Storage Automated Diagnostic Environment 2.2 User's Guide

Device Edition

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Preface

The *Storage Automated Diagnostic Environment User's Guide* explains how to use the Storage Automated Diagnostic Environment graphical user interface (GUI) to collect data about the condition of various storage devices. In addition, this guide describes the tests that provide diagnostics for the following Sun™ products:

- Sun StorEdge™ T3, T3+, and 6120 array
- Sun StorEdge A5000 and A5200 array
- Sun StorEdge A3500FC array
- Sun StorEdge D2 array
- Sun StorEdge 3310 and 3510 array
- 1-Gbit and 2-Gbit Sun StorEdge network FC switch-8 and switch-16 switches
- 1-Gbit and 2-Gbit Brocade Silkworm switch
- 2-Gbit McData Switches
- 1 Gbit and 2-Gbit Sun StorEdge Fibre Channel network adapter (HBA)
- Internal Fibre Channel disk
- Fibre Channel Tape
- Sun Fire™ V880 server

This guide is written for system administrators and support personnel who are already familiar with Sun disk array and storage area network (SAN) products.

How This Book Is Organized

This book contains the following topics:

Chapter 1 provides an overview and general operating instructions for the Storage Automated Diagnostic Environment.

Chapter 2 contains detailed installation and configuration information for the Storage Automated Diagnostic Environment.

Chapter 3 explains the maintenance functions that are necessary for setting up the Storage Automated Diagnostic Environment for the first time, or for making necessary changes, to ensure proper monitoring and notification.

Chapter 4 explains the monitoring functions that you can perform using the Storage Automated Diagnostic Environment, including monitoring devices, monitoring topology, and monitoring logs.

Chapter 5 discusses the functionality of Storage Automated Diagnostic Environment diagnostic tests from the GUI and the diagnostic tools that are available.

Chapter 6 discusses the various reports and lists associated with the Storage Automated Diagnostic Environment.

Chapter 7 briefly describes the online help associated with the Storage Automated Diagnostic Environment, including utilities, man pages, the event grid, and the GUI online help.

Using UNIX Commands

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

See one or more of the following for this information:

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

Typographic Conventions

Typeface	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`% su` `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized	Read Chapter 2 in the *User's Guide*. These are called *class* options. You *must* be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type `rm` *filename*.

Shell Prompts

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

Product Abbreviations

The following table contains a list of the trademarked Sun product names and the abbreviations used in the Storage Automated Diagnostic Environment.

Trademarked Sun Product Name	Abbreviation
Sun StorEdge A5000 array	Sun A5000
Sun StorEdge A3500FC array	Sun A3500FC
Sun StorEdge T3 and T3+ array	Sun T3
Sun StorEdge D2 array	D2-Array
Internal Fibre Channel Disk	FC-Disk
Sun StorEdge 3310 and 3510 array	3310/3510
Fibre Channel Tape	FC-Tape
Sun StorEdge network 2 Gbit FC Switch 16	Sun-2 Gbit Switch
Sun StorEdge network FC switch-8 and switch-16 1 Gbit switch	Sun Switch
Brocade Silkworm switch	Brocade Switch
Sun Fire 880 FC-AL Disk	V880-Disk

Related Sun Documentation

TABLE P-1 Related Sun Documentation

Product	Title	Part Number
Sun StorEdge T3+ array	• *Sun StorEdge T3+ Array Release Notes*	816-4771
	• *Sun StorEdge T3+ Array Start Here*	816-4768
	• *Sun StorEdge T3 and T3+ Array Regulatory and Safety Compliance Manual*	816-0774
	• *Sun StorEdge T3+ Array Installation and Configuration Manual*	816-4769
	• *Sun StorEdge T3+ Array Administrator's Guide*	816-4770
	• *Sun StorEdge T3 Array Cabinet Installation Guide*	806-7979
Sun StorEdge 6120 Array	• *Start Here (Documentation Guide)*	817-0198
	• *Important Safety Information for Sun Hardware Systems*	816-7190
	• *Sun StorEdge 6120 Array Installation Guide*	817-0199
	• *Sun StorEdge 6120 Array Administration and Reference*	817-0200
	• *Sun StorEdge 6120 Array Release Notes*	817-0201
	• *Sun StorEdge 6120 Array Troubleshooting Guide*	817-0828
Sun StorEdge Host Adapter	• *Sun StorEdge PCI FC-100 HBA Installation Manual*	805-3682
	• *Sun StorEdge SBus FC-100 Host Adapter Installation &Service*	802-7572
	• *Sun StorEdge PCI Dual FC Host Adapter Product Notes*	806-5857
	• *Sun StorEdge PCI Dual FC Host Adapter Installation Guide*	806-4199
	• *Sun StorEdge 2 Gb PCI Single FC Host Adapter Product Notes*	816-5000
	• *Sun StorEdge 2 Gb PCI Single FC Host Adapter Installation Guide*	816-4999
	• *Sun StorEdge 2 Gb cPCI Dual FC Host Adapter Product Notes*	816-5002
	• *Sun StorEdge 2 Gb PCI Dual FC Host Adapter Installation Guide*	816-5001
	• *Sun StorEdge 2 Gb cPCI Dual FC Host Adapter Product Notes*	X6769A
	• *Sun StorEdge 2 Gb cPCI Dual FC Host Adapter Installation Guide*	
Sun StorEdge A5000 array	• *Sun StorEdge A5000 User's Guide*	806-1946
	• *Sun StorEdge A5000 Release Notes*	806-1947
	• *Sun StorEdge A5000 Product Notes*	805-1018
	• *Sun StorEdge A5000 Configuration Guide*	805-0264
	• *Sun StorEdge A5000 Installation and Documentation Guide*	805-1903
Sun StorEdge A3500/A3500FC array	• *Sun StorEdge A3500/A3500FC Configuration Guide*	805-4981
	• *Sun StorEdge A3500/A3500FC Controller Module Guide*	805-4980
	• *Sun StorEdge A3500/A3500FC Task Map*	805-4982

TABLE P-1 Related Sun Documentation

Product	Title	Part Number
Sun StorEdge D2 array	• *Sun StorEdge D2 Array Installation, Operations, Service Manual*	816-2578
	• *Sun StorEdge D2 Array Release Notes*	816-1718
	• *Sun StorEdge D2 Array Cabinet Installation Guide*	816-1696
Sun StorEdge 3310 SCSI Array	• *Sun StorEdge 3310 SCSI Array Installation, Operation, and Service Manual*	816-7290
	• *Sun StorEdge 3310 SCSI Array Contents*	816-7294
	• *Sun StorEdge 3310 Quick Install Guide*	816-7849
Sun Fire V880 Disk Server	• *Sun Fire 880 Server Service Manual*	806-6597
	• *Sun Fire 880 Server Rackmounting Guide*	806-6594
	• *Sun Fire 880 Server Owner's Guide*	806-6592
	• *Sun Fire 880 Server Product Notes*	806-6593
Sun StorEdge network FC switch-8 and switch-16	• *Sun StorEdge Network FC Switch-8 and Switch-16 Field Troubleshooting Guide, SAN 3.1 Release*	816-1701
Sun StorEdge SAN 4.0 (1 Gb switches)	• *Sun StorEdge SAN 4.0 Release Guide to Documentation*	816-4470
	• *Sun StorEdge SAN 4.0 Release Installation Guide*	816-4469
	• *Sun StorEdge SAN 4.0 Release Configuration Guide*	806-5513
	• *Sun StorEdge Network 2 Gb FC Switch-16 FRU Installation*	816-5285
	• *Sun StorEdge SAN 4.0 Release Notes*	816-4472
Sun StorEdge SAN 4.1 (2 Gb switches)	• *Sun StorEdge SAN 4.1 Release Guide to Documentation*	817-0061
	• *Sun StorEdge SAN 4.1 Release Installation Guide*	817-0056
	• *Sun StorEdge SAN 4.1 Release Configuration Guide*	817-0057
	• *Sun StorEdge SAN 4.1 2 Gb Brocade Silkworm Fabric Switch Guide to Documentation*	817-0062
	• *Sun StorEdge SAN 3.1 2 Gb McData Intrepid Director Switch Guide to Documentation*	817-0063
	• *Sun StorEdge SAN 4.1 Release Notes*	817-0071
Solaris	• *Solaris Handbook for Sun Peripherals*	806-2210
RAID Manager 6.22	• *RAID Manager 6.22 User's Guide*	806-0478
	• *RAID Manager 6.22 Release Notes*	806-3721

Accessing Online Sun Documentation

You can view, print, or purchase a broad selection of Sun documentation, including localized versions, at:

`http://www.sun.com/documentation`

Related Brocade Documentation

You can locate the following Brocade documentation on a special website provided by Brocade.

- *Brocade Silkworm® 2400 Hardware Reference Manual*
- *Brocade Silkworm® 2800 Hardware Reference Manual*
- *Brocade Silkworm® 3800 Hardware Reference Manual*
- *Brocade Silkworm® 3800 Quick Start Guide*
- *Brocade Fabric OS™ Reference Manual*
- *Brocade Fabric OS™ Procedures Guide*
- *Brocade QuickLoop User's Guide*
- *Brocade SES User's Guide*
- *Brocade WebTools User's Guide*
- *Brocade Zoning User's Guide*

Accessing Brocade documentation

The URL for the Brocade site is 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. **Under Brocade Partner Network, click the Partner Login link.**
3. **Enter your User ID.**
4. **Enter your password (not included for security purposes).**

   You can obtain the User ID and password information from your Sun Partner representative.

Note – You must have a Brocade Partner login and password to access the documentation.

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 (*817-0822*) of the document in the subject line of your email.

