
Switch
Switch ip address = 172.20.67.194
Switch port number = 7
Register Name           = fc-8p-sw1-ip7(qlc-0)
Logical Group           = StorEdge-8p-Switches(qlc-0)
Physical Group          = /StorEdge/qlc-0
Node WWN                 = 200000e08b026c2a
Port WWN                 = 210000e08b026c2a

Detected Missing device:
A5x00 Enclosure
Box Name                 =DPL2
Logical Path             = /dev/es/ses11
PhysPath                 =
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ses@w508002000007ca19,0:0
Register Name           =a5k-ses11
Logical Group           =StorEdge-A5200-DPL2(qlc-0)
Physical Group          = /StorEdge/qlc-0/fc-8p-sw1-ip5(qlc-0)/fc-8p-sw1-dp7(qlc-0)/DPL2qlc-0)
NodeWWN                 =508002000007ca18
PortWWN                 =508002000007ca19
```

Run Functional Test (a5ksestest) against the Failed Enclosure

```
02/09/01 09:28:18 diag 233.Central.Sun.COM SunVTS4.1: VTSID 1012
a5ksestest.process_photest_args. VERBOSE SES: "nws_enatest: called with options:
disk_access=enable,delay=30,dev=a5k-ses11"
02/09/01 01:28:18 diag 233.Central.Sun.COM SunVTS4.1: VTSID 0
a5ksestest.VERBOSE: "Started."
02/09/01 01:28:18 diag 233.Central.Sun.COM SunVTS4.1: VTSID 1000
a5ksestest.VERBOSE: "Started test on /dev/es/ses11"
02/09/01 01:28:18 diag 233.Central.Sun.COM SunVTS4.1: VTSID 8005 a5ksestest.
FATAL: "Could not communicate with the enclosure"
Probable_Causes(s):
(1) Faulty connection
Recommended_Action(s)
(1) Ensure the cables are properly connected
(2) Check GBICs if GBICs are present
```

Run Functional Test (switchtest) on the Initiator Port to Test Host-Switch Link

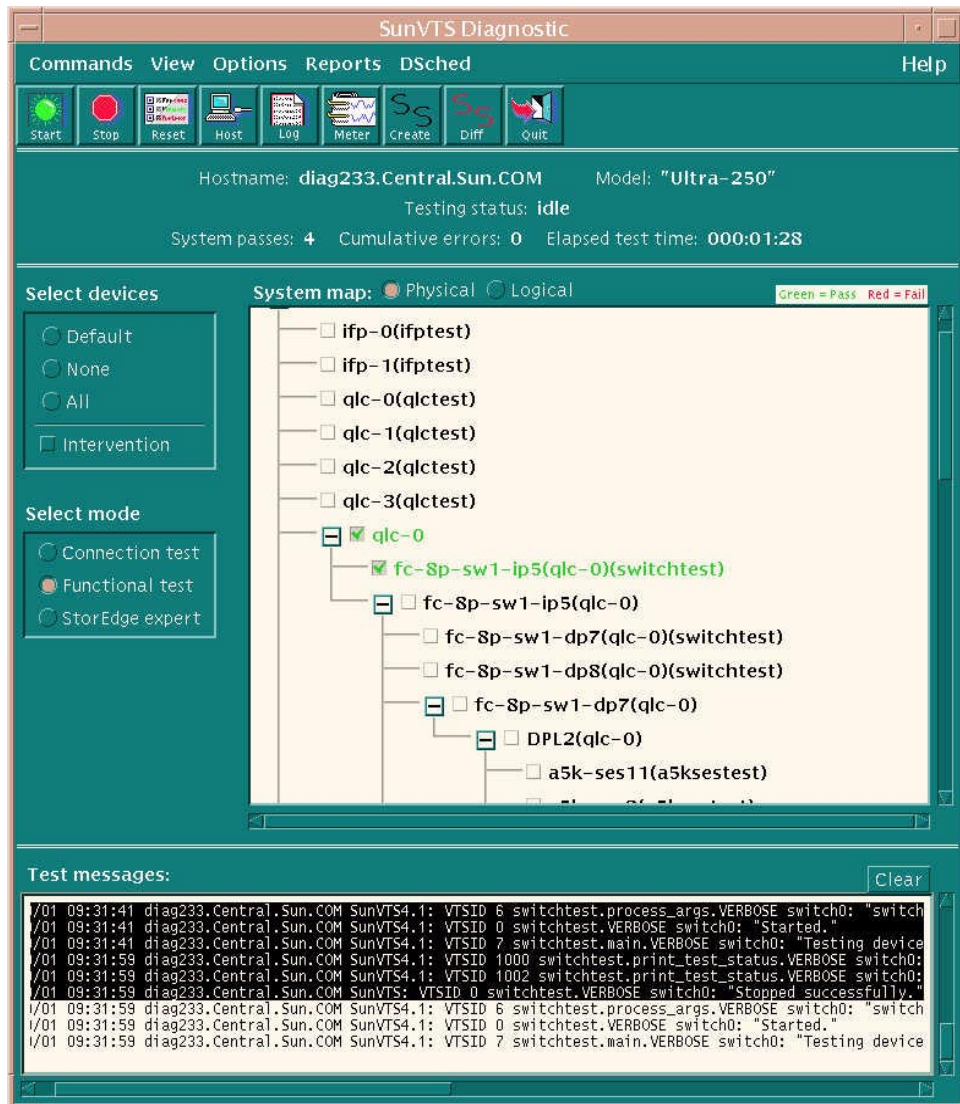


FIGURE 25 Functional Test (switchtest) on Initiator Port to Test Host-Switch Link window


```
02/09/01 09:31:23 diag 233.Central.Sun.COM SunVTS4.1: VTSID 0
switchtest.VERBOSE switch0: "Started."
<snip>
02/09/01 09:31:59 diag 233.Central.Sun.COM SunVTS4.1: VTSID 0
switchtest.VERBOSE switch0: "Stopped successfully."
```

Run Functional Test (switchtest on the Destination Port to Test Switch-Storage Link

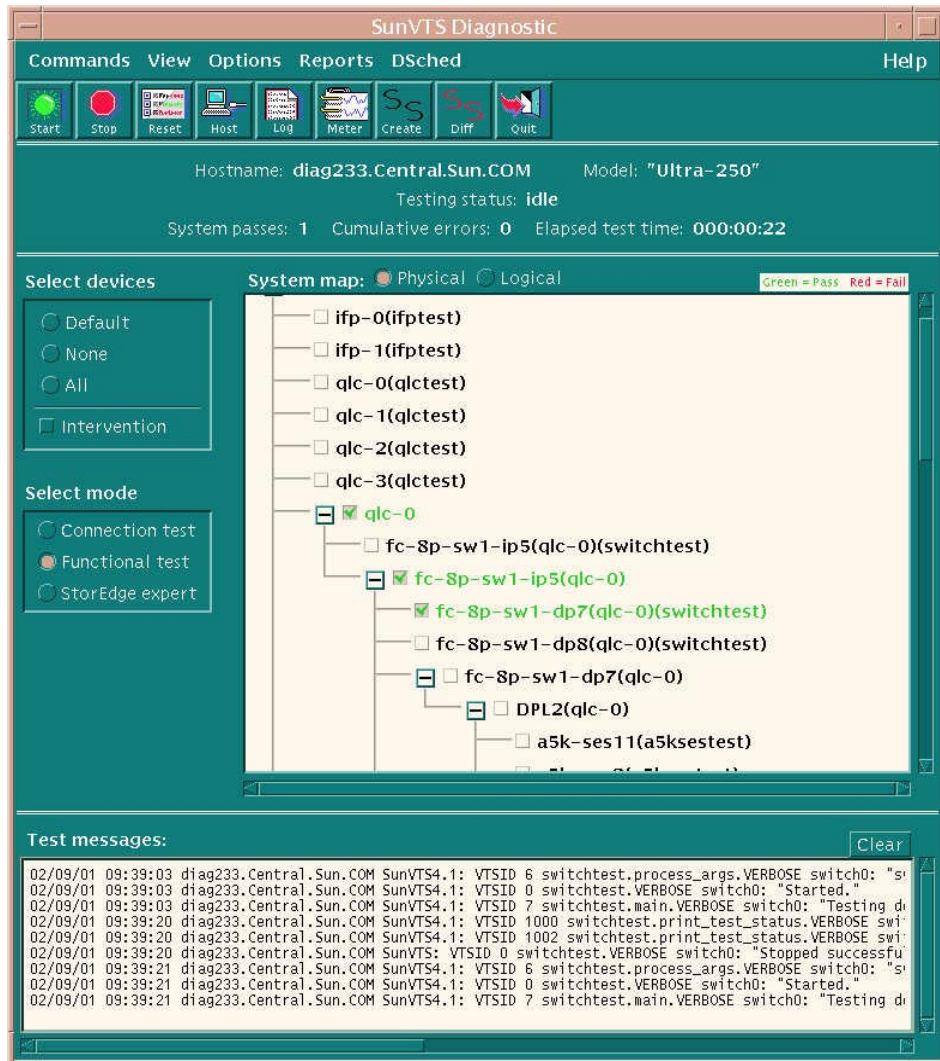


FIGURE 26 Functional Test (switchtest) on Destination Port to Test Switch-Storage Link window

```
02/09/01 09:35:16 diag233.Central.Sun.COM Sun VTS4.1: VTSID 6
switchtest.process_args.VERBOSE switch0: "switchtest: called with options: xfer=
2000,passes=100000,pattern=0x7e7e7e7e,allpatterns=Disable,wait=2,dev=fc-8p-sw1-
dp7(qlc-0)"
02/09/01 09:35:16 diag233.Central.Sun.COM Sun VTS4.1: VTSID 0
switchtest.VERBOSE switch0: "Started."
<snip>
FATAL switch0: "Switch not Connected on Port: 7 Pattern: 0x7e7e7e7e."
Probable_Cause(s):
(1) Fibre Channel cable disconnected
(2) Bad GBIC or bad Fibre Channel cable
(3) Loss of power to switch
```

Insert Loopback in Destination Port to Test Switch's GBIC

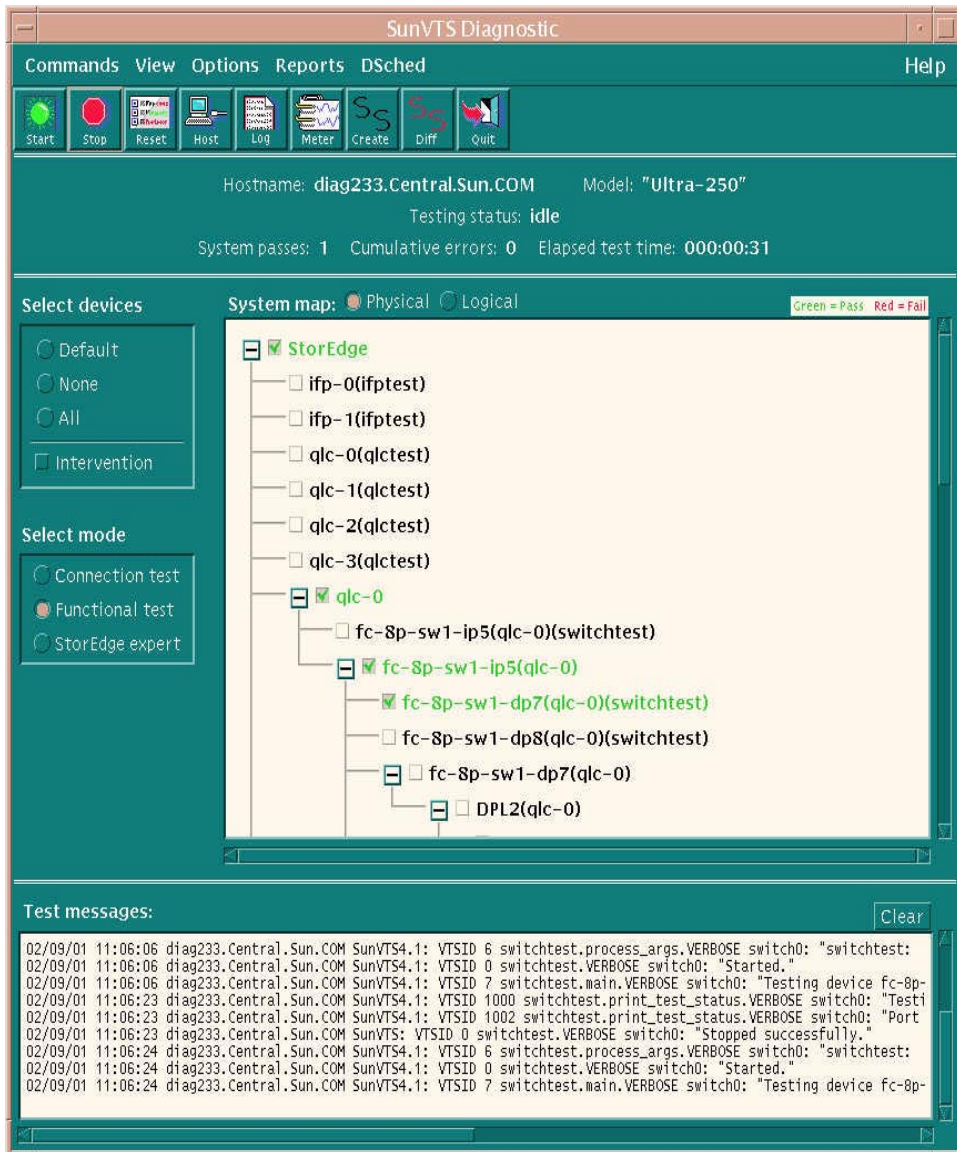


FIGURE 27 Insert Loopback in Destination Port to Test Switch's GBIC window

```
02/09/01 09:39:03 diag233.Central.Sun.COM Sun VTS4.1: VTSID 6
switchtest.process_args.VERBOSE switch0: "switchtest: called with options: xfer=
2000,passes=100000,pattern=0x7e7e7e7e,allpatterns=Disable,wait=2,dev=fc-8p-sw1-
dp7(qlc-0)"
02/09/01 09:39:03 diag233.Central.Sun.COM Sun VTS4.1: VTSID 0
switchtest.VERBOSE switch0: "Started."
<snip>
02/09/01 09:39:03 diag233.Central.Sun.COM Sun VTS4.1: VTSID 0
switchtest.VERBOSE switch0: "Stopped successfully."
```

Problem is isolated to switch-to-storage cable or GBIC/connector on storage side. If the switch has empty ports, the storage-side GBIC could be temporarily placed in switch for loopback testing. This would help to eliminate needless swapping of parts.

In this instance, the cable was bad, and the replaced cable reran a5ksestest.

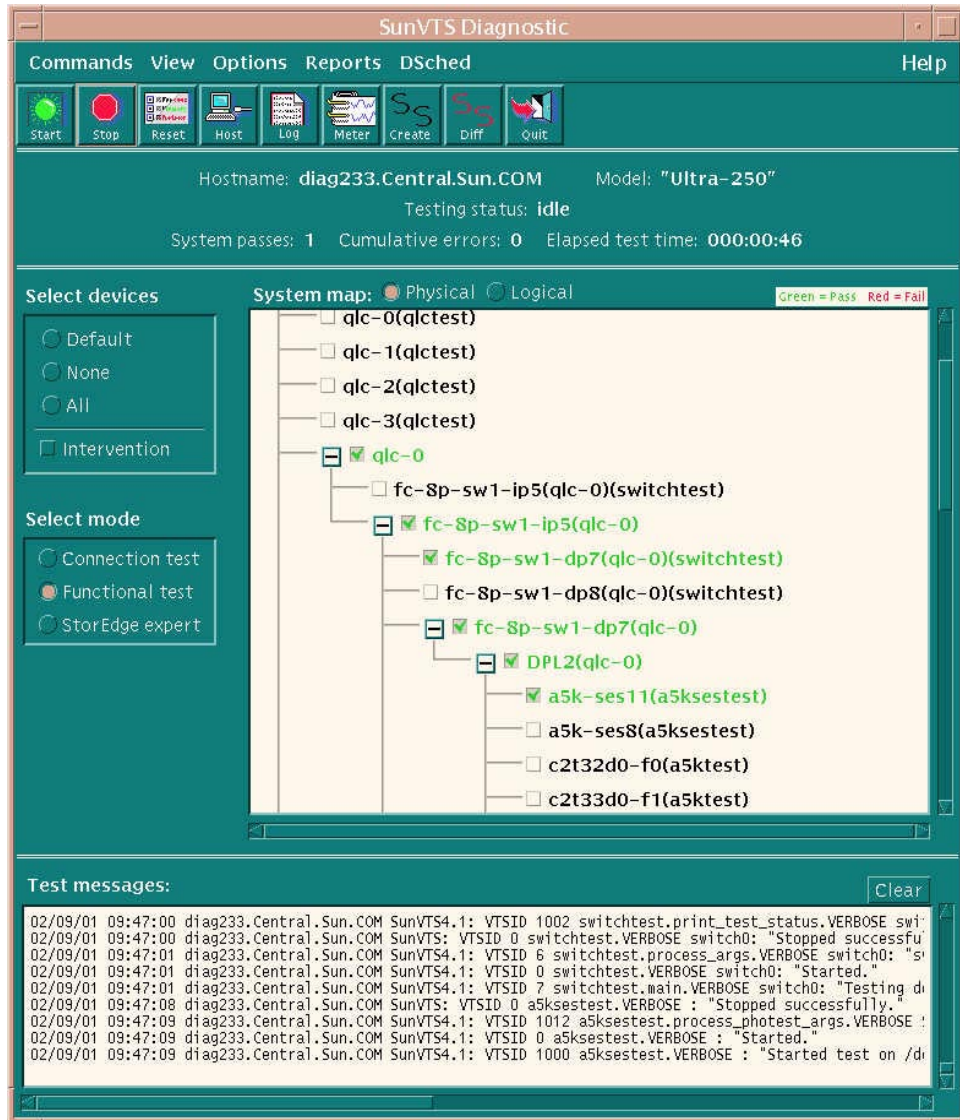


FIGURE 28 Rerun a5ksesTest window

Scenario 5—Bad GBIC in Storage (A5200)

In this example, the loss of an A5200 loop was noted in `/var/adm/messages` and `format`. A Snapshot Diff was run to determine the extent of the failure. A Sun StorEdge StorTools 4.x Functional Test was run to do a quick loop test. StorEdge Expert was used to isolate down to a minimal number of suspect FRUs.

`/var/adm/messages`