CHAPTER 1

Overview

What is the Storage Automated Diagnostic Environment?

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

The Storage Automated Diagnostic Environment offers the following features:

- A common web-based user interface for device monitoring and diagnostics
- Distributed test invocation by means of lists or topology by means. You can run the tests through the Storage Automated Diagnostic Environment GUI or through the command line interface (CLI).
- Topology grouping for multi-level hosts and components
- Alternate master support for redundancy
- Revision checking
- Remote notification through SRS, SRS/NetConnect, Sun StorEdge Remote Response (SSRR), HTTP, and SNMP Providers, or email
- Support for direct attached storage (DAS) and storage area networks (SANs)
- Encryption by way of a Secure Socket Layer (SSL) protocol to protect transmitted information

How the Storage Automated Diagnostic Environment Works

The Storage Automated Diagnostic Environment uses a variety of system tools to monitor various devices. These system tools are executed by device-specific modules within the Storage Automated Diagnostic Environment. All information generated by the Storage Automated Diagnostic Environment is standardized to the common information model (CIM).

The Storage Automated Diagnostic Environment program executes at fixed intervals from the `cron`(1M) facility and relies on a configuration file describing each device that needs to be monitored. Whenever the devices can be discovered automatically, manual configuration entries are not required. The tasks required to configure the Storage Automated Diagnostic Environment are simplified by the use of a web browser-based GUI.

The Storage Automated Diagnostic Environment captures instrumentation data from, or associated with, the storage devices and applies rules to convert this into a set of events. These events contain information that characterizes the operational behavior of the device. Some of these events can represent conditions that require service action, in which case the event is tagged as an alert.

The Storage Automated Diagnostic Environment sends alerts and events to various recipients through a set of notification facilities, such as email or email targeted at a pager. In addition, the Storage Automated Diagnostic Environment can send events as a telemetry stream through the providers to a secure central repository at Sun. This enables the information to be used for product improvement and enables Sun trained personnel to be more effective in providing service, both proactive and reactive.

Because the Storage Automated Diagnostic Environment is executed from a `cron` and relies on the Internet services daemon (`inetd`(1M)) for communication and for the management console, storage space and resource requirements are kept at a minimum.

To minimize email transmission, the Storage Automated Diagnostic Environment keeps a state database on the local host running the agent. This database keeps state information from one execution to the next. When applicable, information is compared and only the differences are sent.

Storage Automated Diagnostic Environment Master and Slave Agents

By allowing for both master and slave agents, the Storage Automated Diagnostic Environment aggregates all of the agents. This aggregation is also called a *domain*.

The following rules exist for a domain:

- All communicating master and slave agents must execute the same version and patch level of the Storage Automated Diagnostic Environment.

Note – Storage Automated Diagnostic Environment Revision Checking checks the hardware, software, and firmware revisions of all user-selected components. See “To Run Revision Checking Report” on page 192.

- To facilitate monitoring of this environment, configure the Storage Automated Diagnostic Environment as a set of distributed agents, in a master/slave relationship, spread across a series of servers. A single agent is given the role of master and acts as the collection point for events originating in the other slave agents.
- The master must always be configured before the slaves. For more information on master and slave configuration, see “To Start the Storage Automated Diagnostic Environment Services on the Master” on page 16 and “To Set Up a Slave” on page 18.
- The master’s IP address controls the web server interface. You can use the Storage Automated Diagnostic Environment GUI to configure, monitor, and diagnose all supported devices, including the slaves.
- The master and slave code base is identical, except that the slave has one extra file, which identifies its master. This file is located in `/opt/SUNWstade/DATA/MASTER`.

Monitoring Devices Using the Storage Automated Diagnostic Environment

Monitoring varies from device to device but usually consists of the following methods. The Storage Automated Diagnostic Environment typically:

1. Finds and monitors message log files for the device and reports new, relevant entries
2. Executes commands to probe the device for status, state, and statistics information
3. Probes the device remotely for information, for devices that support remote access through a management path

Storage Automated Diagnostic Environment Functions

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

1. Sends the information, by way of a discovery event, to the system administrator, the Network Storage Command Center (NSCC), or to other storage management platforms through an interface with the transport mechanisms.

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

---

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

Diagnostic Functionality

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

The Storage Automated Diagnostic Environment Diagnostic tests are described in Chapter 5, “Diagnostics.”

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

CHAPTER 2

Installing and Starting SUNWstade

This chapter presents instructions for installing, configuring, and starting SUNWstade on your system. It includes the following main topics:

- "Installation Checklist" on page 8
- "Host Requirements" on page 10
- "Product Hints" on page 11
- "Installing SUNWstade" on page 12
- "Getting the Storage Automated Diagnostic Environment Ready" on page 15
- "Upgrading or Removing SUNWstade" on page 21
- "Launching the Storage Automated Diagnostic Environment" on page 23

Installation Checklist

Use the information found in TABLE 2-1 to make sure you perform all of the steps necessary for a successful installation.

TABLE 2-1 Installation Checklist

	Step	Action
☐	1	Download the latest compressed SUNWstade package from Sunsolve. **Note:** You must have root access to install SUNWstade.
☐	2	Move the `SUNWstade` package to a temporary working directory; for example: # **`cp SUNWstade.xxx.tar.Z /tmp`**
☐	3	Uncompress the SUNWstade package. # **`cd /tmp`** # **`uncompress SUNWstadex.xxx.tar.Z`** **`x.xxx`** `is the version number`
☐	4	Untar the SUNWstade package. # **`tar -xvf SUNWstadex.xxx.tar`**
☐	5	Install the `SUNWstade` package using the `pkgadd -d .` command: **`# pkgadd -d .`**
☐	6	Locate potential patches on SunSolve and download them and install using the patchadd As superuser, use the `patchadd` (1M) command. See “Installing a Patch” on page 20.
☐	7	Once you have completely and successfully installed the SUNWstade package, execute the `ras_install` installation script. # **cd /opt/SUNWstade/bin** # **./ras_install** See “When To Run the ras_install Script” on page 16.
☐	8	Access the GUI on the host where the master was installed. Use the server name and port 7654 from a browser to set up the rest of the configuration: `http://<master-server.domain>:7654`

TABLE 2-1 Installation Checklist

☐	9	Log in to the Storage Automated Diagnostic Environment: • Login: `ras` • Default password: `agent`
☐	10	Set the site information parameters. Note that fields with an asterisk (*) are mandatory. See Chapter 3, “Maintenance.”
☐	11	Configure the Sun StorEdge T3 and T3+ array and the host to mirror the `syslog`. See “Setting Up Sun StorEdge Array Message Monitoring” on page 47.
☐	12	Using the Update Host functionality, set the categories to monitor. See “To Maintain Hosts” on page 34.
☐	13	Using Device Discovery, request the Storage Automated Diagnostic Environment to probe the environments for the desired device types. See “Discovering Devices” on page 44.
☐	14	Customize the generation of email using the General Maintenance: Email Notification: Add Notification functionality. See “Customizing Email Deliveries” on page 57.
☐	15	Send a test email and a short message to verify the master instance of the Storage Automated Diagnostic Environment’s mailing capability.
☐	16	Create a topology snapshot using the Maintenance: Topology Maintenance functionality. See “To Create a Topology Snapshot” on page 81.
☐	17	Push the configuration. Do this to ensure that all instances of the master agent are synchronized with every device the Storage Automated Diagnostic Environment is monitoring, or to update the slaves, if applicable. You should push the configuration everytime you change a configuration.
☐	18	Review the configuration to ensure that the Storage Automated Diagnostic Environment is not missing required configuration information necessary for proper monitoring. See “To Review the Configuration” on page 75.
☐	19	Manually run the Storage Automated Diagnostic Environment. See “To Run the Agent Manually” on page 92.

Host Requirements

The SUNWstade package is installed on a Storage Service Processor on a management workstation in the `/opt/SUNWstade` directory. Servers running in the Solaris operating environment (Solaris 8 4/01 or newer) and Sun StorEdge devices are supported. Install SUNWstade on a host that satisfies these conditions:

- The host has access to `/var/adm/messages` files, where device logs are sent.
- The host has access to the Sun StorEdge T3 and T3+ array message log, to which Sun StorEdge T3 , T3+, and 6120 array device logs are sent. The name of the file appears in the Sun StorEdge T3 and T3+ array message log configuration window for each host.
- The host has access to the Sun StorEdge T3, T3+, and 6120 arrays and/or the Sun StorEdge network FC switch-8 and switch-16 switches over TCP/IP.
- For SAN datapath monitoring, the host has access to the data path of the devices being monitored.
- The master host can run a browser to complete and maintain the monitored configuration.
- The Storage Service Processor (which is defined as a *Solaris server host*) connects to Sun storage devices "out-of-band" through Ethernet.
- If Solaris 8 4/01 is installed, the host must have the `SUNWsan` package installed, along with the latest 111413-*xx* `luxadm` patch.

Caution – All communicating master and slave agents *must* be executing the same version and patch level of the Storage Automated Diagnostic Environment. The agent will produce a warning if the version and patch do not match.

Example Configurations

- The Sun StorEdge T3, T3+, and 6120 array has an "in-band" datapath attachment to one host but logs its messages to another management host.
- In a multipath environment, more than one host has access to the same device(s).

Product Hints

- You should be familiar with UNIX commands and Sun's disk array products before attempting to use this product.
- System administrators should be knowlegable about security risks associated with installing a web server. Take the appropriate action to protect access to the SUNWstade port 7654.
- You must use `/opt/SUNWstade` as the package base directory.
- When installing a new patch to SUNWstade, stop the agents before the installing the update and run `ras_install` after installing the update
- For Sun StorEdge™ arrays and Sun StorEdge™ Network FC switches connected in a non-Solaris environment, the package must be installed on a Solaris server and configured to monitor the devices through the management path.
- Brocade Silkworm switch configurations using segmented loop (SL) zones can be monitored and diagnosed, but the topology views will not show connections between devices.
- `switchtest`(1M) and `linktest`(1M) may not provide diagnostics for Fibre Channel links between downlevel HBAs and/or downlevel switches, as well as Fibre Channel links between switches and virtualization engines. This is a result of the current lack of support for the fabric ECHO test command in these products.
- Sun StorEdge 3900 and 6900 series solutions must have the file `/var/opt/SUNWstade/DATA/Solution.golden` created on the Storage Service Processor before launching the GUI. This is the default. However, if you perform an upgrade, execute `/opt/SUNWstade/bin/config_solution` on the Storage Service Processor to update the file.
- If you use Netscape 6.2.X with SSL enabled, you must point the browser to `https://hostname` *without* the port number.
- Creation of `/etc/fcswitch.conf` file may be utilized for discovery of all Storage Automated Diagnostic Environment support Sun StorEdge Network FC switches but is not required. Subnet Discovery is the preferred method of discovery.

Installing SUNWstade

This section contains the following procedures:

- "To Install SUNWstade" on page 13
- "To Verify the Installation" on page 15

Installation Notes

- After the package has been completely installed, execute the program `/opt/SUNWstade/bin/ras_install` to install the SUNWstade service and `cron`. See "When To Run the ras_install Script" on page 16.
- After installing SUNWstade, set the environment variables PATH and MANPATH to include SUNWstade directories `/opt/SUNWstade/bin` and `/opt/SUNWstade/man`.

▼ To Install SUNWstade

- **Use the `pkgadd(1M)` command and answer the prompts as shown in** FIGURE 2-1**.**

```
# pkgadd -d .

The following packages are available:
  1  SUNWstade Storage Automated Diagnostic Environment (sparc) 2.0

Select package(s) you wish to process (or 'all' to process
all packages). (default: all) [?,??,q]: 1

  (various copright notices)

Do you accept the terms?  [yes,no,view,?] yes
  Installation end.

Using </opt/SUNWstade> as the package base directory.

## Processing package information.
## Processing system information.
## Verifying disk space requirements.
## Checking for conflicts with packages already installed.
## Checking for setuid/setgid programs.

This package contains scripts which will be executed with super-user
permission during the process of installing this package.

Do you want to continue with the installation of <SUNWstade> [y,n,?]  y

Installing Storage Automated Diagnostic Environment as <SUNWstade>
## Installing part 1 of 1.

/opt/SUNWstade/Diags/bin/linktest
/opt/SUNWstade/System/cron_started
/opt/SUNWstade/bin/rasagent
/opt/SUNWstade/bin/writeNetConnect <attribute change only>
/opt/SUNWstade/htdocs/index.html
/usr/lib/libqsw.so
/usr/lib/libsanbox.so
/usr/lib/sparcv9/libsanbox.so
[ verifying class <none> ]
## Executing postinstall script.

-----------------------------------------------------
 After the package is completely installed,
 execute the program '/opt/SUNWstade/bin/ras_install'
 to install the rasagent inet service and cron.
-----------------------------------------------------

(Continued on following page)
```

```
(Continued from previous page)

If you choose not to use cron this time, re-run
ras_install later to establish a cron entry.
 ---------------------------------------------------

# /opt/SUNWstade/bin/ras_install

**** Installing Storage Automated Diagnostic Environment and crons ****

? Are you installing a Master or a Slave? (Enter M=master or S=slave):M
(Default = M) *** Master Install ***

? Do you want to turn on https security? Y/N:
(Default = N)

This script will now add the Storage Automated Diagnostic Environment service to the inetd
config file. When this script ends, go to the master agent IP-address, port 7654 with a
browser to complete the Storage Automated Diagnostic Environment configuration.
/etc/services is now updated.
- The inetd.conf entry for rashttp is already in /etc/inetd.conf.

? Do you want to C=start or P=stop Storage Automated Diagnostic Environment cron [C/P,
default=C] : C

  ** Storage Automated Diagnostic Environment cron is now installed.

- Resetting the inetd services to see the new rashttp service.
- Testing access to Storage Automated Diagnostic Environment webserver, (this will timeout
in 20 secs) ...

Storage Automated Diagnostic Environment installed properly!

  To complete the Storage Automated Diagnostic Environment configuration, point your
browser to http://<hostname>:7654. Use the browser only after the Storage Automated
Diagnostic Environment has been installed on all master and slave hosts.
```

FIGURE 2-1 Sample SUNWstade Installation

▼ To Verify the Installation

- **Use the** `pkginfo`**(1M) command:**

```
# pkginfo -l SUNWstade
```

Getting the Storage Automated Diagnostic Environment Ready

After you have successfully installed the Storage Automated Diagnostic Environment, but before you launch it, there are several steps you must follow.

These steps include setting the environment variables, editing the configuration files and manually running `ras_install`.

Configuration Files

`/opt/SUNWstade/DATA/rasagent.conf`

Information such as site location, hosts, devices, and local notifications that you enter into the Storage Automated Diagnostic Environment graphical user interface (GUI) is stored in the `/opt/SUNWstade/DATA/rasagent.conf` file. The file remains on the system between upgrades so that previously-entered configuration information is not lost.

`/etc/hosts`

- **Update the `/etc/hosts` file to include valid entries for *each system* with which the Storage Automated Diagnostic Environment will communicate. This includes proper aliases as well.**

▼ When To Run the `ras_install` Script

Caution – If a slave is configured behind a firewall with a non-routable IP address, `ras_install` will always fail, because the master cannot establish communications back to the client.

- Using the instructions below, you should run the `ras_install` script in the following circumstances:
  - After the initial execution and setup of `pkgadd -d`.
  - When you need to modify the `cron`.
  - When you install a patch.
  - When you need to change the master or slave title of a host agent.

▼ To Start the Storage Automated Diagnostic Environment Services on the Master

1. **Run** ras_install**.**

```
# cd /opt/SUNWstade/bin
# ./ras_install
```

2. **Type M (master) to the following question:**

```
**** Installing the Storage Automated Diagnostic Environment Server and
Crons ****

? Are you installing a Master or a Slave Agent?
(Enter M=master or S=slave):M
```

Note – M = master is the default.

---

3. **Specify if you want to turn on the security feature.**

```
Do you want to turn on https security? Y/N
(Default=N)
```

Note – `https security` is the Secure Sockets Layer (SSL). The SSL encrypts and authenticates messages sent between a browser and the webserver. Encryption using public key cryptography ensures the privacy of the messages sent between the client and the browser. Plain HTTP messages are sent across the network in plain ASCII. Authentication using a trusted certification authority ensures that the client can trust that the server is what it claims to be.

The `ras_install` script, with the master option selected, sets up the host as a master, establishes a Storage Automated Diagnostic Environment entry in `cron` tab, and restarts the `cron` daemon. The `ras_install` script also alters the `/etc/inetd.conf` and the `/etc/services` files to enable the host to serve the GUI for configuring and setting up the Storage Automated Diagnostic Environment.

The `/etc/services` file is updated with the Storage Automated Diagnostic Environment HTTP port number (7654) to service requests from the slave agent and to open the GUI on that port.

4. **When you run the `ras_install` script, a `cron`(1M) entry is added to the `cron` facility, based on your answer to the following question:**

```
? Do you want to C=start or P=stop Storage Automated Diagnostic Environment
cron [C/P, default=C] : C
```

Note – For testing purposes or upon initial configuration, you can skip the `cron` activation during the installation and start the `cron` later by rerunning the `ras_install` script.

The text of the `cron` entry that executes is as follows:

```
0,5,10,15,20,25,30,35,40,45,50,55 * * * *  \
/opt/SUNWstade/bin/rasagent -c >> /opt/SUNWstade/log/cron.log 2>&1
```

In this example, the `cron` attempts to start the `rasagent` program every five minutes. However, if the agent takes longer than five minutes to run, due to the size of the configuration, the program will abort.

You can adjust the monitoring frequency if necessary, and periodically enable or disable the `cron` in order to execute the `rasagent` program. To adjust the monitoring frequency, see “To Maintain Hosts” on page 34.

Installing Distributed Agents (Slaves)

When a server satisfies all or only some of the host requirements to monitor specific storage devices, you can optionally install the Storage Automated Diagnostic Environment on multiple servers.

When you distribute the Storage Automated Diagnostic Environment over several systems, configure only one system (the master) to communicate with the providers. This way, the secondary agents send their findings to the primary host in the form of messages through the HTTP service activated on port 7654.

Caution – All communicating master and slave agents *must* be executing the same version and patch level of the Storage Automated Diagnostic Environment. The agent produces a warning if the version and patch do not match.

Note – To install a slave agent, you must know the IP address or host name of the host that is to be configured as the master agent. If you have not yet installed the master agent, abort installation of the slave agent and install the Storage Automated Diagnostic Environment on the host to be configured as the master.

▼ To Set Up a Slave

1. **Run** `ras_install` **and type** `S` **in response to the following question:**

```
**** Installing the Storage Automated Diagnostic Environment Server and
Crons ****

? Are you installing a Master or a Slave Agent?
(Enter M=master or S=slave): S
```

2. **Enter the IP address or the host name of the master agent.**

Note – If this instance of the slave was previously configured with a master, the IP address or name of that master host is the default selection.