```
Feb 8 10:08:53 diag233.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE: Qlogic
qlc(0): Loop OFFLINE
Feb 8 10:09:10 diag233.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE: Qlogic
qlc(0): Loop ONLINE
Feb 8 10:09:10 diag233.Central.Sun.COM qlc: [ID 999315 kern.info] WARNING: fctl(0):
AL_PA=0x7c doesn't exist in LILP map
Feb 8 10:09:10 diag233.Central.Sun.COM qlc: [ID 999315 kern.info] WARNING: fctl(0):
AL_PA=0xac doesn't exist in LILP map
Feb 8 10:09:10 diag233.Central.Sun.COM qlc: [ID 999315 kern.info] WARNING: fctl(0):
AL_PA=0xad doesn't exist in LILP map
Feb 8 10:09:10 diag233.Central.Sun.COM qlc: [ID 999315 kern.info] WARNING: fctl(0):
AL_PA=0xa6 doesn't exist in LILP map
Feb 8 10:09:10 diag233.Central.Sun.COM qlc: [ID 999315 kern.info] WARNING: fctl(0):
AL_PA=0x90 doesn't exist in LILP map
<snip>
Feb 8 10:09:10 diag233.Central.Sun.COMofflining lun=0 target=7c
Feb 8 10:09:10 diag233.Central.Sun.COMscsi: [ID 243001
kern.info]/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0 (fcp0)
Feb 8 10:09:10 diag233.Central.Sun.COMofflining lun=0 target=ac
Feb 8 10:09:10 diag233.Central.Sun.COMscsi: [ID 243001
kern.info]/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0 (fcp0)
```

Run Snapshot DIFF

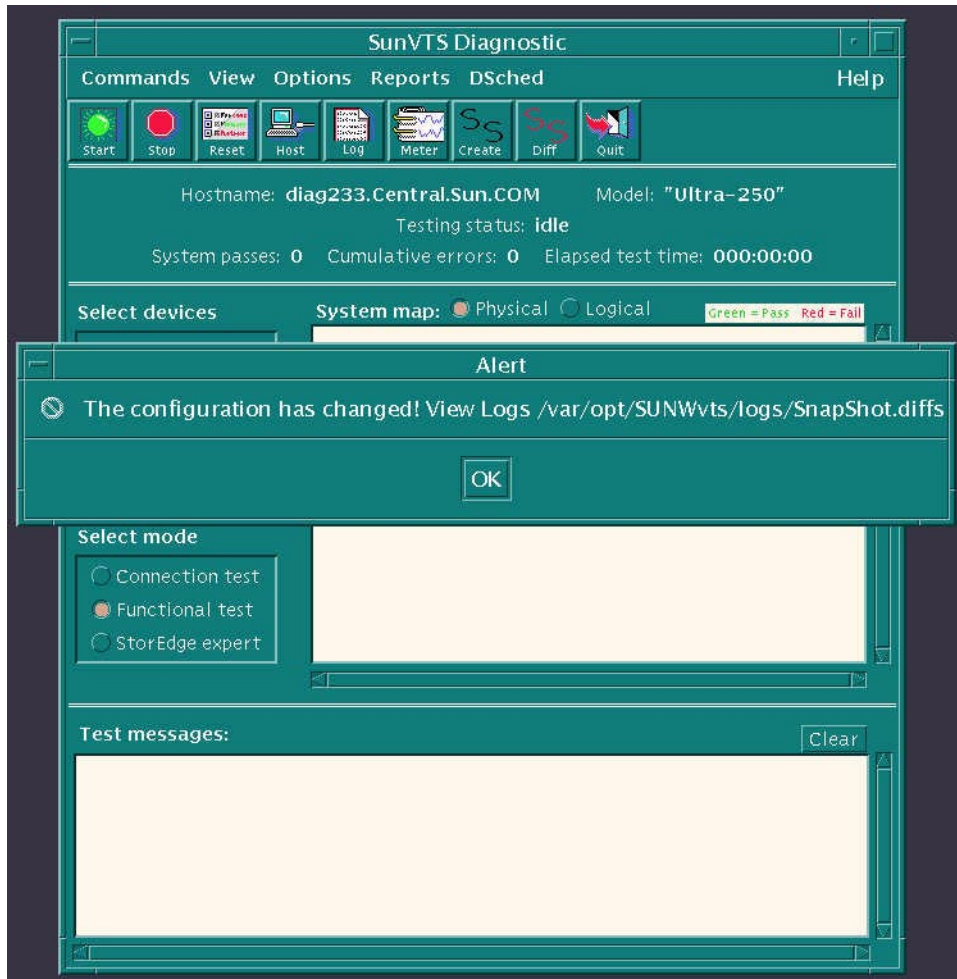


FIGURE 29 Run Snapshot DIFF window

Timestamp: Thu Feb 8 10:19:40 2001

Detected missing Host Bus Adapter Card.
Either the card was removed or we can no longer see storage attached to this card.

 Registername=qlc-0
LGroup =StorEdge-QLC-HostBus adapters
Pgroup =StorEdge
Node WWN =2000000e08b026c2a
Port WWN =2100000e08b026c2a
Driver Name =fp

Detected Missing device:

A5x00 Enclosure
Box Name =DPL2
Logical Path =/dev/es/ses8
PhysPath =
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ses@w508002000007cala,0:0
Register Name =a5k-ses8
Logical Group =StorEdge-A5200-DPL2(qlc-0)
Physical Group =/StorEdge/qlc-0/fc-8p-sw1-ip5(qlc-0)/fc-8p-sw1-dp7(qlc-0)/DPL2qlc-0)
NodeWWN =508002000007ca18
PortWWN =508002000007cala

Detected Missing device:

A5x00 Drive
Box Name =DPL2
Logical Path -/dev/rdisk/c2t32d0s2
PhysPath =
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w210000203733afbd0,0:c,raw
Register Name =c2t32d0-f0
Logical Group =StorEdge-A5200-DPL2(qlc-0)
Physical Group =/StorEdge/qlc-0/fc-8p-sw1-ip5(qlc-0)/fc-8p-sw1-dp8(qlc-0)/DPL2qlc-0)
NodeWWN =200000203733af7bd
PortWWN =210000203733af7bd

Run a5ktest on Drive in Failed Path

```
02/08/01 10:59:23 diag233.Central.Sun.COM SunVTS4.1:VTSID 8014 a5ktest.
FATAL c2t32d0: "Couldn't open /dev/rdisk/c2t32d0s0: No such device or address"
Probable_Causes(s):
(1) Cable loose or disconnected
(2) Device off-line or missing
(3) Device not configured
(4) Device bypassed
Recommended_Actions(s):
(1) Check cable
(2) Check device on-line
(3) Configure device
(4) Check A5k panel to see if drive is bypassed
```

Run From Command Line

```
#!/opt/SUNWvts/bin/sparcv9/stexpert-i-t /dev/rdisk/c2t32d0s2
stexpert: Diagnosis Begins
<snip>
<<Feb082001_13:50:52>>FAILED: for details see:
/var/opt/SUNWvts/logs/Feb082001_13:50:52_fc-8p-sw1-dp7[qlc-0]errlog
stexpert: Remove fiber cable from DPORT GBIC in port 7
stexpert: Type ok to restart testing or exit to quit: ok
stexpert: Insert a loopback cable in DPORT GBIC in port 7
stexpert: Type ok to continue or exit to quit:ok
Waiting 20 seconds for loopback to initialize.
<<Feb082001_13:52:24>> STARTED: fc-8P-sw1-DP7[qlc-0]
<<Feb082001_13:52:24>> NOTICE: Executing switch_dport [64 bit version]
stexpert: Remove loopback cable connected to DPORT GBIC in port 7
stexpert: Type ok to continue or exit to quit: ok
stexpert: Install a new fiber cable between DPORT GBIC port 7 and device
/dev/rdisk/c2t32d0s2
stexpert: Type ok to continue or exit to quit: ok
Timed out waiting for loop to reinitialize
<<Feb082001_14:25:26>> NOTICE: DISK is a suspect component
<<Feb082001_14:25:26>> NOTICE: DPORT_FIBER is a suspect component
<<Feb082001_14:25:26>> NOTICE: DEV_GBIC is a suspect component
<<Feb082001_14:25:26>> COMPLETED: diagnosis expert session on /dev/rdisk/c2t32d0s2
stexpert: Diagnosis Complete
Errors detected - see /var/opt/SUNWvts/logs/activity.log
```

Testing on the other path to the Sun StorEdge A5200 array can help eliminate bad disks. If possible, move the suspected storage GBIC to the switch and do loopback testing. In this case, loopback testing revealed a bad GBIC.

GBIC Replaced

/var/adm/messages

```
Feb 8 14:34:19 diag233.Central.Sun.COM qlc: [ID686697 kern.info] NOTICE: Qlogic  
qlc(0): Loop ONLINE  
Feb 8 14:34:19 diag233.Central.Sun.COM qlc: [ID799468 kern.info] ssd92 at fp0:name  
w2100002037450d3a,0, bus address bc  
Feb 8 14:34:19 diag233.Central.Sun.COM qlc: [ID936769 kern.info] ssd92 is  
/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w2100002037450d3a,0  
<snip>
```

Verify with a GUI Functional Test (a5ktest)

```
<snip>  
02/08/01 14:50:05 diag233.Central.Sun.COM SunVTS4.1:VTSID 50 a5ktest.VERBOSE  
c2t32d0: "Self Test took 5 seconds to execute"  
02/08/01 14:50:05 diag233.Central.Sun.COM SunVTS4.1:VTSID 34 a5ktest.VERBOSE  
c2t32d0: "number of blocks 16019451"  
02/08/01 14:50:05 diag233.Central.Sun.COM SunVTS4.1:VTSID 35 a5ktest.VERBOSE  
c2t32d0: "Testing 160194 blocks on disk"  
02/08/01 14:50:05 diag233.Central.Sun.COM SunVTS4.1:VTSID 24 a5ktest.VERBOSE  
c2t32d0: "blk_base(),base=1,nblk=16019451"  
02/08/01 14:50:05 diag233.Central.Sun.COM SunVTS4.1:VTSID 32 a5ktest.VERBOSE  
c2t32d0: "Start AsyncIO test from block 1 to 160195."  
02/08/01 14:50:05 diag233.Central.Sun.COM SunVTS4.1:VTSID 36 a5ktest.VERBOSE  
c2t32d0: "Start SyncIO test."  
02/08/01 14:50:05 diag233.Central.Sun.COM SunVTS4.1:VTSID 23 a5ktest.VERBOSE  
c2t32d0: "Test passed."  
<snip>
```

At this point format revealed that the disks were back online.

Mamba Field Troubleshooting Guide FAQ

Q Are 2x7 and 3x15 Sun StorEdge A3500-FC configurations supported in the Mamba phase?

A Yes. 1x5, 2x7, and 3x15 Sun StorEdge A3500-FC configurations are supported in the Mamba phase.

Q What is the difference between “SL Zoning” and “Hard Zoning?”

A In the Mamba phase, there is only the concept of an SL Zoning. SL Zones group individual SL Ports into larger, logical loops. A port can be in one and only one SL Zone at a time. Hard Zones will not be applicable until the Python release or later.

The “big picture” answer, however, is that SL Zoning and Hard Zoning are both based on a port-by-port basis and multiple SL Zones could live within a single Hard Zone, but that is a topic for a later switch phase.

Q I’ve heard that the Qlogic switch GUI is embedded in the switch itself. Can the Sun StorEdge switch be used that way? Can the GUI be used through a web browser such as Netscape?

-
- A** No. The current Sun switch GUI is installed with the SUNWsmgr package. The current version of this GUI is 2.07.54 (or 2.07.50, with patch 110696-xx — this patch can be found on SunSolve). The syntax is as follows:

```
java -jar /usr/opt/SUNWsmgr/bin/Sun.jar
```

Refer to the installation guide for instructions on how to install the package. The GUI is launched from a command line in a Java application. No other GUIs are supported. This GUI can also be launched from within the Component Manager 2.1 framework via a separate launch button.

- Q** Where can I get the latest patches and firmware for a Mamba configuration?

- A** The most current list of required patches, firmware, and other software packages for Mamba can be found in the Sun StorEdge Network FC switch-8 and switch-16 Release Notes, part number 806-6924-14, on page 2. As is detailed in the Release Notes, you can download the switch firmware and GUI from the Sun Network Storage Product Page at <http://www.sun.com/storage/san>. You can find the required patches on the SunSolve website: <http://sunsolve.sun.com>.

The maintainer of Early Notifier 14838 HES—CTE NWS SSA, A5x00/E3500 and T3 Software/Firmware Config Matrix Summary is also said to be planning to incorporate the required Mamba revisions in future versions of that document; however, this has not yet been finalized.

Various internal NWS Engineering pages exist with various levels of patches and firmware. Most of these pages are for various testing teams, and they may or may not have the current GA-level software.

- Q** Is the switch firmware or GUI software from Qlogic's website supported by Sun?

- A** No. The only supported switch firmware and GUI software are the Mamba revisions from Sun.

- Q** Are there any configuration files that are needed if a switch is replaced?
-

A Yes. There is a file that should be saved, an Archive Fabric Config file. This file holds an archived copy of chassis configurable parameters, such as port modes, fabric name, SNMP settings, and zoning information (except zoning descriptions).

After configuring the switch, create an archive file by clicking *Special --> Archive Fabric* from the topology view in the switch GUI. Then, name the file whatever you wish.

To replace a switch, load the file onto the new switch by clicking *Special --> Restore Fabric* and choose the appropriate file. This will quickly reconfigure the new switch.

Q How do I recover the switch if the administrator forgets the password?

A A package removal of SUNWsmgr (`pkgrm SUNWsmgr`), followed by a package add (`pkgadd SUNWsmgr`) will restore the package. Once you have added the package a second time using the `pkgadd` command, the login and password will be back to the default values of `su:su`.

Q Are there any guidelines on using the switch GUI's port counters for troubleshooting?

A At this time, there are no set rules for troubleshooting using the port counters. Efforts are underway to incorporate counter methodology into the serviceability strategy for the Python phase.

However, there are several broad pointers:

1. Reset the counters before beginning any troubleshooting. A switch that has counter information for the last six months would not necessarily give meaningful information.
2. Pay particularly close attention to the following fields:
 - Sync Loss 100ms
 - Invalid tx words rcv
 - LIP total received
 - Loss of Signal
 - Sync Loss

Note:

LIPs will be seen by all SL ports in the same SL Zone. The other counters only reflect conditions on the particular point being monitored.

Q What size screwdriver fits in the switch's rotary Test Mode dial?

-
- A** A Phillips-head screwdriver, size #0.
- Q** Sun StorEdge StorTools 4.x is indicating a problem related to qlc0. What physical path is that?
- A** You can find the physical path by bringing up the Sun StorEdge StorTools 4.x GUI, right clicking on qlc0 (qlctest) and selecting Test Parameter Options. The physical path is indicated at the top of the screen.

Alternatively, you can pull this information from the `/var/adm/messages` or the `/etc/path_to_inst`

Examples:

```
# grep -h "qlc0 is" /var/adm/messages | sort -M | tail -1
Mar 14 18:07:02 diag233.Central.Sun.COM genunix: [ID 936769 kern.info] qlc0 is
/pci@1f,4000/pci@4/SUNW,qlc@4

# grep \"qlc\" /etc/path_to_inst | grep \" 0 \"
\"/pci@1f,4000/pci@4/SUNW,qlc@4\" 0 \"qlc\"
```

-
- Q** StorTools 3.x was previously used to track patches and firmware revisions. What do I use now?
- A** Sun StorEdge RASAgent 1.1 has taken the revision checking functionality from Sun StorEdge StorTools 4.x. Sun StorEdge RASAgent 1.1 still uses the same Early Notifier Doc 14838 HES—CTE NWS SSA, A5x00/E3500 and T3 Software/Firmware Config Matrix Summary that Sun StorEdge StorTools used. Sun StorEdge RASAgent 1.1 also provides online monitoring and can be configured to send an administrator email on certain events.

See the Sun StorEdge RASAgent 1.1 download page at <http://nsc.ccentral/CC/RASAgent/release.pl?version=11> for access to the RASAgent 1.1 manuals.

An example email of a Sun StorEdge RASAgent 1.1 Sun StorEdge T3 array LUN failover email is shown below.

```
You requested the following events be forwarded to you.
1 Message-Log Warnings:
** Identification: T300 - purple7 **
key=50020F23000003C5, ip=purple7, key_type=wwn,
hostid=80b20f57, date=2001-03-17 16:00:18
** New Information **
Warning : component='u2ctr', date='2001-03-17 15:54:10', name='purple7',
text='u2ctr starting lun 0 failover',
Warning : component='u2ctr', date='2001-03-17 15:54:16', name='purple7',
text='u2ctr starting lun 0 failover',
```

Note – Customers' adoption of RASAgent is critical in order to make it a useful tool for Field Engineers. RASAgent will be of little use to Field Engineers if it is not installed with the remainder of the Mamba components and is not running *before* problems begin. Marketing efforts are underway to speed up customers' adoption of the Sun StorEdge RASAgent 1.1.

Q How can I find out what PCI Fibre Channel Adapters are installed on a system?

A You can find out what Adapters are installed on a system using `luxadm qlgc`. The following example shows a system with one FC100 card and two dual ported Crystal cards.

Note:

The Crystal cards are no longer supported and will not be supported until Crystal+ is released.

```
# luxadm qlgc

Found Path to 5 FC100/P, ISP2200 Devices

Opening Device: /devices/pci@1f,4000/SUNW,ifp@5:devctl
Detected FCode Version: FC100/P FC-AL Host Adapter Driver: 1.9 00/03/10

Opening Device: /devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Opening Device: /devices/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Opening Device: /devices/pci@1f,2000/pci@1/SUNW,qlc@4/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Opening Device: /devices/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Complete
```

Note – All Fibre Channel cards can be found with "luxadm fcode -p"

```
# luxadm fcode -p

Found Path to 0 FC/S Cards
Complete

Found Path to 0 FC100/S Cards
Complete

Found Path to 5 FC100/P, ISP2200 Devices

Opening Device: /devices/pci@1f,4000/SUNW,ifp@5:devctl
Detected FCode Version: FC100/P FC-AL Host Adapter Driver: 1.9 00/03/10

Opening Device: /devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Opening Device: /devices/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Opening Device: /devices/pci@1f,2000/pci@1/SUNW,qlc@4/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Opening Device: /devices/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0:devctl
Detected FCode Version: ISP2200 FC-AL Host Adapter Driver: 1.8 00/04/11

Complete
```

Q How can I force a LIP on a certain path, device, or HBA?

A There are multiple ways you can force an LIP on a system:

1. From the Faceplate Display screen on the switch GUI, double click the port from which you wish to send the LIP. Click the *Send LIP* button located on the right side of the screen. **Note:** This is the easiest method.
2. From the command line, send an LIP using the `luxadm -e forcelpip` command. To send an LIP to a certain HBA, retrieve the physical path of the HBA from StorTools or from the command line.
3. Send LIPs to devices found in the output of `luxadm probe`.

```
#luxadm -e forcelpip /devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0:devctl
```

Any messages from this LIP can be monitored in `/var/adm/messages`.

```
Mar 15 11:05:15 diag233.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE: Qlogic
qlc(0): Loop OFFLINE

Mar 15 11:05:15 diag233.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE:
Qlogic qlc(0): Loop ONLINE
```

Q How can I see what HBAs are currently connected to what storage?

A Sun StorEdge Stortools 4.x GUI provides an easy-to-read mapping of HBAs to switch ports to target ports to an individual device . There is also command line utilities to discover the equivalent information: the Sun StorEdge Stortools 4.x `discman` command. This command runs the discovery manager and sends the output to the screen, alternatively it can be redirected to a file.

Note:

In Sun StorEdge StorTools 4.x, if a Snapshot has been run, `discman` will pull the topology information from system memory or the Snapshot file. This could be stale/outdated information. If the latest information is needed, rename the `/var/opt/SUNWvtsst/logs/SnapShotGolden.bin` to *save.SnapShotGolden* (or something similar), stop the `stdiscover` daemon and rerun `discman`. After the current information is gathered, the saved copy of *SnapShotGolden.bin* can be replaced and the GUI can be restarted to allow troubleshooting to continue.

```
# /opt/SUNWvtsst/bin/sparcv9/discman (abbreviated)
```

```
# /opt/SUNWvtsst/bin/sparcv9/discman

Sun Microsystems, Inc.
SunVTS FCAL StorEdge Discovery
Version 1.000
Wed Mar 7 11:25:11 MST 2001
Copyright 2000 Sun Microsystems Inc.
All rights reserved.

Timestamp:      Thu Mar 15 13:52:29 2001

Hostname:       diag233.Central.Sun.COM

Version:        1

Detected 6 FCAL HBA port(s)

                SOCAL HBA port(s):      0
                IFP HBA port(s):        2
                QLC HBA port(s):        4
                ...

                                                < -- first HBA port on switch (ip3=Initiator Port 3)

Device # 0:
LogicalPath:
PhysPath:
RegisterName:   fc-8p-sw0-ip3_qlc-0
LGroup: StorEdge-8P-Switches(qlc-0)
PGroup: /StorEdge/qlc-0
NodeWWN: 200000e08b026c2a
PortWWN: 210000e08b026c2a
wNODEWWN:
DualPort:
PortMode:
Instance: 0
VendorID: Ancor
ProductID: Switch-8

...

                                                < -- shows us the entire path to the T3 lun

Device # 4:
LogicalPath: /dev/rdisk/c5t1d0s2
PhysPath:
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w50020f23000003c5,0:c,raw
RegisterName:   c5t1d0
LGroup: StorEdge-T3-50020f20000003c5_qlc-0
PGroup: /StorEdge/qlc-0/fc-8p-sw0-ip3_qlc-0/fc-8p-sw0-dp2-qlc-0
NodeWWN: 50020f20000003c5
PortWWN: 50020f23000003c5
wNODEWWN: 0000000000000000
DualPort: Yes
PortMode: Primary
Instance: 0
VendorID: SUN
ProductID: T300

...
```

...

< -- shows us the entire path to the T3 lun

```
Device # 5:
LogicalPath: /dev/rdisk/c5t1d1s2
PhysPath:
/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0/ssd@w50020f23000003c5,1:c,raw
RegisterName: c5t1d1
LGroup: StorEdge-T3-50020f20000003c5_qlc-0
PGroup: /StorEdge/qlc-0/fc-8p-sw0-ip3_qlc-0/fc-8p-sw0-dp2-qlc-0
NodeWWN: 50020f20000003c5
PortWWN: 50020f23000003c5
wNODEWWN: 0000000000000000
DualPort: Yes
PortMode: Alternate
Instance: 0
VendorID: SUN
ProductID: T300
```

...

< -- second HBA port

```
Device # 2:
LogicalPath:
PhysPath:
RegisterName: fc-8p-sw0-ip6_qlc-1
LGroup: StorEdge-8P-Switches(qlc-1)
PGroup: /StorEdge/qlc-1
NodeWWN: 200100e08b226c2a
PortWWN: 210100e08b226c2a
wNODEWWN:
DualPort:
PortMode:
Instance: 0
VendorID: Ancor
ProductID: Switch-8
```

...

< -- entire path from host to T3 lun

```
Device # 6:
LogicalPath: /dev/rdisk/c4t2d1s2
PhysPath:
/devices/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0/ssd@w50020f23000003d5,1:c,raw
RegisterName: c4t2d1
LGroup: StorEdge-T3-50020f20000003d5_qlc-1
PGroup: /StorEdge/qlc-1/fc-8p-sw0-ip6_qlc-1/fc-8p-sw0-dp8-qlc-1
NodeWWN: 50020f20000003d5
PortWWN: 50020f23000003d5
wNODEWWN: 0000000000000000
DualPort: Yes
PortMode: Primary
Instance: 1
VendorID: SUN
ProductID: T300
```

...

Using luxadm commands

```
# luxadm -e port

Found path to 4 HBA ports

/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0:devctl      NOT CONNECTED
/devices/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0:devctl      CONNECTED
/devices/pci@1f,2000/pci@1/SUNW,qlc@4/fp@0,0:devctl      NOT CONNECTED
/devices/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0:devctl      CONNECTED

# luxadm -e dump_map /devices/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0:devctl
Pos AL_PA ID Hard_Addr Port WWN          Node WWN          Type
0   e8 1    e8 50020f23000003c5 50020f20000003c5 0x0 (Disk device)
1   1  7d    0 210100e08b226c2a 200100e08b226c2a 0x1f (Unknown Type,Host Bus Adapter)
```

Q I've heard about the `sanbox` command line and a utility called `capture`. What are they and where do I find them?

A On <http://diskworks.ebay/SW/sw.html> (no external access at this time), scroll down to the *Python* section. Both utilities are there. At this time (March 2001), neither of these tools are intended for customer use.

There is currently work in progress to make the `capture` utility a part of the information gathering procedures for bugs and escalations. That is not finalized yet, and the code is not to be considered "production environment" ready. Neither of the tools could be considered fully supported by Engineering or the Solution Center, thus revision information is not relevant for these tools. Use what is currently posted on <http://diskworks.ebay> and use at your own discretion and risk.

Capture usage

capture version 1.0.1.REV.2001.02.27.16.30

Usage:

capture <ip_address> [-nvram] [Output filename]

Example of capture output:

```
# ./capture 172.20.67.194 capture.out
# more capture.out
Capture Version 1.0.1
-----
IP Address:      172.20.67.194

*****
Version Information
*****

HW:              a03
PROM:            30200
FLASH:           b30351
CHASSIS TYPE:    A8
CHASSIS NUMBER: 0
Fabric Id:       1
WWN:             100000c0dd00562a
MAC:             00c0dd005629

*****
Chassis Status
*****

Number of Ports:      8
Power: OK
Temp: OK
Temp = 27.0c
Fan 1: OK
Fan 2: OK
GBIC 1 :              Optical shortwave
GBIC 2 :              Optical shortwave
GBIC 3 :              Optical shortwave
GBIC 4 :              None installed
GBIC 5 :              None installed
GBIC 6 :              Optical shortwave
GBIC 7 :              Optical shortwave
GBIC 8 :              Optical shortwave

*****
Time Out Values
*****

Active:
Timeout Values:
  edtov: 2560
  mfstov: 0
  ratov: 5000
  rttov: 100

continued on next page...
```

continued from previous page...

Port Status

| Port # | Port Type | Admin State | Oper State | Status | Loop Mode |
|--------|-----------|-------------|------------|---------------|-------------------------------------|
| 1 | SL_Port | online | offline | Not-logged-in | |
| 2 | SL_Port | online | online | logged-in | TargetDevices: 1 Address: 0x00 0xe8 |
| 3 | SL_Port | online | online | logged-in | TargetDevices: 1 Address: 0x00 0x01 |
| 4 | SL_Port | online | offline | Not-logged-in | |
| 5 | SL_Port | online | offline | Not-logged-in | |
| 6 | SL_Port | online | online | logged-in | TargetDevices: 1 Address: 0x00 0x01 |
| 7 | SL_Port | online | offline | Not-logged-in | |
| 8 | SL_Port | online | online | logged-in | TargetDevices: 1 Address: 0x00 0xe4 |

Topology

| Port #: | Remote: Chassis | StageType | PortAddr | LinkAddr |
|---------|-----------------|-----------|----------|----------|
| 01 | 00 | IOT | 100000 | 000000 |
| 02 | 00 | IOT | 100100 | 000000 |
| 03 | 00 | IOT | 100200 | 000000 |
| 04 | 00 | IOT | 100300 | 000000 |
| 05 | 00 | IOT | 100400 | 000000 |
| 06 | 00 | IOT | 100500 | 000000 |
| 07 | 00 | IOT | 100600 | 000000 |
| 08 | 00 | IOT | 100700 | 000000 |

Links Information

| Chassis: 00 | Remote: Chassis | Port | FCAddr | WWN |
|----------------|-----------------|------|--------|-----|
| No Links found | | | | |

port count

| | | | |
|------------------|--------|-----------------|---------|
| Port Number: | 1 | | |
| Inframes: | 983615 | Outframes: | 4828427 |
| LinkFails: | 1 | SyncLosses: | 1 |
| InvalidTxWds: | 2092 | Total LIP Rcvd: | 10 |
| LIP F7 F7: | 10 | AL Inits: | 33 |
| lip_during_init: | 23 | sync_loss: | 1 |

continued on next page...

continued from previous page...

```
Port Number:      2
Inframes:         785611      Outframes:         4820054
LinkFails:        16          SyncLosses:        16
InvalidTxWds:     780498      Total LIP Rcvd:    69
LIP F7 F7:        37          LIP F8 F7:         32
AL Init Errs:     15          AL Inits:           1060
loss_of_signal_cnt: 18113      lip_during_init:   1035
sync_loss:        515
```

```
-----
Port Number:      3
Inframes:         9027777      Outframes:         1668118
LinkFails:        173          SyncLosses:        173
InvalidTxWds:     934907      Total LIP Rcvd:    105
LIP F7 F7:        33          LIP F8 F7:         70
LIP F7 AL_PS:     2           AL Init Errs:      170
AL Inits:         4876         loss_of_signal_cnt: 23050
lip_during_init:  4847         sync_loss:          595
```

```
-----
Port Number:      4
Inframes:         0            Outframes:         0
```

```
-----
Port Number:      5
Inframes:         0            Outframes:         0
```

```
-----
Port Number:      6
Inframes:         8447481      Outframes:         1460890
Discards:         7811         LinkFails:         12
SyncLosses:       12          InvalidTxWds:      506328
CRC Errs:         8862         DelimiterErrs:     1290
Total LIP Rcvd:   16          LIP F7 F7:         8
LIP F8 F7:        7           LIP F7 AL_PS:      1
AL Init Errs:     9           AL Inits:           701
LIF_flow_cntrl_err_cnt: 5221      short_frame_err_cnt: 574
loss_of_signal_cnt: 1562      lip_during_init:   691
sync_loss:        233
```

```
-----
Port Number:      7
Inframes:         854531      Outframes:         4414326
LinkFails:        1           SyncLosses:        1
InvalidTxWds:     29999       Total LIP Rcvd:    8
LIP F7 F7:        8           AL Inits:           25
lip_during_init:  17          sync_loss:          1
```

```
-----
Port Number:      8
Inframes:         734064      Outframes:         8605372
LinkFails:        1           SyncLosses:        1
InvalidTxWds:     74446       DelimiterErrs:     1
Total LIP Rcvd:   28          LIP F7 F7:         16
LIP F8 F7:        12          AL Init Errs:      1
AL Inits:         669         loss_of_signal_cnt: 6016
lip_during_init:  657         sync_loss:          34
```

continued on next page...

continued from previous page...

Name Server

| Port | Address | Type | PortWWN | Node WWN | FC-4 Types |
|------|---------|------|---------|----------|------------|
|------|---------|------|---------|----------|------------|

Database is empty

World-wide Name Zone

WWN Zone total: 0

NameServer Zone

NameServer Zone total : 0

Broadcast Zone

Broadcast Zone total : 0

Hard Zone

Hard Zone total : 0

SL Zone

Zone: 2, Enabled: yes
Port: 1
Port: 2
Port: 3
Port: 4
Zone: 3, Enabled: yes
Port: 5
Port: 6
Port: 7
Port: 8

The sanbox API is a tool that can also be used to glean information from a switch. Use caution, as the sanbox API can be used to change state information on the switch. All documentation and source code for the API is included in the tarfile. The documentation is in html format and an example manpage is included as well. An example usage is shown below.

```
# ./sanbox initiators 172.20.67.194
WWN:    100000c0dd00562a    210000e08b026c2a    200000e08b026c2a    3    0x01
WWN:    100000c0dd00562a    210100e08b226c2a    200100e08b226c2a    6    0x01
```

This shows us that the switch has two initiators (HBAs) connected to it, one on port 3, one on port 6.

You could now correlate this to physical addresses by looking at the output of "luxadm -e dump_map".