---

3. **Indicate whether you want to turn on the security feature.**

```
Do you want to turn on https security? Y/N
(Default=N)
```

The Storage Automated Diagnostic Environment then verifies that the master host is reachable.

Caution – All communicating master and slave agents *must* be executing the same version and patch level of the Storage Automated Diagnostic Environment. If all of the Storage Service Processors are utilizing a down-level revision, and the data host is utilizing a newer revision, one of the Storage Service Processors must be configured as a master of all the Storage Service Processor slaves, with the data host as a master. This prevents the data host from communicating with the down-level revision, but provides monitoring and diagnostics for the data host connection.

Installing a Patch

Patches are **not mandatory** if you have the most recent SUNWstade package installed. See Sunsolve or PatchPro for the most recent patches.

Note – When installing a patch to the Storage Automated Diagnostic Environment, stop the agents before installing the patch (see "Starting and Stopping Agents" on page 72). Then, run `ras_install` after installing the update.

1. **Download the latest Storage Automated Diagnostic Environment patch from Sunsolve to a temporary workspace.**
2. **As superuser, use the `patchadd` (1M) command and answer the prompts as shown in** CODE EXAMPLE 2-1**.**

CODE EXAMPLE 2-1 Patch Installation

```
# cd /tmp
# uncompress xxxxxx-xx.tar.Z
# tar xvf xxxxxx-xx.tar

# patchadd xxxxxx-xx .
# /opt/SUNWstade/bin/ras_install -options
```

3. **Re-run `ras_install` using the instructions in "To Start the Storage Automated Diagnostic Environment Services on the Master" on page 16.**

Upgrading or Removing SUNWstade

This section contains the following subsections:

- "To Upgrade the Storage Automated Diagnostic Environment Package" on page 21
- "To Remove the SUNWstade Package" on page 22

▼ To Upgrade the Storage Automated Diagnostic Environment Package

---

Note – When installing a new version of, or a patch to, the Storage Automated Diagnostic Environment, stop the agents before installing the update (see "Starting and Stopping Agents" on page 72). Then, run `ras_install` after installing the update.

---

1. **Remove any Storage Automated Diagnostic Environment patches.**
2. **Remove the existing SUNWstade installation using the following command from the `/opt/SUNWstade/` directory:**

```
# pkgrm SUNWstade
```

Caution – Do not remove `/var/opt/SUNWstade/` or `/opt/SUNWstade/` files.

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

---

3. **Reinstall the upgraded package using the following command:**

```
# pkgadd -d .
```

4. **Run `ras_install` to enable the `cron` and to configure the agent as master or slave.**

   a. **Upgrade the master first.**

   b. **Download all patches from SunSolve to the host prior to beginning an upgrade.**

▼ To Remove the SUNWstade Package

1. **Remove the initial installation using the following command:**

```
# pkgrm SUNWstade
```

2. **To completely remove the package for a clean install, remove the following directories once the `pkgrm` command has completed its run:**

```
# rm -f /var/opt/SUNWstade
# rm -f /opt/SUNWstade
```

Launching the Storage Automated Diagnostic Environment

Once you have executed `ras_install`, you can launch the Storage Automated Diagnostic Environment graphical user interface (GUI) from a web browser.

The Storage Automated Diagnostic Environment GUI is a browser-based tool that enables you to maintain and tune the Storage Automated Diagnostic Environment functions. To maintain and tune the Storage Automated Diagnostic Environment, point the browser to the host with the master instance of Storage Automated Diagnostic Environment.

The remainder of this guide explains how to use the GUI functionality.

▼ To Launch the Storage Automated Diagnostic Environment GUI

1. **Open a web browser and go to `http://hostname:7654`**

   where *hostname* is the IP address or the host name of the master.

2. **Log in to the Storage Automated Diagnostic Environment by typing:**

   - Default Login: `ras`
   - Default password: `agent`

   The Storage Automated Diagnostic Environment main window is displayed.

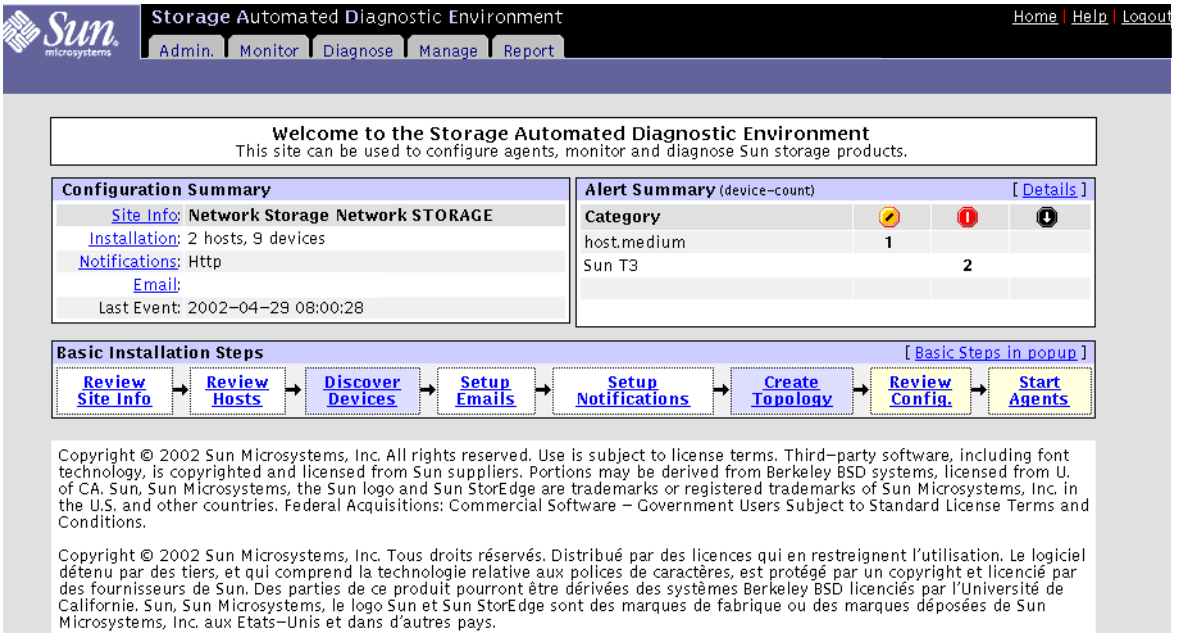


FIGURE 2-2 Storage Automated Diagnostic Environment Main Window

The Master Configuration window opens automatically the first time you initiate the GUI.

Note – The Storage Automated Diagnostic Environment is always accessed on port 7654 of the *host* configured as the *master agent*. All of the agents communicate with one another through this port to synchronize their configurations.

CHAPTER 3

Maintaining the Storage Automated Diagnostic Environment

The Maintenance section includes all the functions that are necessary for setting up the Storage Automated Diagnostic Environment for the first time or to make changes. The primary maintenance functions are shown in TABLE 3-1.

TABLE 3-1 Storage Automated Diagnostic Environment General Maintenance Functions

Task	Function
Maintain host information. See “To Maintain Hosts” on page 34.	• Supports the maintenance of host-specific information such as host name, location, and IP address. • Enables you to manually add a new slave or an alternate master • Tests the availability of the Storage Automated Diagnostic Environment on each host using the Ping Slaves function. • Enables you to push slave configuration to the corresponding slaves.
Add or update the site information. See “To Maintain Site Information” on page 32.	Supports the maintenance of customer information and master configuration information, including: • Customer name, contract number, and location information • Default local message files • Device category selection • Monitoring frequency
Discover devices. See “Discovering Devices” on page 44.	Requests that the Storage Automated Diagnostic Environment probe the environments for the desired device types.

TABLE 3-1 Storage Automated Diagnostic Environment General Maintenance Functions

Add devices manually. See “To Add a Device Manually” on page 48.	Enables you to manually add any currently supported device and enter the information required for that device.
Maintain devices. See “To Maintain Devices” on page 48.	Supports the maintenance of device-specific information. With the Maintain devices functionality, you can update or delete existing devices.
Set up local email and pager notification. See “To Set Up Local Email and Pager Notifications” on page 57.	Enables local notification information: : • Enable specific events to be emailed to local administrators. Events can be categorized by device type, severity level, and event type. Events can also be summarized and sent to a pager’s email address. • Enables events to be automatically translated from their internal encoded format to a human-readable format
Set up a Provider. See “To Set Up Notification Providers” on page 63.	Relays events generated by health monitors.
Control agent activity. See “Starting and Stopping Agents” on page 72.	Temporarily stops the Storage Automated Diagnostic Environment from running on a selected host.
Start or stop devices. See “To Activate or Deactivate Monitoring on a Device-by-Device Basis” on page 73.	If the device is being tested, or if faults are being injected into the device intentionally, temporarily stops the notifications for a specific device.
Test email. See “To Send Test Email” on page 74.	Sends test emails and messages to verify the mailing capability of the Storage Automated Diagnostic Environment.

TABLE 3-1 Storage Automated Diagnostic Environment General Maintenance Functions

Review configurations See “To Review the Configuration” on page 75.	Verifies all configuration settings.
Change configuration options See “Config Options” on page 76.	Enables you to change defaults on selected configuration options.
Optimization/FSA	Aggregates alerts that share common FRUs and attempts to summarize them into more specific groups for root cause analysis.

▼ To Access the Admin Window

1. **Click the Admin link on the Storage Automated Diagnostic Environment main window.**

   Admin is divided into three sections: General Maintenance, Topology Maintenance, and System Utilities, as shown in FIGURE 3-1.