```
# luxadm -e dump_map /devices/pci@1f,4000/pci@4/SUNW,q1c@4/fp@0,0:devctl
Pos AL_PA ID Hard_Addr Port WWN      Node WWN      Type
0    e8 1    e8 50020f23000003c5 50020f20000003c5 0x0 (Disk device)
1    1 7d 0 210000e08b026c2a 200000e08b026c2a 0x1f (Unknown Type,Host Bus Adapter)
```

You can see by the WWN that the physical device /devices/pci@1f,4000/pci@4/SUNW,q1c@4/fp@0,0:devctl is the HBA port plugged into port 3 on the switch.

Note – The dual ported nature of the Crystal card can make identification difficult, but you can note the difference between "2000...." and "2001..." in the example above.

-
- Q** I've discovered what path is having problems. How do I stop I/O on that path to start troubleshooting?
- A** The specific methods will vary depending on what multi-pathing I/O software the system is running. The exact steps will vary from application to application, be it vxdmp, EMC Powerpath, or ATF. An example of a vxdmp situation is illustrated below. (Watch for MpxIO examples as that product rolls out.)
-

```

# vxddmpadm listctlr all
CTLR-NAME      DA-TYPE      STATE      DA-SNO
=====
ctlr0          OTHER        ENABLED    OTHER_DISKS
ctlr0=/pci@1f,4000/scsi@3

ctlr1          T300        ENABLED    60020f20000003c50000000000000000
ctlr1=/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0

ctlr2          T300        ENABLED    60020f20000003c50000000000000000
ctlr2=/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0

# vxddmpadm disable ctlr=/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0
# vxddmpadm listctlr all
CTLR-NAME      DA-TYPE      STATE      DA-SNO
=====
ctlr0          OTHER        ENABLED    OTHER_DISKS
ctlr0=/pci@1f,4000/scsi@3

ctlr1          T300        DISABLED   60020f20000003c50000000000000000
ctlr1=/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0

ctlr2          T300        ENABLED    60020f20000003c50000000000000000
ctlr2=/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0

```

****Noted in /var/adm/messages****

```

Mar 17 16:10:18 diag233.Central.Sun.COM vxddmp: [ID 969440 kern.notice] NOTICE:
vxvm:vxddmp: disabled controller /pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0 connected to
disk array 60020f20000003c50000000000000000 Mar 17 16:10:18 diag233.Central.Sun.COM

```

Note – A good case study, showing many of the methods outlined this FAQ, can be found at <http://hes.west.nws/products/Switch/index.html>

Isolation of SAN Components Flowchart

This appendix contains a generic flowchart, which describes how to isolate Mamba phase faults. The flowchart's purpose is to help you use Stortools 4.x using a logical troubleshooting methodology.

Starting with the circle labeled *A1*, the flowchart steps through a systematic isolation of the various SAN components. After the suspected component has been identified and replaced, the flowchart takes you back to the beginning of the test methodology to verify the fix.

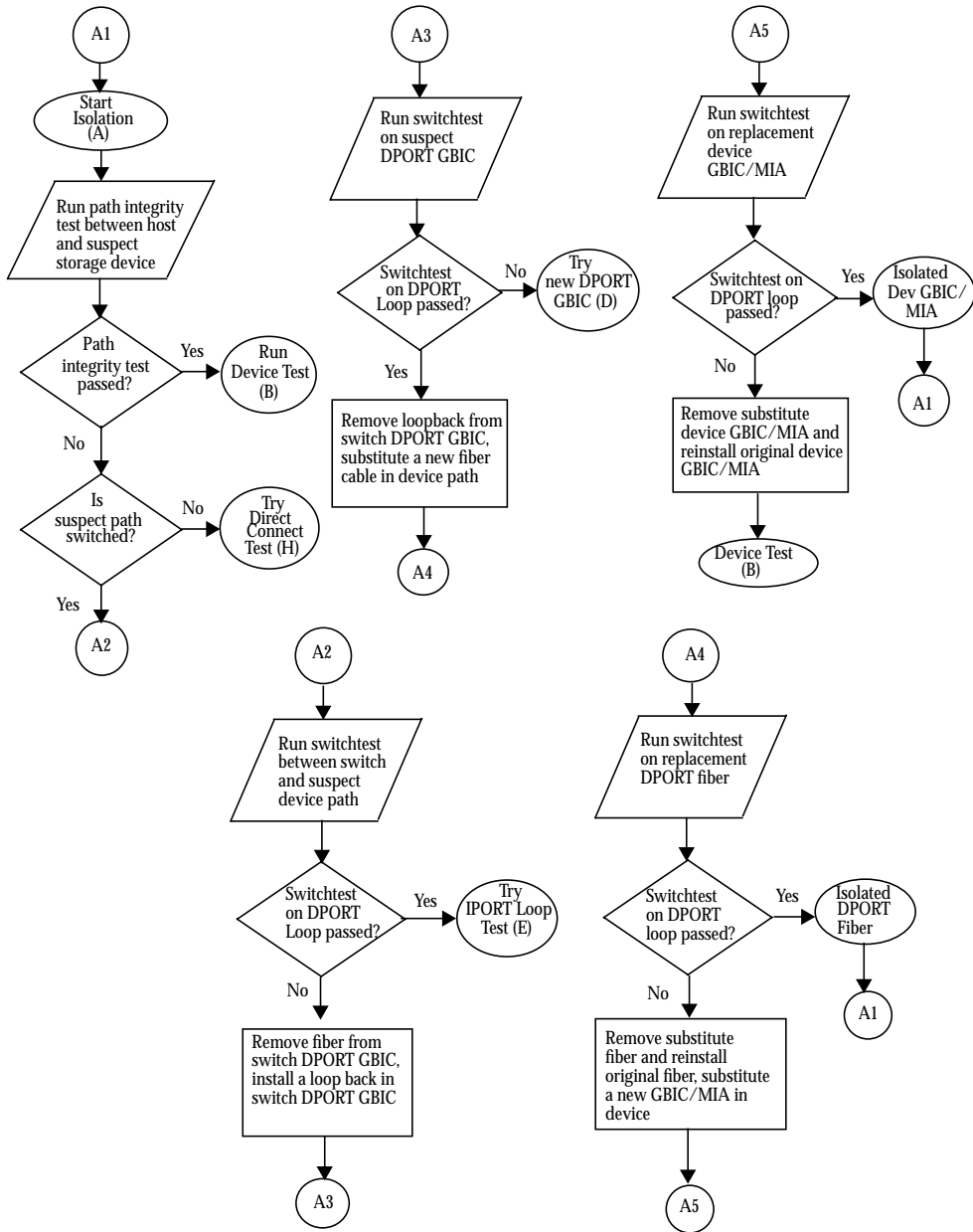


FIGURE 30 Systematic Isolation of the Various SAN Components

...continued

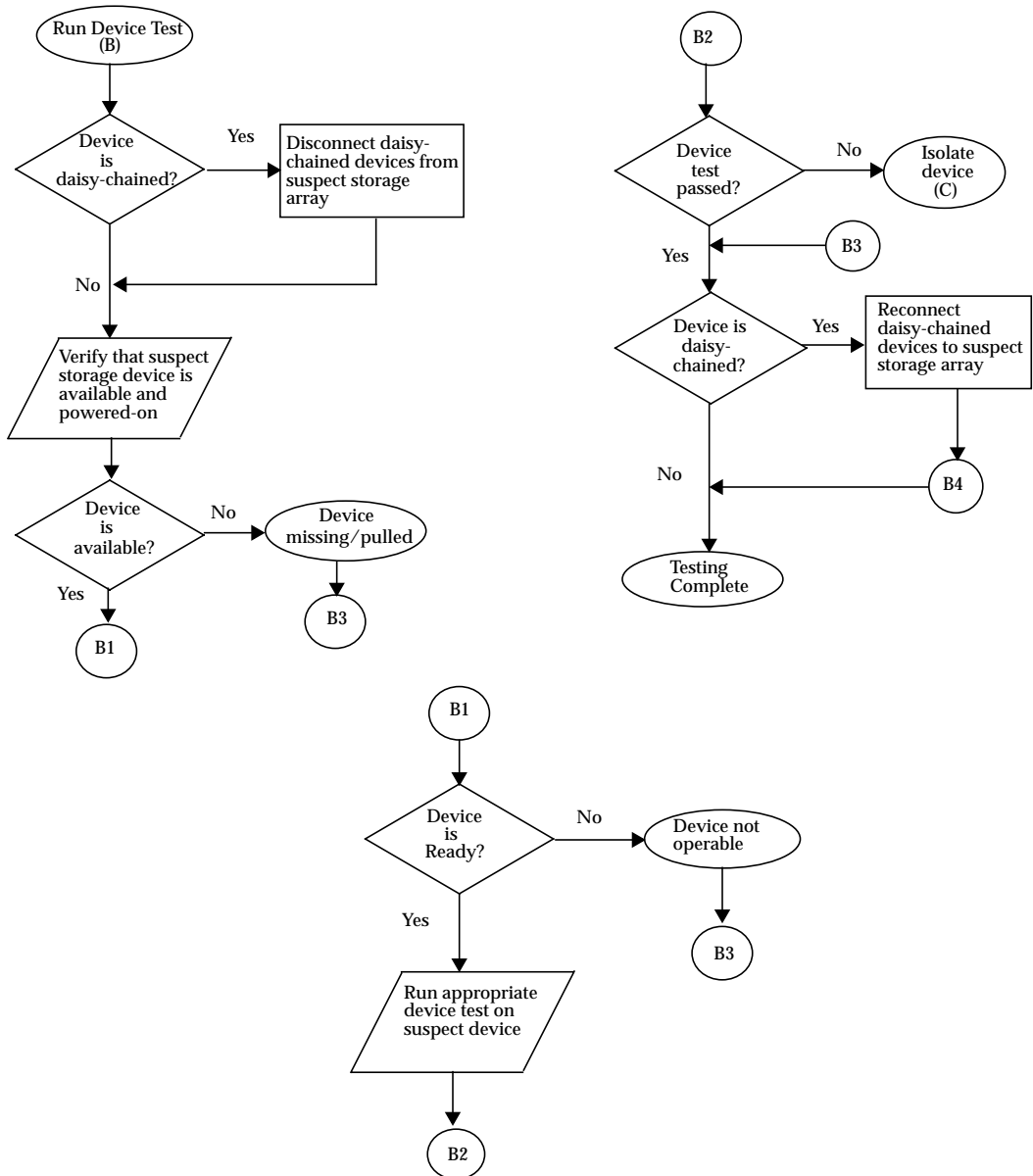


Figure 30. Systematic Isolation of the Various SAN Components (continued)

... continued

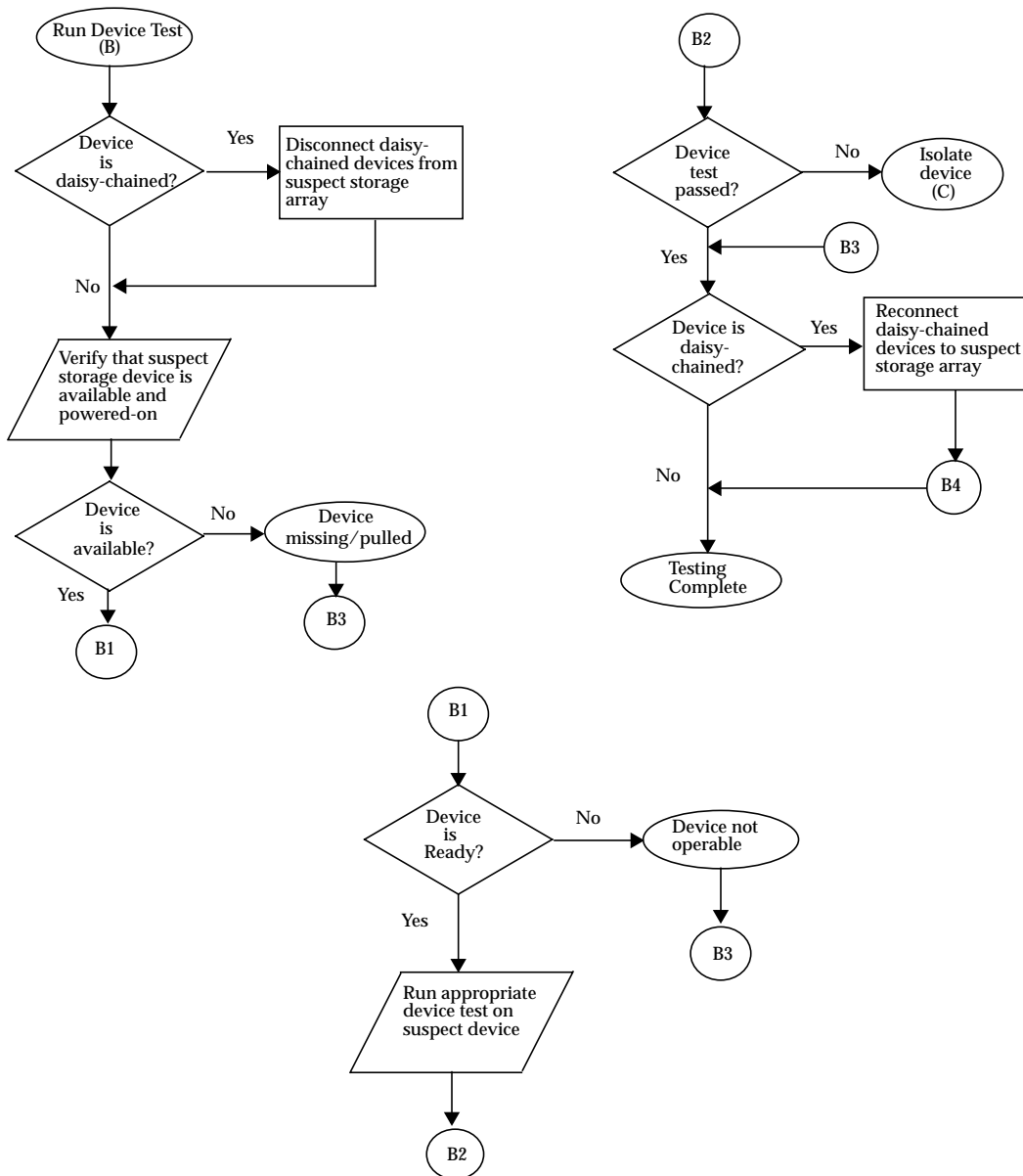


Figure 30. Systematic Isolation of the Various SAN Components (continued)

... continued

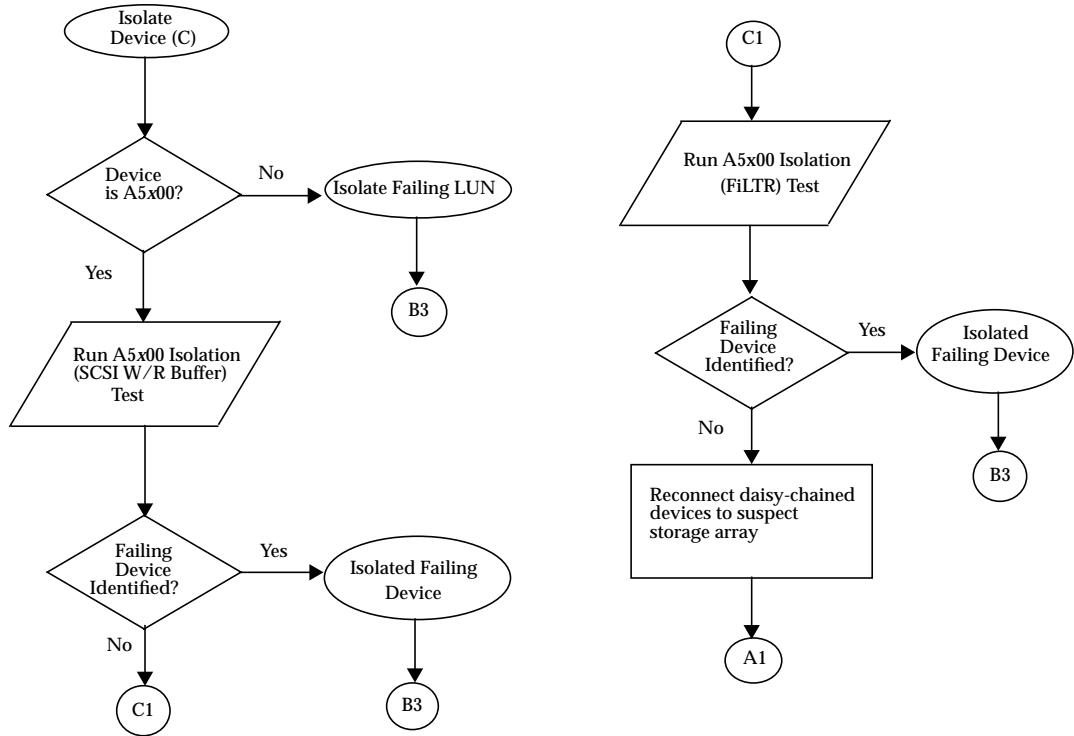


Figure 30. Systematic Isolation of the Various SAN Components (continued)

...continued

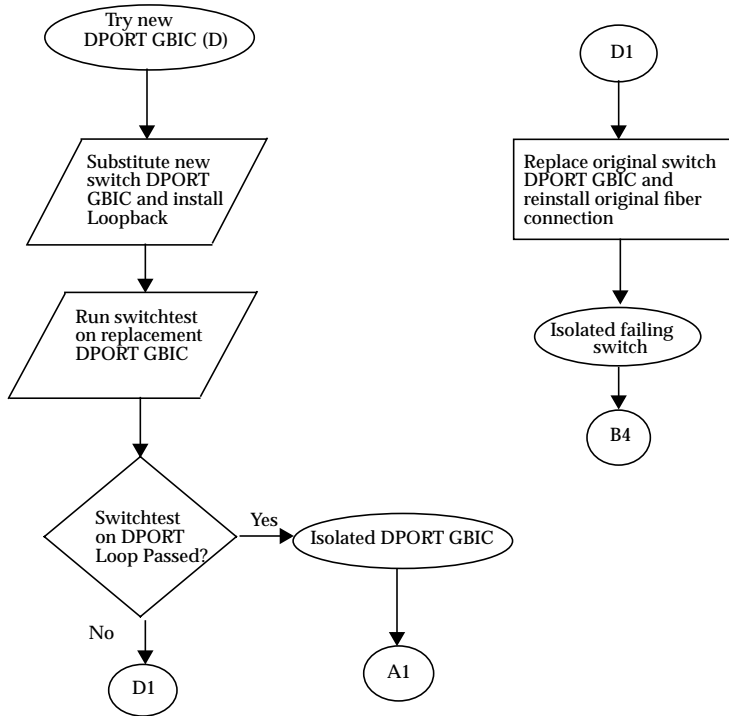


Figure 30. Systematic Isolation of the Various SAN Components (continued)

...continued

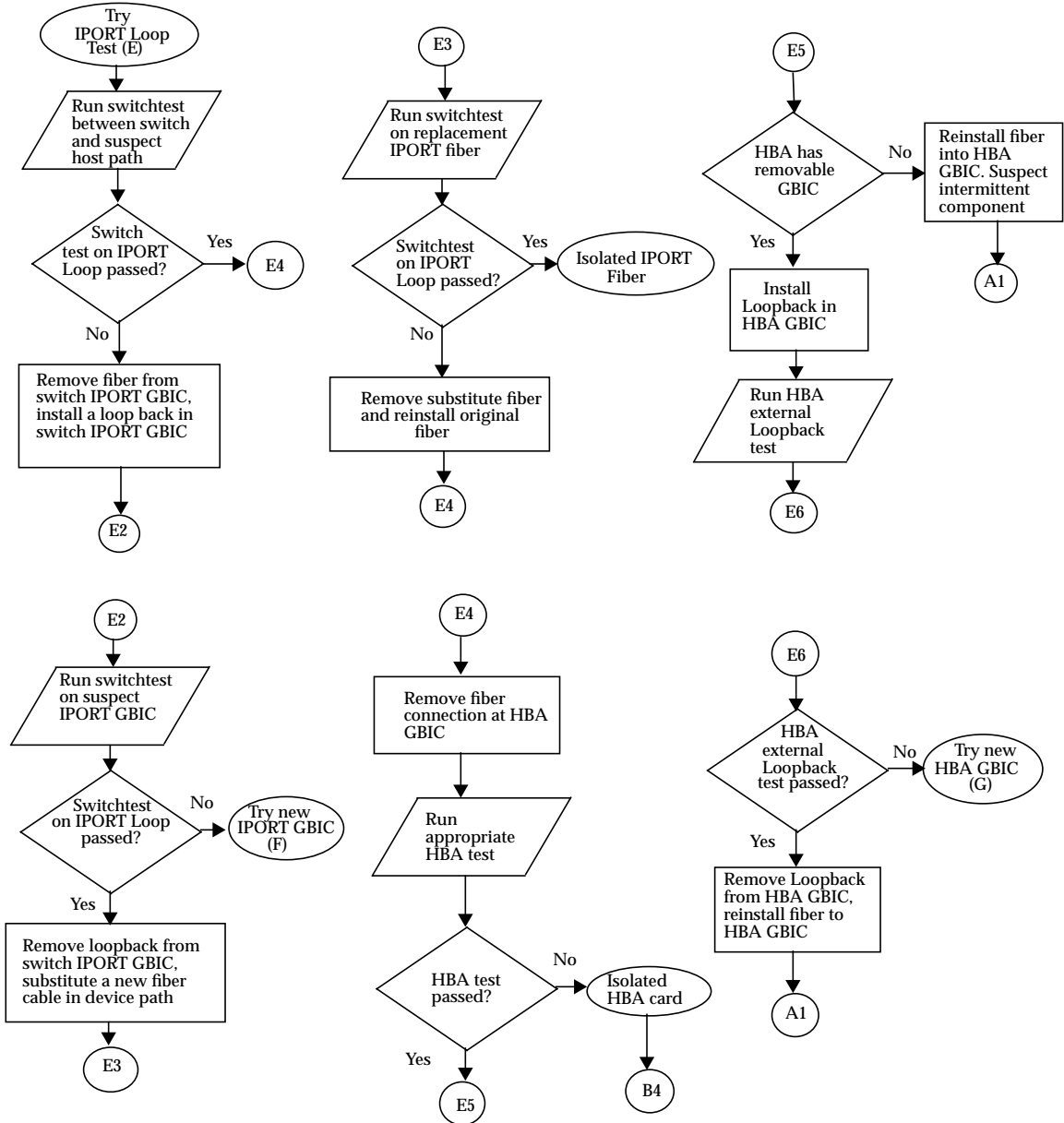


Figure 30. Systematic Isolation of the Various SAN Components (continued)

...continued

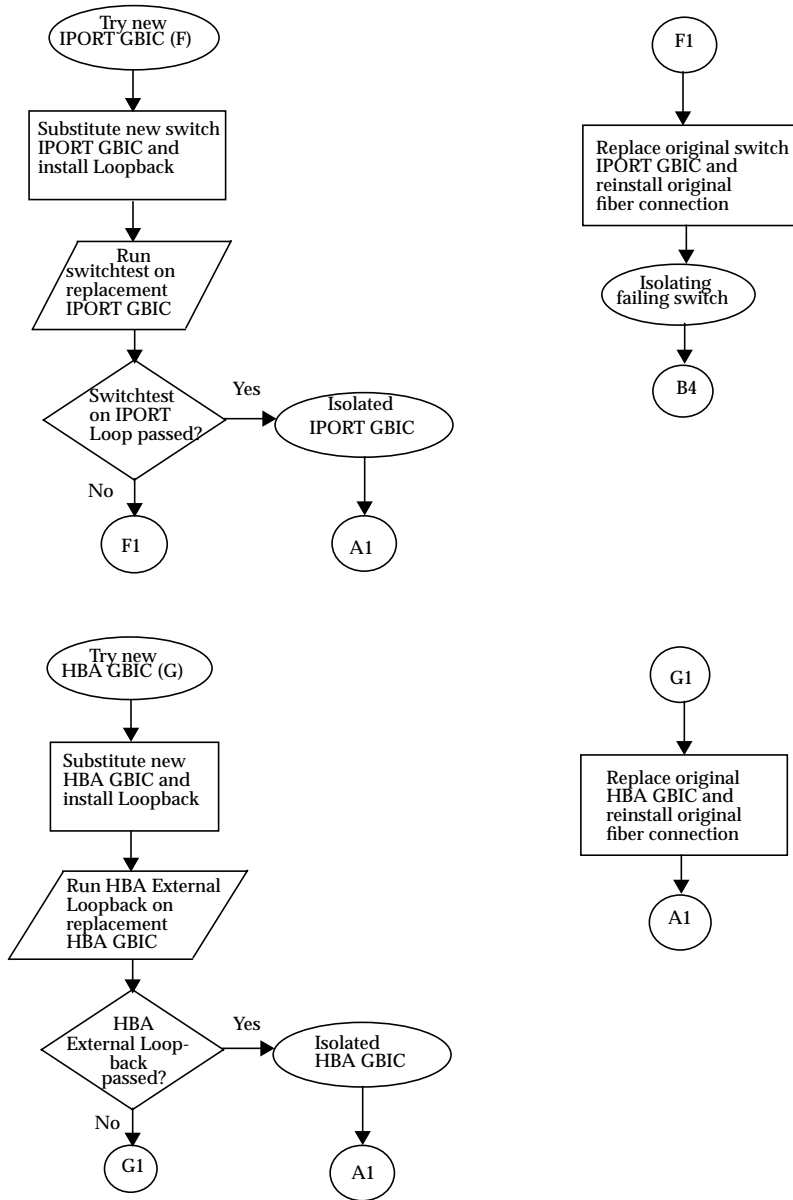


Figure 30. Systematic Isolation of the Various SAN Components (continued)

...continued

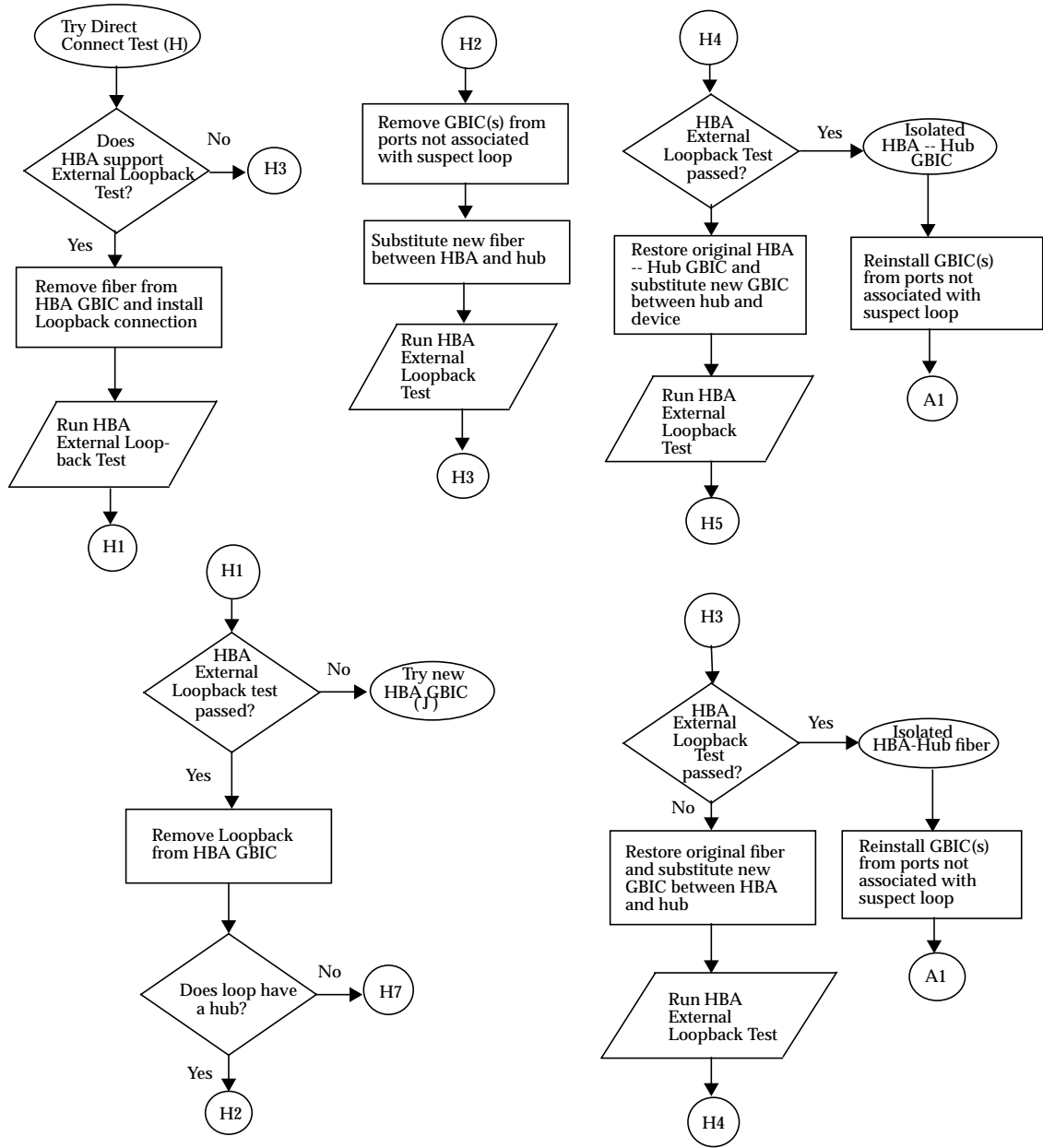


Figure 30. Systematic Isolation of the Various SAN Components (continued)

...continued

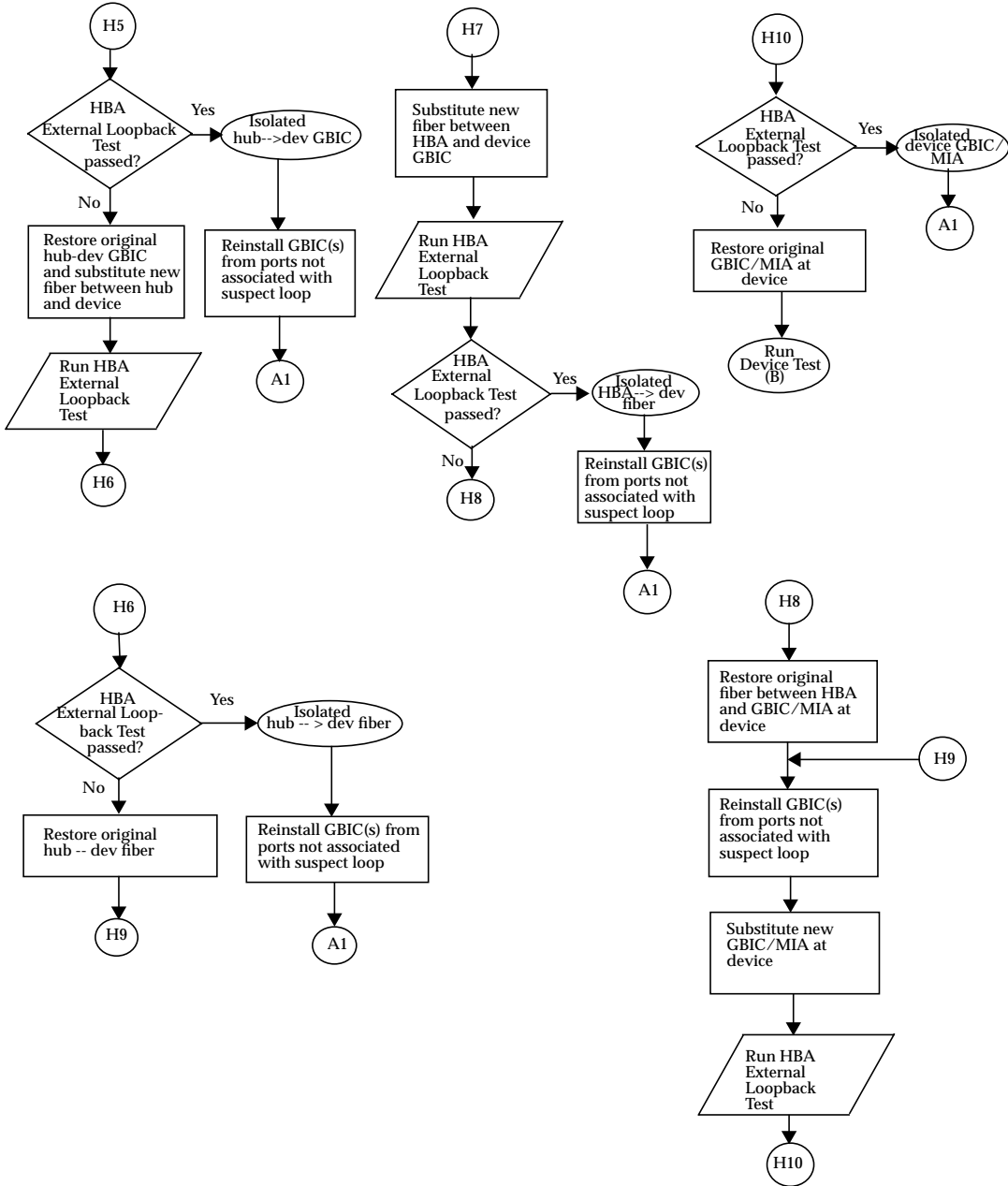


Figure 30. Systematic Isolation of the Various SAN Components (continued)

Brocade Troubleshooting

Copyright 1998, 2000 Brocade Communications Systems, Incorporated.

ALL RIGHTS RESERVED.

BROCADE, SilkWorm, SilkWorm Express, Fabric OS, QuickLoop, and the BROCADE logo are trademarks or registered trademarks of Brocade Communications Systems, Inc., in the United States and/or in other countries.

All other brands, products, or service names are or may be trademarks or service marks of, and are used to identify, products or services of their respective owners.

Notice: This document is for informational purposes only and does not set forth any warranty, express or implied, concerning any equipment, equipment feature, or service offered. BROCADE reserves the right to make changes to this document at any time, without notice, and assumes no responsibility for its use.

Export of technical data contained in this document may require an export license from the United States Government.

Introduction

This appendix provides basic guidelines that you can use to isolate problems found in a Brocade Silksworm® Mamba configuration. It assumes that you have been trained on all the components, such as storage and switch, that make up the configuration.

The scope of this appendix is to highlight the differences in troubleshooting with a Brocade Mamba configuration, from a Mamba configuration that contains the current Sun StorEdge Network Fibre Channel family of switches. Wherever possible, existing documentation will be referenced rather than duplicated in this appendix. Current support is limited to diagnosing failures down to the FRU level; in Sun's support model, the entire Silksworm switch is considered a FRU. Many of Brocade's internal diagnostics, while useful for depot or Root Cause Analysis situations, are not ultimately pertinent to a Sun Field Engineer trying to isolate to a FRU.

Related Documentation

- Brocade Silksworm® 2400 Hardware Reference Manual
- Brocade Silksworm® 2800 Hardware Reference Manual
- Brocade Fabric OS™ Hardware Reference Manual
- Brocade Fabric OS™ Release Notes
- Brocade QuickLoop User's Guide
- Brocade WebTools User's Guide
- Brocade Zoning User's Guide
- Sun StorEdge Network FC switch-8 and switch-16 Installation, and Configuration Guide, *part number 806-6922-10***
- Sun StorEdge Network FC switch-8 and switch-16 Release Notes, *part number 806-6924-10***

** The Sun StorEdge switch documents are referenced for overall configuration guidelines and Operating System level and patch revision information.

▼ To Access Brocade documentation

You can locate Brocade documentation on a special website provided by Brocade. The URL for the Brocade site is <http://www.brocade.com>.

To access the Silkworm series hardware and software documentation, from the Brocade website:

1. **Click the Partners link.**
2. **Click the Partner Login link.**
3. **Enter the Login: Sun. Enter the password: silkworm.**

Supported Configurations

The Brocade Mamba configurations follow the same rules regarding OS and patch levels, minimum software revisions, and Host Bus Adapter firmware/fcode version as the current switches do. Also, the supported maximum number of initiators, supported number of arrays per zone, and other hardware-specific information follow the same rules.

Please refer to the *Sun StorEdge FC switch-8 and switch-16 Installation and Configuration Guide*, the *Sun StorEdge FC switch-8 and switch-16 Release Notes* or “Supported Configurations” on page 101 of this guide for details.

Brocade-specific Configuration Information

- SilkWorm® 2400 & 2800 Switches ONLY
- Fabric OS
- Switch Firmware, version 2.4.1 (or greater)
- Licenses: QuickLoop, Zoning, WebTools, Fabric OS
- QuickLoop set on all ports (Brocade equivalent to SL-Mode)

QuickLoop

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

Features

- Maximum of 126 devices within a single QL.
- Ports (looplets) of up to two switches can be included in a QL by Sun (not supported in Mamba phase).
- Each looplet supports transfer rates of up to 100 MB/sec and multiple, concurrent transfers can occur in multiple looplets.
- Hosts that are attached to QL can communicate to all devices in the same QL.
- Other public hosts can communicate to all devices in QL.
- Individual QL ports can be converted to a Fabric Loop Attach (FLA) compliant FL_Ports by disabling the QL mode on that port (not supported in Mamba phase).

Note – In the Brocade Mamba phase, all ports must be in a QL. You can verify this by running *qlShow* from a telnet session.