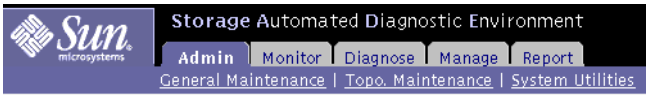


FIGURE 3-1 Admin Sections window

To configure the Storage Automated Diagnostic Environment, use the General Maintenance functions and the information found in TABLE 3-2.

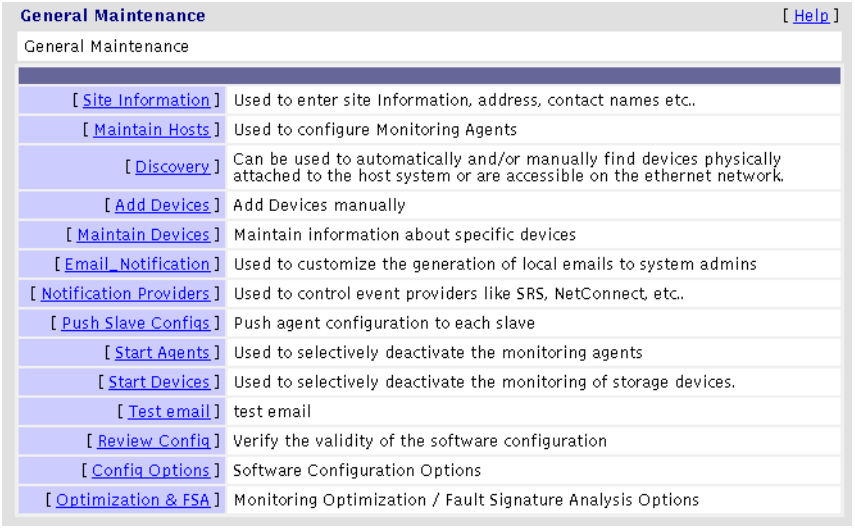


FIGURE 3-2 General Maintenance window

TABLE 3-2 General Maintenance Functions

Function	Description
Site Information	Complete the mandatory fields, denoted with an asterisk (*) before you proceed.
Maintain Hosts	Enables agent configuration.
Discovery	Enables the Storage Automated Diagnostic Environment to probe the in-band data paths of Sun StorEdge devices, as well as the out-of-band management paths for Sun StorEdge devices and Brocade Silkworm switches. **Note:** Agents on hosts with a Sun StorEdge T3, T3+, and 6120 array message log file automatically finds only Sun StorEdge T3, T3+, and 6120 arrays that have made entries in that log file.
Add Devices	Enables you to add devices manually.
Maintain Devices	Enables the Storage Automated Diagnostic Environment to manually add devices or delete unwanted devices or to change the agent's reference to the device(s) being monitored.
Email Notification	Enables the configuration of certain types of events for specific device types, and sends an automatic email to a list of multiple users' email addresses. This option can be fully customized to streamline notifications; for example, in addition to specifying email addresses, you can specify pager numbers.
Notification Providers	The selections you make here instruct the Storage Automated Diagnostic Environment to use the appropriate protocol to send the device data collected by the agent modules back to Sun.
Push Slave Configs	If you select this option, an update occurs, even when there is no information to be updated.

TABLE 3-2 General Maintenance Functions *(Continued)*

Start/Stop Agent	Enables the Storage Automated Diagnostic Environment to start or stop agents from executing. For a slave agent, this option disables monitoring of only those devices that the agent has been configured to monitor. If the master agent is turned off, the slaves continue to run. But if any events occur, the configurations are not pushed to the Storage Automated Diagnostic Environment until the master agent is restarted.
Start/Stop Devices	Enables the Storage Automated Diagnostic Environment to start or stop the alert notification of an event for one or more selected devices. This function does not stop the monitoring of the device and the interface to the provider.
Test Email	Enables the Storage Automated Diagnostic Environment to generate a generic email and send it to the list of recipients configured in the Email Notification step.
Review Config	Enables the Storage Automated Diagnostic Environment to verify all settings and display instructions for those that have been missed or for those that should be double-checked.
Config Options	Use this window to update existing configuration options.
Optimization/FSA	Fault Signature Analysis (FSA) aggregates alerts that share common suspect FRUs. After a set of events is generated but before these events are sent as email or to the NetConnect provider, the FSA module attempts to summarize into fewer and more specific and actionable events. The aggregation of events often points to a root cause of the problem, whereas events are merely *symptoms* of a problem.

General Maintenance

The following sections discuss the general maintenance functions that you can perform using the Storage Automated Diagnostic Environment:

- "To Maintain Site Information" on page 32
- "To Maintain Hosts" on page 34
- "To Maintain Devices" on page 48
- "Customizing Email Deliveries" on page 57
- "Using Providers" on page 62
- "Starting and Stopping Agents" on page 72
- "To Send Test Email" on page 74
- "To Review the Configuration" on page 75
- "Config Options" on page 76
- "Using Fault Signature Analysis" on page 79

▼ To Maintain Site Information

- **From the General Maintenance window, select Site Information. The fields on this page must be completed before you proceed. The fields with an asterisk (*) are mandatory.**

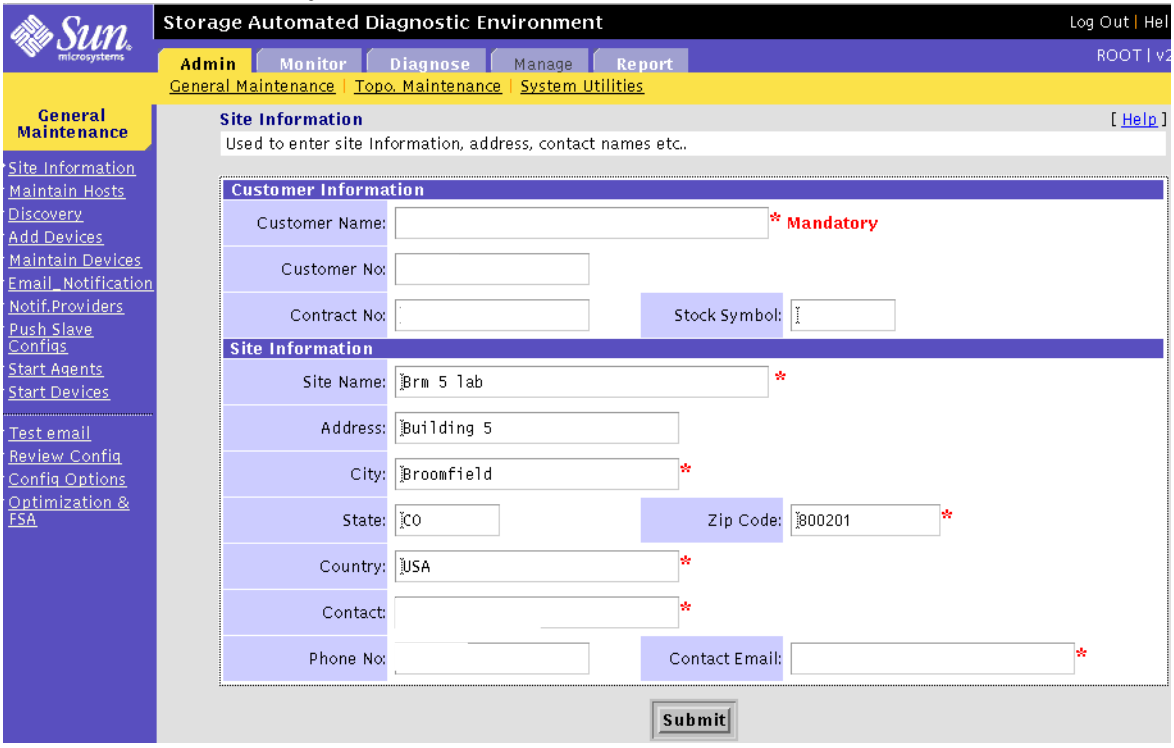


FIGURE 3-3 Maintain Site Information window

TABLE 3-3 describes the fields on the the Storage Automated Diagnostic Environment Maintain Site Information window.

TABLE 3-3 Site Information Fields

Field	Action
Customer Name	Type your customer name.
Customer No.	Type your company's customer number.
Contract No.	Type your company's contract number.
Stock Ticket	Enter your company's stock market symbol as a unique company identifier.
Site Information	Type your site name and address. Include a contact person's name and either an email address or a phone number.

Setting your Browser Window

You can configure your browser window's size and specify whether to show or hide the left frame menu. Using the Config Options Update Window functionality from the General Maintenance menu, shown in FIGURE 3-4, you can select one of the following window options:

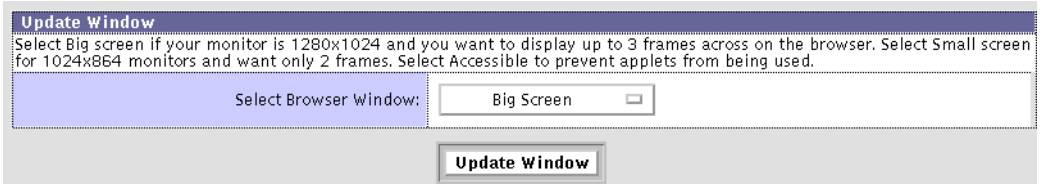


FIGURE 3-4 Update Window using Config Options

- Big Screen—displays three windows: the left frame window, the top window (with tracking links), and the main topic window.
- Small Screen—displays three windows: the left frame window, the top window (with tracking links), and the main topic window
- No Frames—displays the top window (with tracking links) and the main topic window only.
  Note: Most of the GUI windows in this guide are shown using the No Frames option.
- No Frames + Accessible—displays the top window (with tracking links) and the main topic window, as with No Frames, but enables the user to use keystroke combinations to perform tasks instead of using the mouse.

▼ To Maintain Hosts

When the Storage Automated Diagnostic Environment package is installed on a host, it registers with the master agent and an entry is added to this page.

The Maintain Host section contains the following subsections:

- “To Update the Master Configuration” on page 36
- “To Add a Host” on page 40
- “Discovering Devices” on page 44

Note – For this automatic registration to work, you must first install and run the master agent. (A Yes appears in the Active field of the Maintain Hosts window.) Once all hosts are installed, you can access this page to change the configuration of each host.

---

1. **Click the Admin link on the Storage Automated Diagnostic Environment main window.**
2. **Click the Maintain Hosts link on the General Maintenance menu.**

The Maintain Hosts window is displayed.

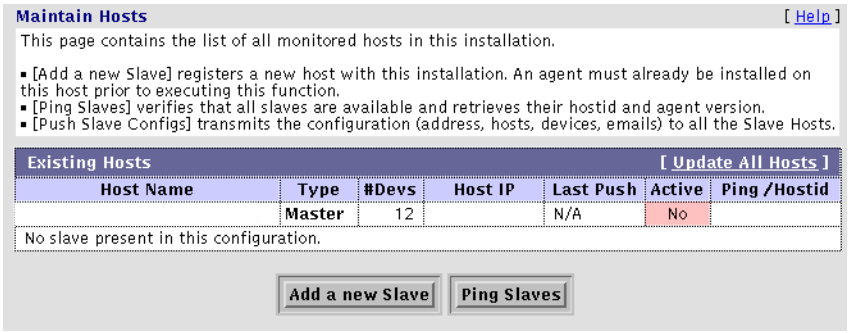


FIGURE 3-5 Maintain Hosts window

TABLE 3-4 describes the fields on the Storage Automated Diagnostic Environment Maintain Hosts screen. The functionality is described in more detail in the following subsections.

TABLE 3-4 Maintain Hosts Descriptions

Button	Function
Add a new Slave	Use when the agent does not automatically register. This can occur if a previously installed instance is temporarily deleted from the configuration. Note that the slave is not active if manually added.
Ping Slaves	Verify that the agent at each host is up and running. The Storage Automated Diagnostic Environment pings the slaves and requests each slave's hostID to verify that the host is up and that the Storage Automated Diagnostic Environment service is available.
Note: If 'No' appears in the Active field, you can activate the host using the procedures in "Starting and Stopping Agents" on page 72.	

▼ To Update the Master Configuration

- **From the Maintain Hosts window, click an existing Host Name link and update the fields as required.**

FIGURE 3-6 lists *all* devices currently supported by the Storage Automated Diagnostic Environment. FIGURE 3-7 lists components of a Sun StorEdge 39xx or 69xx series system.

Note – The devices listed in *Categories to Monitor* depend on your system configuration.

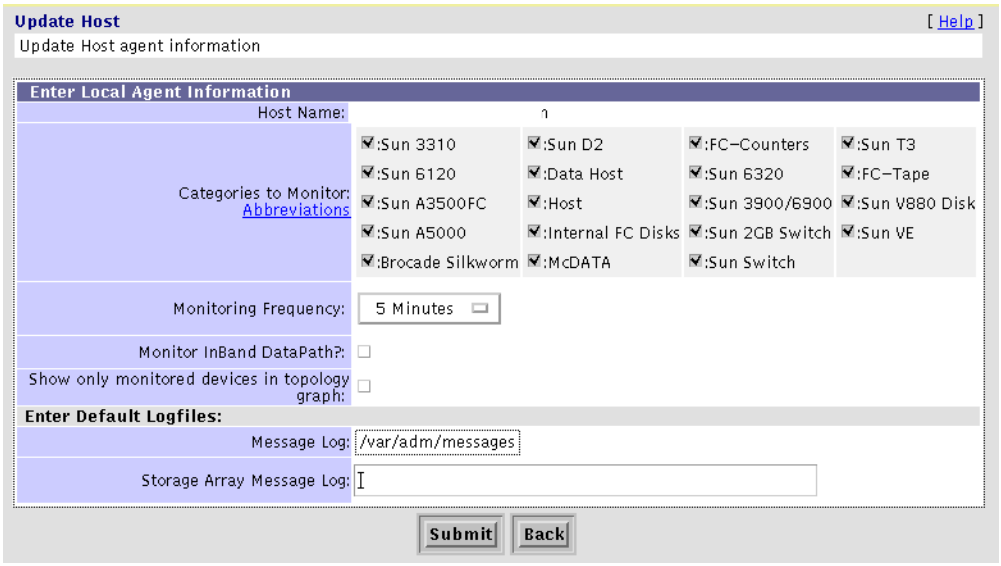


FIGURE 3-6 Master Configuration Window for *All* Supported Devices

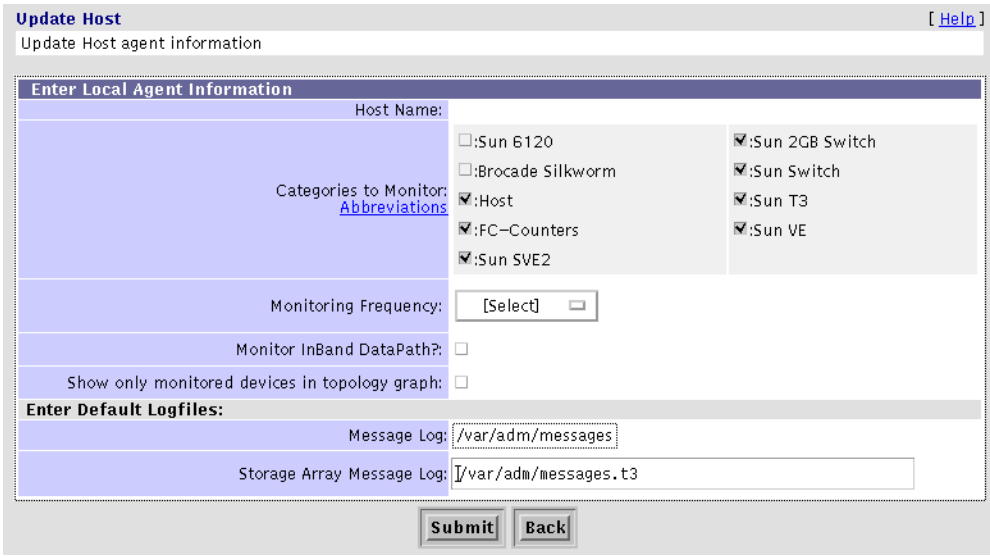


FIGURE 3-7 Master Configuration Window for Sun StorEdge 39xx or 69xx Components

TABLE 3-5 describes the fields on the the Storage Automated Diagnostic Environment Master Configuration window that you can update.

TABLE 3-5 Master Configuration Update Fields

Field	Required Action
Categories to Monitor	Select from the available categories supported *with this instance* of the Storage Automated Diagnostic Environment. You must make at least one selection. Categories from which to choose include: • Sun 3310 • Sun 6120 • Sun A3500FC • Sun A5000 • Brocade Silkworm • Sun D2 • Data Host • Host • Internal FC Disks • McDATA • FC-Counters • Sun 6320 • Sun 3900/6900 • Sun 2-Gbit Switch • Sun Switch • Sun T3 • FC-Tape • Sun V880 Disk • Sun VE
Monitoring Frequency	Select a variable between 5 and 120 minutes. This frequency variable affects how often the Storage Automated Diagnostic Environment executes. The default is 5 minutes. Monitoring frequency does not affect the `cron`. The `cron` will initiate the Storage Automated Diagnostic Environment agent's execution, but it is the Storage Automated Diagnostic Environment agent's task to query this variable and test whether it is time for the Storage Automated Diagnostic Environment agent to run.
Monitor InBand Data Path?	Select this checkbox to enable monitoring of the in-band data path.

TABLE 3-5 Master Configuration Update Fields *(Continued)*

Show only monitored devices in topology graph	When this option is selected, Topology shows only the devices in the Monitor Devices menu. In addition, only devices monitored by *that agent* are displayed in the agent's topology. See "Monitoring Topology" on page 111 for more information.
Message Log	The path for the message log (for example, `/var/adm/messages`), which displays the history of status messages.
Storage Array Message Log	Type the path for the host's T3, T3+, and 6120 array message log (for example, `/var/adm/messages.T3`). In this example, the path should be to where the T3 logs are being sent. This field is used to tell the Storage Automated Discovery Environment where to look for the log files; it does not alter the location to where the array actually sends the log files. **Note:** You can check and verify the path by looking at the `/etc/syslog.conf` on the host.

▼ To Add a Host

If an agent does not automatically register, you can add a new slave manually.

1. **Click the Maintain Hosts link on the General Maintenance window.**
2. **Click the Add a new Slave button on the Maintain Hosts window.**

The Maintain Hosts: Add Host window is displayed.

Note – The Categories to Monitor choices indicate Sun Microsystems network storage devices that are supported with the Storage Automated Diagnostic Environment.