```
diag167:admin> qlshow
Self: 10:00:00:60:69:20:1e:fc domain 2
State: Master
Scope: single
AL_PA bitmap: 20000000 00000000 00000000 27ff27ff
Local AL_PAs
  [021300]: b5 ba bc c3 c5 c6 c7 c9 ca cb<-- these AL_PAs should match the
results of a luxadm -e dump_map from the host.
           cc cd d2 d5 d6 d9 da dc e0 e1
           e2 e4 e8 ef
  [021500]: 01
Local looplet states
Member: 0 1 2 3 4 5 6 7 <-- check to see that all ports are members of theQL.
This is a 8-port switch.
Online: - - - 3 - 5 - - <-- these ports have active devices on the QL.

Looplet 0: offline
Looplet 1: offline
Looplet 2: offline
Looplet 3: online<-- check for online state
Looplet 4: offline
Looplet 5: online<-- online
Looplet 6: offline
Looplet 7: offline
```

For more detailed QuickLoop information, refer to the *Brocade QuickLoop User's Guide*.

Diagnostic Tools

The tools available for troubleshooting include most of the tools that are currently used for Sun StorEdge switch troubleshooting, except for the Sun StorEdge switch GUI (Brocade has its own GUI Interface called *WebTools*), Sun StorEdge StorTools 4.x and Sun StorEdge RASAgent 2.0.

Sun StorEdge StorTools 4.x and Sun StorEdge RASAgent 2.0 do not have the capability to discover the Brocade Silkorm switch at this time. Many of Sun StorEdge StorTools 4.x's diagnostic routines depend on the switch to execute certain isolation tests, and this is currently not possible with the Brocade switch. However, Sun StorEdge StorTools 4.x and Sun StorEdge RASAgent 2.0 are still important in an overall system-level view and should not be omitted from the configuration.

The main difference between the Brocade switch and the Sun StorEdge switch is the support for internal diagnostics, which is more robust on the Brocade switch. The wide range of internal commands available for diagnostics are documented in the *Fabric OS* manual, online help pages or in the Hardware Reference Manuals for the Brocade Silkorm switch.

There are, however, certain commands that will be particularly useful for Sun Service personnel. In addition to the standard information documented in the Mamba Troubleshooting Guide, you should gather the output of these commands.

You can access the commands listed below via telnet, serial connections to the Brocade Silkorm switch, and the front panel of the Brocade 2800 switch.

- *supportShow*
- *switchShow*
- *qlShow*
- *diagShow*
- *crossPortTest*
- *loopPortTest*
- *spinSilk*
- *portLoopbackTest*
- *nsShow*

supportShow

supportShow runs nearly all commands. Because the *supportShow* output can be quite lengthy, you should run *supportShow* and capture the output *before* you open a service call.

Tip – When output is lengthy, as it can be with *supportShow*, simple cut-and-paste methods in a Solaris terminal window is difficult. You can use the following method to direct the output of *supportShow* from a Brocade switch to a Solaris host. The output shown is abbreviated for space considerations.

```
ragnorak:/u01
l % telnet switch-16 | tee /tmp/support.out
Trying 172.20.67.164...
Connected to switch-16.
Escape character is '^]'.

Fabric OS (tm) Release v2.4.1a_rcl

login: admin
Password:
diag164:admin> supportshow 0,0,5

Kernel:      5.3.1
Fabric OS:   v2.4.1a_rcl
Made on:    Fri Mar 16 20:17:04 PST 2001
Flash:     Fri Mar 16 20:18:04 PST 2001
BootProm:  Thu Jun 17 15:20:39 PDT 1999

  25  29  29  28  28  Centigrade
  77  84  84  82  82  Fahrenheit
...
...
No fault trace available

No stack trace available

Mar 27      task      event port  cmd  args
-----
15:43:44.883 tShell    ioctl  12  df  10f53990,0
15:43:44.883 tShell    ioctl  13  df  10f53990,0
15:43:44.883 tShell    ioctl  14  df  10f53990,0
15:43:44.883 tShell    ioctl  15  df  10f53990,0
15:43:45.183 tShell    ioctl   0  dd  10f539e0,0
diag164:admin> exit
```

You can now view the text file */tmp/support.out* using various utilities. You can achieve similar results with the *script* utility.

switchShow example

```
diag167:admin> switchshow
switchName:    diag167
switchType:    3.4
switchState:   Online
switchRole:    Principal
switchDomain:   2
switchId:      fffc02
switchWwn:     10:00:00:60:69:20:1e:fc
switchBeacon:  OFF
port 0: -- No_Module
port 1: -- No_Module
port 2: -- No_Module
port 3: sw Online           L-Port 24 private, 2 phantom
port 4: -- No_Module
port 5: sw Online           L-Port 1 private, 25 phantom
port 6: -- No_Module
port 7: -- No_Module
```

qlshow example

```
diag167:admin> qlshow
Self: 10:00:00:60:69:20:1e:fc domain 2
State: Master
Scope: single
AL_PA bitmap: 20000000 00000000 00000000 27ff27ff
Local AL_PAs
  [021300]: b5 ba bc c3 c5 c6 c7 c9 ca cb
            cc cd d2 d5 d6 d9 da dc e0 e1
            e2 e4 e8 ef
  [021500]: 01
Local looplet states
Member: 0 1 2 3 4 5 6 7
Online: - - - 3 - 5 - -

Looplet 0: offline
Looplet 1: offline
Looplet 2: offline
Looplet 3: online
Looplet 4: offline
Looplet 5: online
Looplet 6: offline
Looplet 7: offline
```

diagShow example

```
diag167:admin> diagshow

Diagnostics Status: Thu Mar 29 14:04:00 2001

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

    pt3: 123904179 frTx  85600770 frRx      0 LLI_errs.
    pt5:   1145104 frTx      1201 frRx  24399 LLI_errs.

Central Memory OK
Total Diag Frames Tx: 1279
Total Diag Frames Rx: 1877
```

crossPortTest example

```
diag167:admin> crossporttest

Running Cross Port Test .....
One moment please ...
switchName:    diag167
switchType:    3.4
switchState:   Testing
switchRole:    Disabled
switchDomain:  2 (unconfirmed)
switchId:      fffc02
switchWwn:     10:00:00:60:69:20:1e:fc
switchBeacon:  OFF
port 0: -- No_Module      Disabled
port 1: -- No_Module      Disabled
port 2: -- No_Module      Disabled
port 3: sw Testing        Loopback->7
port 4: -- No_Module      Disabled
port 5: -- No_Module      Disabled
port 6: -- No_Module      Disabled
port 7: sw Testing        Loopback->3
Executing test ...

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status:  Thu Mar 29 14:27:41 2001

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

    pt3:          463 frTx          463 frRx          0 LLI_errs.  <looped-7>
    pt7:          463 frTx          463 frRx          0 LLI_errs.  <looped-3>

Central Memory OK
Total Diag Frames Tx: 2223
Total Diag Frames Rx: 2803

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og:
```

loopPortTest example

```
diag167:admin> loopporttest
Configuring normal L-Ports ( pt3 pt5 ) to Cable Loopback L-ports.....done.

Running Loop Port Test .....

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status:  Fri Mar 30 10:17:34 2001

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

      pt3:           84 frTx           83 frRx           0 LLI_errs. <looped-3>
      pt5:           81 frTx           81 frRx           0 LLI_errs. <looped-5>

Central Memory OK
Total Diag Frames Tx: 3745
Total Diag Frames Rx: 4325

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og:
```

Notes on loopPortTest:

1. *loopPortTest* runs only on active L-Ports at this time (non L-Ports are ignored).
2. You must use *crossPortTest* if you insert a Loopback plug into port.
3. *loopPortTest* can be run on a single port. The syntax is *loopPortTest <num of passes><port>*.

spinSilk example

```
diag167:admin> spinsilk
spinSilk: This command may not be executed on an operational switch.
You must first disable the switch using the "switchDisable" command.
diag167:admin> switchdisable
diag167:admin> spinsilk

Running Spin Silk .....
One moment please ...
switchName:    diag167
switchType:    3.4
switchState:   Testing
switchRole:    Disabled
switchDomain:  2 (unconfirmed)
switchId:      fffc02
switchWwn:     10:00:00:60:69:20:1e:fc
switchBeacon:  OFF
port 0: -- No_Module Disabled
port 1: -- No_Module Disabled
port 2: -- No_Module Disabled
port 3: sw Testing Loopback->7
port 4: -- No_Module Disabled
port 5: -- No_Module Disabled
port 6: -- No_Module Disabled
port 7: sw Testing Loopback->3

Transmitting ... done.
Spinning ...
port 7 Rx/Tx 1 million frames.
port 3 Rx/Tx 1 million frames.
port 3 Rx/Tx 2 million frames.
port 7 Rx/Tx 2 million frames.
port 3 Rx/Tx 3 million frames.
port 7 Rx/Tx 3 million frames.

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status: Thu Mar 29 14:23:47 2001

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

    pt3:  4031081 frTx    4025437 frRx    0 LLI_errs. <looped-7>
    pt7:  4025792 frTx    4031438 frRx    0 LLI_errs. <looped-3>

Central Memory OK
Total Diag Frames Tx: 1297
Total Diag Frames Rx: 1877

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og:
```

Note – *spinSilk* is a test that requires you to disable the switch. In addition, you must insert a single cable that connects two ports together (that is, the cable goes from port 3 to port 7), and uncable the devices, which results in halted access to the devices via this path.

portLoopbackTest example

```
diag167:admin> portloopbacktest 100
Running Port Loopback Test .... passed.
diag167:admin>
```

portloopbackTest tests only the internal port circuitry; it does not test the GBICs and cables connected to that port. Also, *portloopbackTest* is an offline test only.

nsShow example