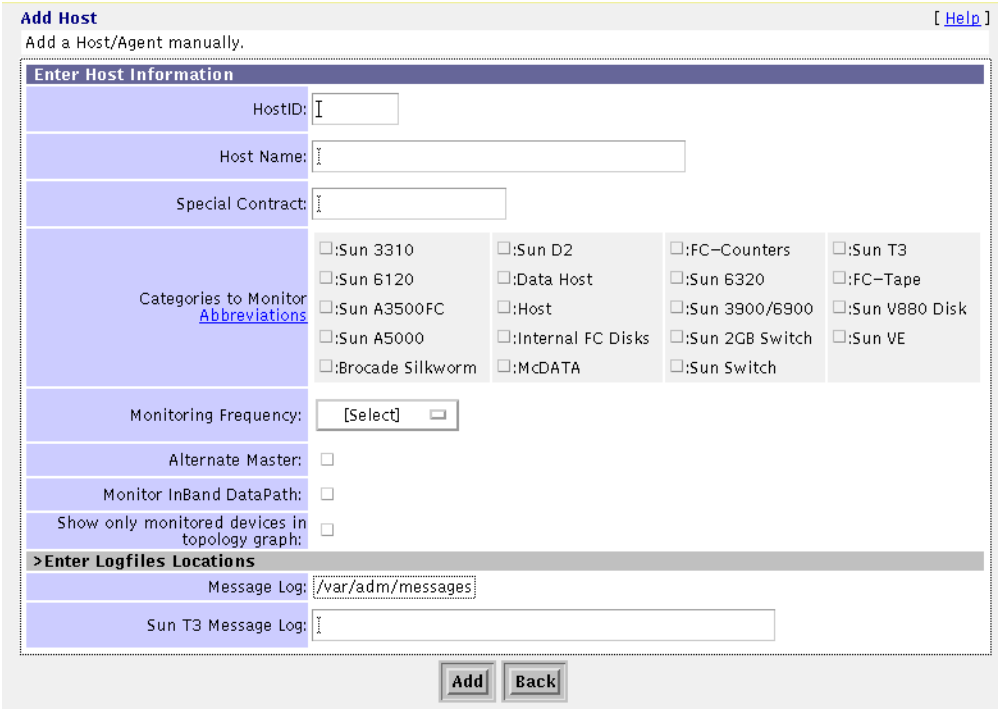


FIGURE 3-8 Add Host window

3. **Complete the fields using the descriptions shown in** TABLE 3-6**.**

4. **Click Add to add the new host.**

5. **To automatically update the slave's configurations and to verify that all slaves agree with the master configurations, click Push Slave Configs from the Maintenance menu.**

Notes:

- Enter an 8-digit hostID in the `/usr/sbin/hostid` directory. The Storage Automated Diagnostic Environment will not add a new slave without it.

  If you do not know the hostID, you can enter a dummy number and later correct it. Note, however, that the hostID cannot match any other previously accepted hostID.

  The host you add as a slave must be accessible over the Ethernet from the master and must, at a minimum, be able to respond to a ping.

- If you manually enter a slave host and no instance of the Storage Automated Diagnostic Environment is installed on that host, you must also manually enter the hostID for that slave host.

  Otherwise, the Categories to Monitor field will not have any devices selected and the Storage Automated Diagnostic Environment will not be active.

  The Active state will depend on the slave configuration file (`rasagent.conf.push`) in the `/var/opt/SUNWstade/DATA` directory, and will also depend on whether the Active flag is set. If there is simply no slave configuration file (for example, if the host is a master), the Active state will be set to OFF.

TABLE 3-6 describes the fields on the Maintain Hosts: Add New Slave window.

TABLE 3-6 Maintain Hosts: Add Host Options

Option	Required Input
HostID	Type the 8-digit alphanumeric hostID, which is the same as the system ID (for example, `123x45y6`) in the `/usr/sbin/hostid` directory. You can use the `hostid` command on the host to obtain a valid hostID. If the hostID is not available, you can enter a dummy number and later correct it. Note, however, that the hostID cannot match any other previously accepted hostID.
Host Name	Type the name of the host (`hostname.domain`).
Categories to Monitor	Choose the devices the Storage Automated Diagnostic Environment will monitor. The Categories to Monitor choices indicate Sun Microsystems Network Storage devices that are supported with the Storage Automated Diagnostic Environment.
Monitoring Frequency	Select a variable between 5 and 120 minutes. This frequency variable affects how frequently the Storage Automated Diagnostic Environment executes the health monitoring agents. The default setting is 5 minutes. **Note:** By default, the Storage Automated Diagnostic Environment is activated by a cron every 5 minutes. The program automatically checks the last run, notes the current time, and compares the difference to the last time the cron executed. If the time exceeds 60 minutes, it executes again.
Alternate Master	The Alternate Master checkbox is enabled the first time you add a new slave. For the slave to be an Alternate Master, you must disable this checkbox.
Monitor InBand Data Path	Enable this button if you want to view devices on the topology of a host that are accessible in-band by that host.

TABLE 3-6 Maintain Hosts: Add Host Options

Option	Required Input
Show only monitored devices in topology graph	When this option is selected, Topology shows only the devices in the Monitor Devices menu. In addition, only devices monitored by *that agent* are displayed in the agent's topology. See "Monitoring Topology" on page 111 for more information.
Message Log	The path for the message log (the default is `/var/adm/messages`), which displays the history of the status messages.
Storage Array Message Log	Type the path for the host's Sun StorEdge T3, T3+, or 6120 array Message Log. The path should be to where the array logs are being sent. This option is used to tell the Storage Automated Discovery Environment where to look for the log files; it does not alter the location to where the array actually sends the log files. **Note:** You can check and verify the path by looking at the `/etc/syslog.conf` on the host.

Discovering Devices

The Discovering Devices section contains the following subsections:

- "To Access the Device Discovery Window" on page 44
- "To Discover Devices from the IP List" on page 45
- "To Search the LAN for Sun StorEdge Devices Using Subnet Discovery" on page 46
- "Setting Up Sun StorEdge Array Message Monitoring" on page 47

You can request the Storage Automated Diagnostic Environment to probe the environments for the device types shown in the Device Discovery window.

The Storage Automated Diagnostic Environment discovers storage devices in two ways:

- Merged host-centric discovery views
- Storage-centric topology

Note – A subnet discovery mechanism discovers Sun StorEdge T3, T3+, and 6120 array storage, virtualization devices, and switch devices for a particular subnet.

▼ To Access the Device Discovery Window

1. **Click the Admin link on the the Storage Automated Diagnostic Environment window.**
2. **Click the Discovery tab from the General Maintenance menu.**

   The Device Discovery window is displayed.

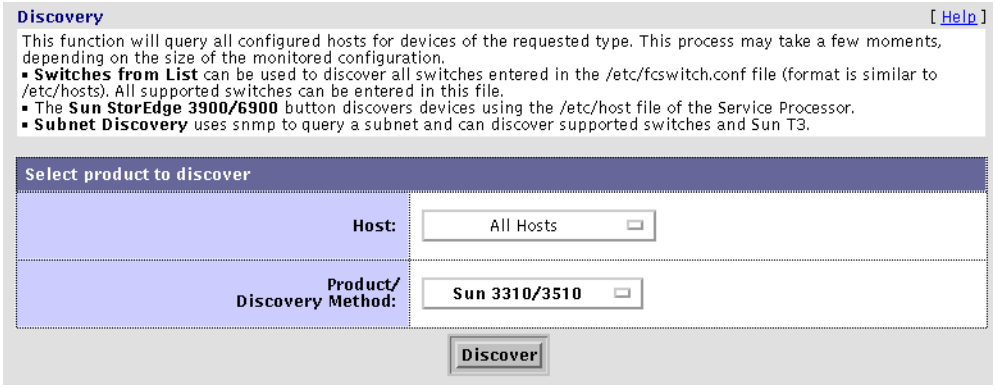


FIGURE 3-9 Discovery window

▼ To Discover Devices from the IP List

1. **Enter the IP address and device name into the `/etc/deviceIP.conf` file.**

   The first continuous character string after the IP address is used as the device name. If there is no character string after the IP address, then a combination of the device type and IP address is used to name the device.

2. **Select Devices from IP List from the Product/Discovery Method pull-down menu.**

3. **Click Discover.**

   The Storage Automated Diagnostic Environment is discovering the IP addresses that have been entered into the `/etc/deviceIP.conf` file.

   The following explains which devices are automatically discovered and which are not.

   - The Storage Automated Diagnostic Environment discovers the Sun StorEdge A5000 arrays, the Sun StorEdge A3500FC array, the Sun Fire V880 server, the Sun StorEdge D2 array, Internal Fibre Channel Disk, and Fibre Channel Tape devices on the physical data path attachments to the host. The devices are discovered on the physical data path attachments to the host because they do not have IP addresses.
   - The Storage Automated Diagnostic Environment discovers the Sun StorEdge network FC switch-8 and switch-16 switches by reading the `/etc/fcswitch` file. Additionally, the Subnet functionality asks for an IP network prefix to scan for Sun StorEdge network 1 Gbit and 2 Gbit switch-16 switches answering to SNMP queries.
   - The Storage Automated Diagnostic Environment *does not* automatically discover Brocade Silkworm switches. The current workaround is to manually add the Brocade Silkworm switch IP address to the `/etc/fcswitch` file. The Brocade switches can then be discovered using the IP address.
   - The Storage Automated Diagnostic Environment automatically discovers the Sun StorEdge T3, T3+, and 6120 arrays by scanning the Sun StorEdge array log file on all hosts. Entries that contain a valid IP name or address are added to the configuration. In addition, the arrays are discovered by `luxadm`.
   - The Storage Automated Diagnostic Environment discovers the Sun StorEdge 3900 and 6900 series using the `/etc/host` file of the Storage Service Processor.

Note – As long as there are valid Sun StorEdge T3, T3+ array entries in this log file, the *auto-discovery* finds them and adds them. You can avoid adding older, unwanted Sun StorEdge T3 and T3+ arrays by rolling over the log file, much the same way the system log rolls over. Refer to the scripts `/usr/lib/newsyslog` and `/etc/cron.d/logchecker`.

▼ To Search the LAN for Sun StorEdge Devices Using Subnet Discovery

Use Subnet Discovery to search the LAN for Sun StorEdge network FC switch devices, Brocade Silkworm devices, and Sun StorEdge T3 and T3+ arrays.