```
diag167:admin> nsshow
The Local Name Server has 25 entries {
  Type Pid      COS      PortName                               NodeName                               TTL(sec)
  NL   0213b5;    3;50:80:02:00:00:08:3c:b4;50:80:02:00:00:08:3c:b0; na
      FC4s: FCP [SUN      SENA      1.09]
      Fabric Port Name: 20:03:00:60:69:20:1e:fc
  NL   0213ba;    3;22:00:00:20:20:37:45:04:e2;20:00:00:20:20:37:45:04:e2; na
      FC4s: FCP [SEAGATE ST39103FCSUN9.0G034A]
      Fabric Port Name: 20:03:00:60:69:20:1e:fc
  ...
  NL   0213ef;    3;22:00:00:20:20:37:19:f7:e0;20:00:00:20:20:37:19:f7:e0; na
      FC4s: FCP [SEAGATE ST39103FCSUN9.0G034A]
      Fabric Port Name: 20:03:00:60:69:20:1e:fc
  NL   021501;    3;21:01:00:e0:8b:22:6d:2a;20:01:00:e0:8b:22:6d:2a; na
      Fabric Port Name: 20:05:00:60:69:20:1e:fc
}
diag167:admin>
```

nsShow is a listing of the WWNs of the devices attached to the switch.

Port Differences between Sun StorEdge Ports and Brocade Ports

TABLE C-1 Port Differences

| Sun StorEdge | Brocade | Function |
|-------------------------------|---------|---|
| T_Port | E_Port | Expansion Port. Used for interswitch connections |
| SL_Port (segmented loop) | L-Port | Loop Port. In Sun StorEdge switch, the SL_Port is Private Loop only. |
| TL_Port (translative loop) | L-Port | Loop Port. This port is used to allow private devices to communicate with fabric or public devices. In the Brocade switch, this address translation is automatic. In Sun StorEdge switches, the private device must be configured on a TL-Port. |
| F_Port | F_Port | A fabric port that is point-to-point only, not loop capable, and used to connect N_Ports to the switch. |
| FL_Port | FL_Port | A fabric port that is loop-capable and used to connect NL_Ports to the switch. |
| N/A | G_Port | Brocade has a G_Port, which is a generic port. This port can operate as either an E_Port or an F_Port. A port is defined as a G_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric. |
| N/A | U_Port | Brocade has a U_Port or Universal Port. This port can operate as an E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not yet fully connected or has not yet assumed a specific function in the fabric. |

Accessing the Silkworm switch

You can access the Silkworm switches in multiple ways:

- Telnet via a standard RJ-45 Ethernet port
- The front panel (2800 only)
- A serial connection (2400 only)
- The WebTools GUI

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

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

The WebTools GUI is a separately licensed feature. All Brocade switches that are sold by Sun Professional Services should come with the license pre-installed. WebTools can be accessed via a standard web browser (Netscape or Microsoft Internet Explorer with a Java Plugin) by pointing the browser to `http://<ip_address_of_switch>`

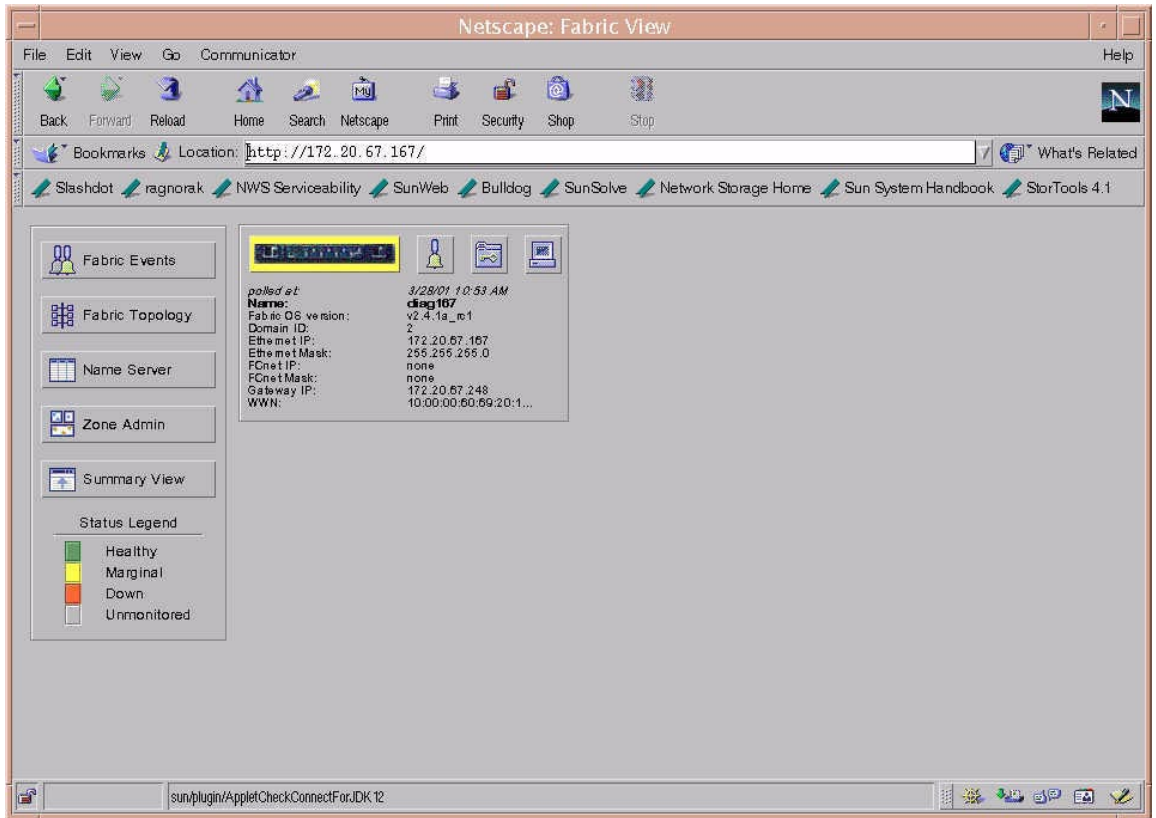


FIGURE C-1 Brocade Webtools GUI

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

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

Power On Self Tests (POST)

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

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

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

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

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

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

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

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

Removing Power

Caution –

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

Status and Activity Indicators

Front Panel LED Port Indicators

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

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

See the *Brocade Silk Worm Hardware Reference Manual* for further details.

Initialization Steps:

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

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

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

Troubleshooting Overview

This section highlights the troubleshooting methodology differences between the current Brocade switch in a Mamba configuration.

Brocade and Sun StorEdge StorTools 4.x

Note – The current version of Sun StorEdge StorTools (4.x) cannot recognize or utilize the Brocade switch in diagnostic routines.

The features of the StorEdge switch and the Sun StorEdge StorTools test *switchtest* are not available in a configuration with a Brocade switch. The ability for Sun StorEdge StorTools 4.x to map the data path from the host bus adapter, to the switch, and then out to the storage device is not present in a Brocade configuration at this time. This capability is tentatively scheduled for the Sun StorEdge StorTools 4.2 release timeframe (Q1, FY02). Until that release, Sun StorEdge StorTools 4.x will only be able to test and diagnose the HBA and the storage itself. The switch and path isolation diagnosis will have to be done manually.

Methodology

In order to effectively isolate and diagnose a failing component in a Brocade Mamba configuration, certain broad steps can be outlined to assist you in pinpointing the source of the problem. In each step, tools or tests that may help you are noted.

1. Discover Error

- `/var/adm/messages`
- SNMP traps and events
- Application errors
- Sun StorEdge RASAgent 2.0 notification
- Storage notification (such as Sun StorEdge Component Manager 2.2 and Raid Manager)

2. Identify Failing Path

- `luxadm` output
- `switchShow`, `supportShow`, and `qlShow` from the Brocade switch
- Sun StorEdge StorTools 4.x output
- Observe LEDs

3. Map Failing Path

- `luxadm` output
- `nsShow`, `switchShow`, and `qlShow` from the Brocade switch
- Sun StorEdge StorTools 4.x output
- Customer configuration documentation

4. Disable path for troubleshooting

- Application specific, `vxdmpadm` for example

5. Isolate subsections of the path

- `loopPortTest` from Brocade switch

6. Isolate FRUs in the path

- `loopPortTest` `crossPortTest` from Brocade switch
- Sun StorEdge StorTools 4.x component tests (`qlctest`, `a5ktest`, `t3test`)

Troubleshooting Case Study

The following case study is included to illustrate a practical application of the steps outlined above. **Note, however, that this application is not the only way to approach the problem.**

Knowledge and training on all the components in the SAN are a prerequisite before attempting the procedures below. In this test case, I/O load was generated with the dex disk exerciser to simulate customer load, and the steps outlined below allowed that I/O to continue uninterrupted throughout the procedure.

Configuration

- Ultra Enterprise 250
- Solaris 8 10/00 KJP 108528-05
- Dual PCI FC Host Bus Adapter (2) FCode 1.10
(crystal cards are not officially supported)
- Sun StorEdge A5200 (1.09 IB firmware, single full loop)
- Brocade Silksworm 2400 (2)
- Sun StorEdge StorTools 4.x
- Sun StorEdge RASAgent 2.0
- Veritas Volume Manager 3.0.4c

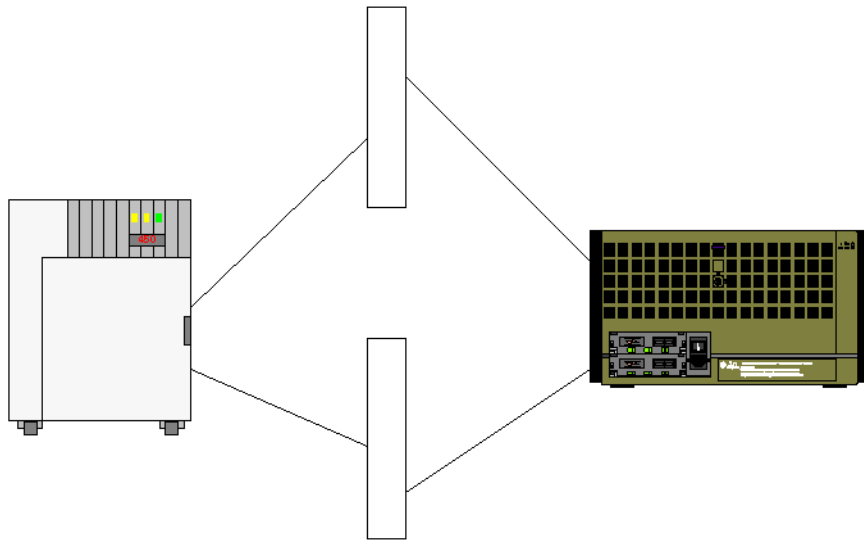


FIGURE C-2 Sun StorEdge A5200 array configured in a single loop.

In this diagram, Loop A is connected to one switch and Loop B is connected to the other switch. The server has two HBAs, with one port on each HBA connecting to each switch. Vxdmp is used to control the multi-pathing.

Troubleshooting the Problem

The path `/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0/ssd@w220000203719f7e0,0` and `qlc(3)` are posting errors. The `/var/adm/messages` output follows:

```
Mar 28 12:09:07 diag233.Central.Sun.COM scsi: [ID 243001 kern.warning] WARNING:
/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0/ssd@w22000020373cc091,0 (ssd23):
Mar 28 12:09:07 diag233.Central.Sun.COM          SCSI transport failed: reason 't
imeout': retrying command
Mar 28 12:09:07 diag233.Central.Sun.COM
Mar 28 12:10:08 diag233.Central.Sun.COM scsi: [ID 243001 kern.warning] WARNING:
/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0/ssd@w22000020373cc1ac,0 (ssd32):
Mar 28 12:10:08 diag233.Central.Sun.COM          SCSI transport failed: reason
'timeout': retrying command
Mar 28 12:10:08 diag233.Central.Sun.COM
Mar 28 12:10:38 diag233.Central.Sun.COM scsi: [ID 243001 kern.warning] WARNING:
/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0/ssd@w220000203719f7e0,0 (ssd41):
Mar 28 12:10:38 diag233.Central.Sun.COM          SCSI transport failed: reason
'timeout': retrying command
Mar 28 12:10:38 diag233.Central.Sun.COM
...
Mar 28 12:15:43 diag233.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE: Qlogic
qlc(3): Loop OFFLINE
Mar 28 12:15:43 diag233.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE: Qlogic
qlc(3): Loop ONLINE
```

1. Ensure that the physical path and the qlc label are indeed the same path.

```
# luxadm -e port

Found path to 4 HBA ports

/devices/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0:devctl1      CONNECTED
/devices/pci@1f,4000/pci@4/SUNW,qlc@5/fp@0,0:devctl1      NOT CONNECTED
/devices/pci@1f,2000/pci@1/SUNW,qlc@4/fp@0,0:devctl1      NOT CONNECTED
/devices/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0:devctl1      CONNECTED

# grep -h "qlc3 is" /var/adm/messages | sort -M |tail -1
Mar 28 12:00:13 diag233.Central.Sun.COM genunix: [ID 936769 kern.info] qlc3 is
/pci@1f,2000/pci@1/SUNW,qlc@5
```

Since the paths match, conclude that this is the affected path.

2. Determine what is connected on this path.

```
# luxadm -e dump_map /devices/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0:devctl
Pos AL_PA ID Hard_Addr Port WWN Node WWN Type
0 c9 14 c9 22000020373cc1ac 20000020373cc1ac 0x0 (Disk device)
1 c3 18 c3 22000020374507de 20000020374507de 0x0 (Disk device)
2 ba 1a ba 22000020374504e2 20000020374504e2 0x0 (Disk device)
3 bc 19 bc 2200002037450d3a 2000002037450d3a 0x0 (Disk device)
4 d5 a d5 22000020373cc091 20000020373cc091 0x0 (Disk device)
5 cc 11 cc 22000020373ccb07 20000020373ccb07 0x0 (Disk device)
6 ef 0 ef 220000203719f7e0 200000203719f7e0 0x0 (Disk device)
7 d2 d d2 5080020000083cb3 5080020000083cb0 0xd (SES device)
8 b5 1d b5 5080020000083cb4 5080020000083cb0 0xd (SES device)
9 da 7 da 220000203719f802 200000203719f802 0x0 (Disk device)
10 e4 2 e4 220000203719f803 200000203719f803 0x0 (Disk device)
11 c7 15 c7 22000020374505ca 20000020374505ca 0x0 (Disk device)
12 d9 8 d9 220000203745060f 200000203745060f 0x0 (Disk device)
13 e0 5 e0 220000203719eb58 200000203719eb58 0x0 (Disk device)
14 d4 9 d4 2200002037450d6b 2000002037450d6b 0x0 (Disk device)
15 c6 16 c6 2200002037450d4c 2000002037450d4c 0x0 (Disk device)
16 cb 12 cb 2200002037450d4d 2000002037450d4d 0x0 (Disk device)
17 e2 3 e2 220000203719f7d0 200000203719f7d0 0x0 (Disk device)
18 dc 6 dc 220000203719f7b0 200000203719f7b0 0x0 (Disk device)
19 e8 1 e8 220000203719f810 200000203719f810 0x0 (Disk device)
20 e1 4 e1 220000203719f6f4 200000203719f6f4 0x0 (Disk device)
21 ca 13 ca 2200002037450d71 2000002037450d71 0x0 (Disk device)
22 cd 10 cd 22000020373cce1c 20000020373cce1c 0x0 (Disk device)
23 c5 17 c5 220000203745053c 200000203745053c 0x0 (Disk device)
24 1 7d 0 210100e08b226d2a 200100e08b226d2a 0x1f (Unknown Type,Host Bus
Adapter)
```

— The screen displays a Sun StorEdge A5200 array with 22 disks connected.

3. Note the WWN of the HBA (device 24), which helps to identify to which switch this HBA is connected.

If proper configuration documentation is maintained, this can be simply a verification of what is documented. For this problem, the HBA has a WWN of 200100e08b226d2a.

4. Now that you've identified the path, disable the path to allow further troubleshooting.

The dual-pathed, redundant configuration makes online troubleshooting possible. In this case, `vxdmp` is being used to provide multi-pathing to the Sun StorEdge A5200 array. Failing the problem path will cause all I/O to failover to the alternate path.

```

# vxddmpadm listctlr all
CTLR-NAME      DA-TYPE      STATE      DA-SNO
=====
ctlr0          OTHER        ENABLED    OTHER_DISKS
              ctlr0=/pci@1f,4000/scsi@3

ctlr1          SEAGATE      ENABLED    SEAGATE_DISKS
              ctlr1=/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0

ctlr2          SEAGATE      ENABLED    SEAGATE_DISKS
              ctlr2=/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0
# vxddmpadm disable ctlr=/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0

```

5. Watch /var/adm/messages to verify that the path is disabled.

```

Mar 28 12:18:23 diag233.Central.Sun.COM vxddmp: [ID 969440 kern.notice] NOTICE:
vxvm:vxddmp: disabled controller /pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0 connected to
disk array SEAGATE_DISKS

```

```

# vxddmpadm listctlr all
CTLR-NAME      DA-TYPE      STATE      DA-SNO
=====
ctlr0          OTHER        ENABLED    OTHER_DISKS
              ctlr0=/pci@1f,4000/scsi@3

ctlr1          SEAGATE      ENABLED    SEAGATE_DISKS
              ctlr1=/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0

ctlr2          SEAGATE      DISABLED   SEAGATE_DISKS
              ctlr2=/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0

```

6. Using the WWN (200100e08b226d2a) that you noted above, telnet to the switches and verify to what switch the device is connected.

Again, customer documentation or visual inspection could also reveal the same information.

7. If there is no customer documentation, or if you have no immediate access to the hardware, you can run the *nsShow* command on the Brocade switch.

This command dumps the Name Server information with each device's WWN noted, and to what port the device is connected.

```
NL 021501;          3:21:01:00:e0:8b:22:6d:2a;20:01:00:e0:8b:22:6d:2a; na
Fabric Port Name: 20:05:00:60:69:20:1e:fc
```

By looking for the HBA's WWN, you can see that this switch is the correct switch on which to focus your troubleshooting. You can now get an overall view of the switch. In this case, the storage is connected to port 3 (24 private devices on the loop) and the HBA is connected to port 5 (1 private device).

```
diag167:admin> switchshow
switchName:      diag167
switchType:      3.4
switchState:     Online
switchRole:      Principal
switchDomain:     2
switchId:        fffc02
switchWwn:       10:00:00:60:69:20:1e:fc
switchBeacon:    OFF
port 0: -- No_Module
port 1: -- No_Module
port 2: -- No_Module
port 3: sw Online           L-Port 24 private, 2 phantom
port 4: -- No_Module
port 5: sw Online           L-Port 1 private, 25 phantom
port 6: -- No_Module
port 7: -- No_Module
```

8. Test the links. You can run *loopPortTest* with no options to test both paths at once (switch-host path and switch-storage path).

```
diag167:admin> loopporttest
Configuring normal L-Ports ( pt3 pt5 ) to Cable Loopback L-ports.....done.

Running Loop Port Test .....0x10f587a0 (tShell): Mar 28 12:26:10
Error DIAG-TIMEOUT, 1, loopPortTest, pass 66,
Pt5 (Lml) Receive Timeout,
Err# F06F

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og:
```

In this case, there is an error with Pt5 (port 5), which is the switch-host connection (the link HBA-cable-GBIC-Port 5.) Concentrating your troubleshooting along this path will help you isolate to the proper failing FRU.

Note – Brocade’s diagnostics mark a port BAD on error.

- 9. In order to continue running tests on Pt5, clear the current error condition with a *diagClearError* <port #>.**

```
Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: q
FAILED.

Configuring Loopback L-port(s) back to normal L-port(s).....done.
diag167:admin> diagclearerror 5
0x10f587a0 (tShell): Mar 28 12:29:39
      Error DIAG-CLEAR_ERR, 3,
Pt5 (Lml) Diagnostics Error Cleared
Err# 0001
```

- 10. Re-run the *loopPortTest* on port 5 alone. The syntax of the command is *loopPortTest* <number of frames><port #>.**

Note – For this test, an arbitrarily high number of frames was chosen to ensure the port was well saturated during the test.

```
diag167:admin> loopporttest 100000000, 5
Configuring L-port 5 to Cable Loopback Port.....done.

Running Loop Port Test .....0x10f587a0 (tShell): Mar 28 12:30:30
      Error DIAG-TIMEOUT, 1, loopPortTest, pass 62,
Pt5 (Lml) Receive Timeout,
Err# F06F

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status:  Wed Mar 28 12:31:52 2001

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

      pt3:      151962 frTx          1745 frRx          0  LLI_errs.
      pt5:      152351 frTx          871 frRx          3  LLI_errs.  <looped-5>

Central Memory OK
Total Diag Frames Tx: 1004
Total Diag Frames Rx: 1602

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og:
```

— Again, port 5 is marked BAD.

- 11. Test the individual FRUs in the link.**
- 12. Test the host’s HBA by running the Sun StorEdge StorTools 4.x *qlctest*.**

Note –

For this test, a loopback connector is inserted into the HBA and the test is run with most of the options except *External Loopback Test*, which is turned off to speed up the execution time.

You can also run this test from the Sun StorEdge StorTools GUI.

```
# sparcv9/qlctest -v -o dev=qlc-3,run_connect=Yes,checksum=Disable,selftest=
Disable,mbox=Disable,ilb_10=Disable,ilb=Disable,elb=Enable,icnt=1000,lbfpattern=
0x7e7e7e7e
"qlctest: called with options: dev=qlc-3,run_connect=Yes,checksum=Disable,selftest=
Disable,mbox=Disable,ilb_10=Disable,ilb=Disable,elb=Enable,icnt=1000,lbfpattern=
0x7e7e7e7e"
"qlctest: Started."
"Program Version is 4.0.1"
"Testing qlc-3 device at /devices/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0:devctl."
"Running external loopback test"
"Performing Loop Back Frame Test. Pattern: 0x7e7e7e7e"
"Performing Loop Back Frame Test. Pattern: 0xf0f0f0f"
"Performing Loop Back Frame Test. Pattern: 0x43434343"
"Performing Loop Back Frame Test. Pattern: 0x48484848"
"Performing Loop Back Frame Test. Pattern: 0x49494949"
"Performing Loop Back Frame Test. Pattern: 0x4a4a4a4a"
"Performing Loop Back Frame Test. Pattern: 0x78787878"
"Performing Loop Back Frame Test. Pattern: 0x7e7e7e7e"
"Performing Loop Back Frame Test. Pattern: 0x7f7f7f7f"
"Performing Loop Back Frame Test. Pattern: 0xaa55aa55"
"Performing Loop Back Frame Test. Pattern: 0xb5b5b5b5"
"Performing Loop Back Frame Test. Pattern: 0xdb6db6db"
"Performing Loop Back Frame Test. Pattern: 0xe7e7e7e7"
"Performing Loop Back Frame Test. Pattern: 0xffffffff"
"qlctest: Stopped successfully."
```

The successful completion of this test rules out the HBA as a failing FRU. You can now concentrate on the switch side, namely the port and GBIC.

13. Insert a Loopback connector in port 5.

As noted in the *switchShow* output, the port is noted with a *Loopback -> 5* to indicate proper connection with the Loopback plug. The port will also flash a slow, green light.

14. Once you have inserted the Loopback plug, run the *crossPortTest* to test the port-GBIC combination.

You can run this test on a single port and this single port can have a loopback inserted. The syntax is *crossPortTest <number of passes><1>*. The *<1>*, for *singlePortAlso* mode, designates that a port can be looped back to itself.

```

diag167:admin> switchshow
switchName:      diag167
switchType:      3.4
switchState:     Online
switchRole:      Principal
switchDomain:     2
switchId:        fffc02
switchWwn:       10:00:00:60:69:20:1e:fc
switchBeacon:    OFF
port 0: -- No_Module
port 1: -- No_Module
port 2: -- No_Module
port 3: sw Online      L-Port 24 private, 1 phantom
port 4: -- No_Module
port 5: sw Online      Loopback->5
port 6: -- No_Module
port 7: -- No_Module

diag167:admin> crossporttest 5,1

Running Cross Port Test .....0x10f587a0 (tShell): Mar 28 14:44:25
Error DIAG-ERRSTAT, 1, crossPortTest1, pass 4,
Pt5 (Lml) Enc_out Error Counter is 1 sb 0,
Err# 3145

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status:  Wed Mar 28 14:45:39 2001

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

    pt3:      426985 frTx      13594 frRx      0 LLI_errs.
    pt5:           4 frTx           4 frRx      992 LLI_errs. <looped-5>

Central Memory OK
Total Diag Frames Tx: 1055
Total Diag Frames Rx: 1653

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og:

```

In this test, port 5 again failed. This indicates that after removing the cable from the link, the problem still persists. Most likely, the port or the GBIC is failing.

15. Clear the error again, insert a new GBIC and rerun the test.

```
diag167:admin> diagclearerror 5
0x10f587a0 (tShell): Mar 28 14:46:10
      Error DIAG-CLEAR_ERR, 3,
Pt5 (Lm1) Diagnostics Error Cleared
Err# 0001
diag167:admin> crossporttest 5,1

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

— The test now passed with a new GBIC.

16. Recable the link and retest the entire path.

When recabling the HBA, you may need to send a LIP to force the HBA to "wake up" and rejoin the loop.

```
luxadm -e forcелip /devices/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0:devctl
```

You will want to see both ports logged into the switch correctly.

```
diag167:admin> switchshow
switchName:    diag167
switchType:    3.4
switchState:   Online
switchRole:    Principal
switchDomain:   2
switchId:      fffc02
switchWwn:     10:00:00:60:69:20:1e:fc
switchBeacon:  OFF
port  0: -- No_Module
port  1: -- No_Module
port  2: -- No_Module
port  3: sw Online      L-Port  24 private, 2 phantom
port  4: -- No_Module
port  5: sw Online      L-Port  1 private, 25 phantom
port  6: -- No_Module
port  7: -- No_Module
```

17. Retest the link from port 5 to the host using *loopPortTest*.

```

diag167:admin> loopporttest 100000,5
Configuring L-port 5 to Cable Loopback Port.....done.

Running Loop Port Test .....

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og: s

Diagnostics Status:  Wed Mar 28 14:52:47 2001

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

    pt3:      574893 frTx      15240 frRx      0  LLI_errs.
    pt5:        160 frTx      160 frRx      0  LLI_errs. <looped-5>

Central Memory OK
Total Diag Frames Tx: 1220
Total Diag Frames Rx: 1818

Diags: (Q)uit, (C)ontinue, (S)tats, (L)og:

```

18. Assuming this test passed, re-enable I/O to this path and put it back into production.

```

# vxdmpadm listctlr all
CTLR-NAME      DA-TYPE      STATE      DA-SNO
=====
ctlr0          OTHER        ENABLED    OTHER_DISKS
              ctlr0=/pci@1f,4000/scsi@3

ctlr1          SEAGATE      ENABLED    SEAGATE_DISKS
              ctlr1=/pci@1f,4000/pci@4/SUNW,qlc@4/fp@0,0

ctlr2          SEAGATE      DISABLED   SEAGATE_DISKS
              ctlr2=/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0
# vxdmpadm enable ctlr=/pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0

Mar 28 14:55:27 diag233.Central.Sun.COM vxdmp: [ID 916426 kern.notice] NOTICE:
vxvm:vxdmp: enabled controller /pci@1f,2000/pci@1/SUNW,qlc@5/fp@0,0 connected to
disk array SEAGATE_DISKS

```

19. Verify that I/O is once again passing through this path by checking the Brocade WebTools GUI Performance Page, seen in FIGURE C-3.



FIGURE C-3 Webtools Performance Page

Glossary

This glossary contains a Fibre Channel reference model, definitions for terms, and examples of error messages used in Fibre Channel Arbitrated Loop (FC-AL).

Fibre Channel Layers

| | |
|--------------|--------------------------------------|
| API | device drivers and applications |
| FC-4 | upper level protocols, e.g. SCSI, IP |
| FC -3 | common services |
| FC-2 | framing protocol and flow control |
| FC-1 | 8bit/10bit encoding |
| FC-0 | physical interface |

Terms

Address Resolution

Protocol (ARP) A protocol that enables systems to query the network to identify devices by internet address.

AL_PA Arbitrated Loop Physical Address; 8-bit value used to identify itself in a Arbitrated Loop in a Arbitrated Loop Cut-through, a technique that allows a routing decision to be made as soon as the destination address of the frame is received.

ASIC Application Specific Integrated Circuit

CRC Cyclic Redundancy Check

**Cyclic Redundancy
Check (CRC)**

A method of detecting small changes in blocks of data.

E_Port An expansion port connecting two switches together.

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

F_Port On a fibre channel switch, a port that supports an N_Port. A fibre channel port in a point-to-point or fabric connection.

N_Port A fibre channel port in a point-to-point or fabric connection.

NL_Port Node loop port; a port that supports Arbitrated Loop protocol.

G_Port On a Fibre Channel switch, a port that supports either F_Port or E_Port

SL_Port Segmented Loop Port. A port connected to a private loop device.

SL_Port Zone A set of ports and their connected devices (zone) that behave as a single private loop.

Zone A set of ports and their connected devices that have been grouped together to control information exchange.

Public Loop An Arbitrated Loop attached to a fabric switch.

Private Loop An Arbitrated Loop without a fabric switch

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

LIP Loop Initialization Primitives

LIP(F7,F7) Example: The first F7 indicates that the HBA recognizes that it is on an active loop. The second F7 indicates that the device has no AL_PA

LIP(F7, AL_PS) The first F7 indicates that it recognizes that it is on an active loop. The AL_PS is the source AL_PA of the LIP. That is, the HBAs previously assigned AL_PA. The HBA is not issuing LIPs, but is notifying the loop that the topology has changed.

LIP(F8, F7) F8 is used to indicate a loop-down state; the F7 indicates that the HBA in this case has no AL_PA

LIP(AL_PD, AL_PS) Selective Reset

D_ID Destination ID, the destination address of the frame

S_ID Source ID, the source address of the frame E_Port. An expansion port connecting two switches together.

Out-of-band Transmission of management protocol outside of the Fibre Channel network, typically over ethernet.

8b/10b encoding An encoding scheme that converts an 8-bit byte into one of two possible 10-bit characters (negative or positive).

Index

A

- AC input power
 - connector and fuses, 22
- adapter
 - PIC single fibre channel network, 4
- adapter ports
 - connection of, 2
- arrays
 - configuration guidelines, 5
 - maximum number possible per zone, 5
 - mixing in the same zone, 5

B

- blink pattern
 - arbitrated loop test failure, 31
 - failure, 28
 - fibre channel port loopback test failure, 30
 - flash checksum failure, 28, 29
 - force PROM mode, 29
 - GBIC bypass port loopback test failure, 30
 - NVRAM test failure, 32
 - PROM checksum failure, 28
 - RAM failure, 28
 - switch ASIC test failure, 29
 - switch auto-route test failure, 31
 - switch bus test failure, 31
 - switch management port failure, 31

C

- cables, multi-mode

- maximum length supported, 4
- capture utility, 82
- configuration
 - multi-host, 13
- configuration guidelines, 5
- configurations
 - hardware supported, 4
 - supported, 2
- connector
 - switch management, 22
- connector and fuses, 22
- conventions
 - typographic, iv
- counter
 - descriptions from port display window, 35
 - LIP, 33
 - names and descriptions (faceplate window), 39
- counters
 - viewing, 33

D

- diagnosing and troubleshooting the switch, 23
- diagnostic information, 41
- diagnostic isolation, 44
- diagnostic tools, 16
- diagram
 - isolation in areas 1, 2, and 3, 44
 - LEDs and back panel controls (16-port), 19
 - LEDs and back panel controls (8 port), 18
 - single host connected to multiple StorEdge T3

- partner pairs, 12
- single host connected to one Sun StorEdge A5200 controller module, 7
- single host connected to one Sun StorEdge T3 partner pair, 8
- single host connection to one Sun StorEdge A3500-FC controller module, 7
- single host to multiple A3500-FC controller modules, 9
- single host to multiple A5200 controller modules, 10
- single host to two StorEdge T3 partner pairs, 11
- Sun StorEdge StorTools 4.x array tests, 43
- Sun StorEdge StorTools 4.x qlctest, 41
- switch and interconnections, 1
- test mode switch functions and positions, 26
- two hosts connected to multiple A3500-FC controller modules, 13
- two hosts connected to multiple Sun StorEdge A5200 controller modules, 14
- two hosts connected to multiple Sun StorEdge T3 partner pairs, 15

documentation

- accessing online, v
- ordering, vi

E

ethernet LEDs, 22

F

failure

- associated with fibre channel port, 24
- complete, 32
- hung flash control code, 32
- PROM checksum, 24

failure information, 17

fault isolation

- bad cable between host and switch, 46
- bad cable between host and switch using functional test, 51
- bad cable from switch to storage, 59
- bad GBIC in storage (A5200), 67
- bad GBIC in switch, 48
- catastrophic switch failure, 56
- examples of, 46

firmware

- for Mamba configuration, 74

flowchart

- isolation of SAN components, 89

frequently-asked questions (FAQ), 73

front panel

- switch modes, 26

G

GBICs, maximum length supported, 4

H

host

- configuration guidelines, 5
- tools for troubleshooting, 16

I

indicator

- fan fail LED (red), 20
- heartbeat LED (yellow), 20
- logged-in LED (green), 21
- over temperature LED (red), 21
- switch logic power good LED (green), 20
- traffic LED (yellow), 21

information

- helpful failure, 17
- required before you begin troubleshooting, 17
- switch counter, 33

L

LEDs

- back panel, 20
- ethernet, 22
- heartbeat blink patterns, 27

link status, 22

LIP

- forcing on a system, 79

luxadm

- use of to add storage to zone, 5
- used to find fibre channel cards, 78

M

multi-host configuration, 13

P

part numbers

hardware supported, 4

patches

for Mamba configuration, 74

tools used to track, 76

patches necessary for switch support, 5

pkgadd SUNWsmgr, 75

pkgrm SUNWsmgr, 75

POST

bus error, 24

diagnostic program, 25

error descriptions, 24

port error, 24

power-on-self-test, 23

PROM checksum error, 24

power checks and troubleshooting, 23

power switch

location on switches, 20

Q

Qlogic switch GUI, 73

R

related documentation

AnswerBook, iii

RAID Manager 6.22 User's Guide, v

SANbox 8/16 Segmented Loop Switch

Management User's Manual, v, 2, 3

Solaris Handbook for Sun Peripherals, iii

Sun SANbox 16 Segmented Loop Switch User's Manual, v

Sun StorEdge A5000 Configuration Guide, v

Sun StorEdge A5000 Installation and Service Guide, v

Sun StorEdge network FC switch-8 and switch-16 Installation and Configuration Guide, v, 3

Sun StorEdge network FC switch-8 and switch-16 Release Notes, v

Sun StorEdge StorTools User's Guide, Version

4.x, part number 806-6235-10, 41

Sun StorEdge T3 Disk Tray Administrator's Guide, v

Sun StorEdge T3 Disk Tray Installations, Operations and Service Manual, v

Sun Switch Management Installer's/User's Manual, 24

S

SAN components

isolation of, 89

sanbox API, 87

screwdriver

which to use for the switch's rotary test mode dial, 75

shell prompts, iv

solaris

required level, 5

storage

tools for troubleshooting, 16

StorTools

version required to support configurations, 2

Sun StorEdge Network FC Switch-8 and Switch-16

troubleshooting guide

scope of, 2

Sun StorEdge RASAgent 1.1

revision checking, 76

Sun StorEdge StorTools 4.x

array tests, 43

qlctest, 41

stexpert (offline), 45

switchtest, 42

Sun StorEdge StorTools 4.x GUI, 76

Sun StorEdge Stortools 4.x GUI

mapping HBAs, 79

SUNWsmgr package, 74

switch

tools for troubleshooting, 16

switch counter information, 33

switch GUI, 75

switches

configuration guidelines, 5

T

- table
 - arrays, zones, and initiators, 6
 - dynamic addition to a zone, 6
- test
 - a5ksestest, 54, 59
 - functional a5ktest, 47
 - switchtest, 57, 60, 62
- test mode switch
 - force PROM, 25
 - location of, 25
 - normal operation, 25
 - using, 25
- test mode switch functions
 - troubleshooting, 27
- tests
 - cable continuity, 23, 32
 - execution in area 1, 45
 - execution in area 2, 45
 - execution in area 3, 45
- tools
 - diagnostic, 16
 - hardware, 16
- troubleshooting
 - power checks, 23
 - power-on-self-test (POST), 23
- troubleshooting and diagnosing the switch, 23
- troubleshooting guide
 - purpose of, 2
 - scope of, 1

U

- UNIX commands
 - use of, iii

W

- weblog.gui
 - checking, 58
- website
 - http
 - [//www.sun.com/service/support/sunsolve/index.html](http://www.sun.com/service/support/sunsolve/index.html), 2

W

- window
 - functional test of switch, 57
 - port display, 34
 - switch GUI, 58
 - web gui, 38

Z

- zoning
 - configuration, 3, 5
 - difference between SL zoning and hard zoning, 73