1. **Click the Admin tab in the the Storage Automated Diagnostic Environment window.**
2. **Click Discovery from the General Maintenance menu.**
3. **In the Discovery window, choose Subnet from the Product/Discovery Method pull-down menu.**
4. **Click Discover.**

   The Discovery: Submit window is displayed.

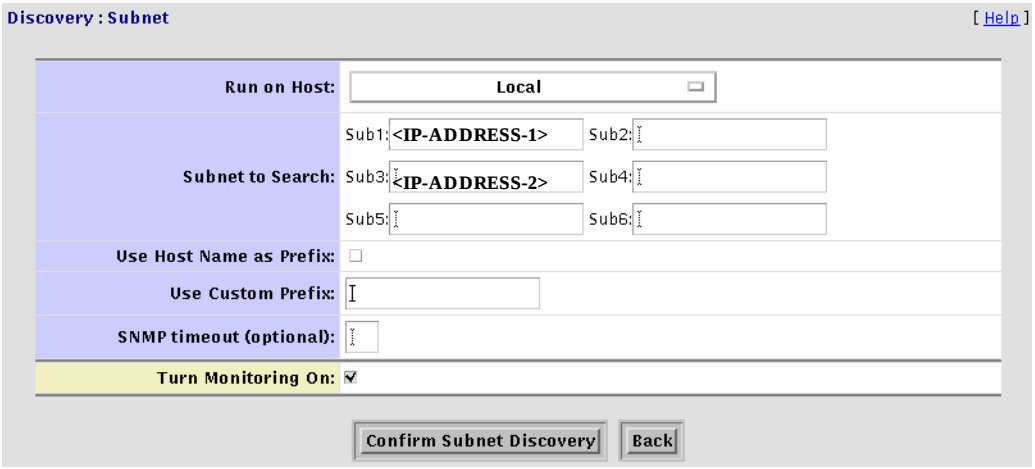


FIGURE 3-10 Subnet Discovery

5. **Choose a host from the Run on Host pull-down menu.**
6. **Enter the IP address of the subnet you want searched. You can enter up to six subnets.**

7. **Complete the remaining fields using the information found in the following table.**

TABLE 3-7 Discovery: Subnet Fields

Field	Description
Use Host Name as Prefix	The Storage Automated Diagnostic Environment host assigns a name to the device when it discovers the device. Select the *Use Host Name as Prefix* check box to start with the name of the host that discovered the device.
Use Custom Prefix	Enables the user to enter a custom prefix, rather than the name of the host that discovered the device.
SNMP timeout (optional)	Specifies how many seconds the subnet discovery function waits for an answer from a device.
Turn Monitoring On	If a device has been discovered and added to the Storage Automated Diagnostic Environment configuration file, enable the Turn Monitoring On function. If the device has not been added to the configuration file, you must use the Turn Monitoring On functionality described in "Starting and Stopping Agents" on page 72.

8. **After you have completed the Discovery: Subnet fields, click Confirm Subnet Discovery.**

   The Storage Automated Diagnostic Environment searches the subnet for valid devices and sends the search results back to the master agent. The master agent moves the recently discovered, valid devices that were previously in the subnet into the main configuration file.

Setting Up Sun StorEdge Array Message Monitoring

In order for the Storage Automated Diagnostic Environment software package to monitor messages from a Sun StorEdge array, you must mirror the Sun StorEdge array's `/syslog` to a host with the Storage Automated Diagnostic Environment installed and configured to monitor Sun StorEdge T3, T3+, and 6120 arrays.

1. **See the *Sun StorEdge T3 and T3+ Disk Array Installation, Operation, and Service Manual* and the *Sun StorEdge 6120 array documentation* for procedures on how to set up the Sun StorEdge T3 and T3+ array and the host to forward `/syslog` messages.**

2. **See the section “To Maintain Hosts” on page 34 for information about how to configure each host with the name given to the Sun StorEdge T3 and T3+ array message log file.**

▼ To Maintain Devices

Use the Maintain Devices window to configure the host to monitor each device. You can also use this window to change the name the storage device will use as a reference to that device through its email notifications.

The Maintain Devices section is divided into the following subsections:

- “To Add a Device Manually” on page 48
- “To Update a Device Manually” on page 54
- “To Delete a Device” on page 56
- “Renaming a Device” on page 56

▼ To Add a Device Manually

1. **Click the Add Devices link from the General Maintenance menu.**

   The Add Devices window is displayed.

2. **From the Add devices window, select and click the device you want to add.**

FIGURE 3-11 Add Devices window

The corresponding Add Devices screen is displayed, as the example shown in FIGURE 3-12

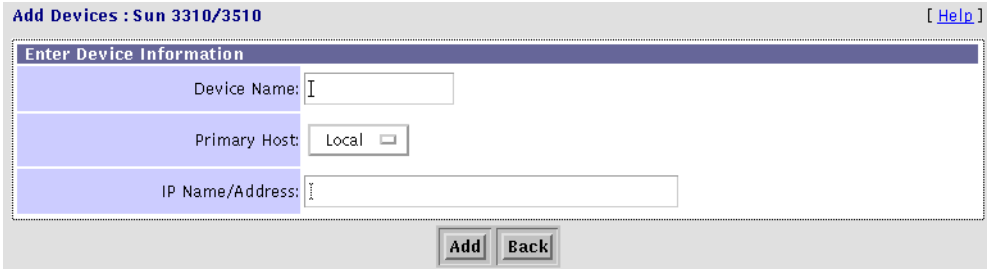


FIGURE 3-12 Add Devices: Sun 3310/3510

3. Complete the required fields using the descriptions shown in the following table.

TABLE 3-8 Maintain Devices: Add Devices

Device	Required Input
Sun StorEdge 3510 array	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. • Type the IP address that identifies the host to the network.
Sun StorEdge A3500FC array	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Enter the serial number for the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device.
Sun StorEdge A5000 array	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device.
Brocade Silkworm switches	• Type the *device name* the Storage Automated Diagnostic Environment will use to identify the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device. • Type the telnet password, which enables the Storage Automated Diagnostic Environment to log in to the Brocade switch. • Type the IP address that identifies the host to the network.
Sun StorEdge D2 array	• Type the *device path* with which the Storage Automated Diagnostic Environment will access the device. • Select the Storage Automated Environment's *primary host* that will perform the actual monitoring of the device. • Type the *serial number* of the Sun StorEdge D2 array, which will be used to identify the device to the host.
Internal FC Disk	• Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device.

TABLE 3-8 Maintain Devices: Add Devices

Device	Required Input
McDATA switches	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Type the optional telnet password, which enables the Storage Automated Diagnostic Environment to log in to the McDATA switch. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device. • Type the IP address that identifies the host to the network.
Sun Solutions	This options adds a Sun StorEdge 3900, 6320 or 6320SL, or 6900 series system to your configuration as a single device. • Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device. • Type the IP address that identifies the host to the network. • Type the Agent Login. • Type the Agent Password.
Sun switches	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device. • Type the optional admin/telnet password, which enables the Storage Automated Diagnostic Environment to log in to the Sun switch. • Type the IP address that identifies the host to the network.
Sun StorEdge T3, T3+, and 6120 array	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Type the optional telnet password, which enables the Storage Automated Diagnostic Environment to log in to the Sun StorEdge T3 and T3+ array device. Note that the user is not authorized to *change* an existing Sun StorEdge T3 and T3+ array password. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device. • Type the IP address that identifies the host to the network.

TABLE 3-8 Maintain Devices: Add Devices

Device	Required Input
FC Tape	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. **Note:** The default is the host that automatically discovered the device.
Sun Fire V880 FC-AL Server	• Type the *device name* that the Storage Automated Diagnostic Environment will use to identify the device. • Select the Storage Automated Diagnostic Environment's *primary host* that will perform the actual monitoring of the device. • **Note:** The default is the host that automatically discovered the device.

4. From the Maintain Hosts window, click Push Slave Configs.

Be aware of the host's access method when making decisions about which devices the Storage Automated Diagnostic Environment will monitor, as shown in the following table.

Device Monitoring Method	In-band or Out-of-Band?
Monitor *Sun StorEdge A3500FC arrays* from a host that has an attachment through the Fibre Channel cables and can run the Sun StorEdge RAID Manager commands.	In-band
Monitor *Sun StorEdge A5000 arrays* from the host that has an attachment through the Fibre Channel cables.	In-band
Monitor the *Sun switches* on any host on the subnet, because the probing is done over the network.	Out-of-Band
Monitor the *Brocade Silkworm switches* on any host on the subnet, because the probing is done over the network.	Out-of-Band
Monitor *Sun StorEdge T3, T3+, and 6120 arrays* from the host that has access to the Sun StorEdge T3 and T3+ array message log file and has an Ethernet connection on the subnet.	In-band and Out-of-Band
Monitor *Fibre Channel tape devices* from the host that has an attachment through the Fibre Channel cables.	In-band
Monitor Fibre Channel internal disk devices.	In-band
Monitor Sun StorEdge D2 arrays.	In-band
Monitor Sun StorEdge 3510 FC arrays	In-band
Monitor Sun Fire V880 FC-AL disk devices.	In-band
Monitor *Sun StorEdge 3900, 6320, and 6900 series devices* from the Storage Service Processor, which has Ethernet connection to the Sun StorEdge arrays, the Sun switches, and the virtualization engine (Sun StorEdge 3900 and 6900 series only).	Out-of-Band

▼ To Update a Device Manually

1. **Click the Maintain Devices link on the General Maintenance menu.**

   The Maintain Devices window is displayed.

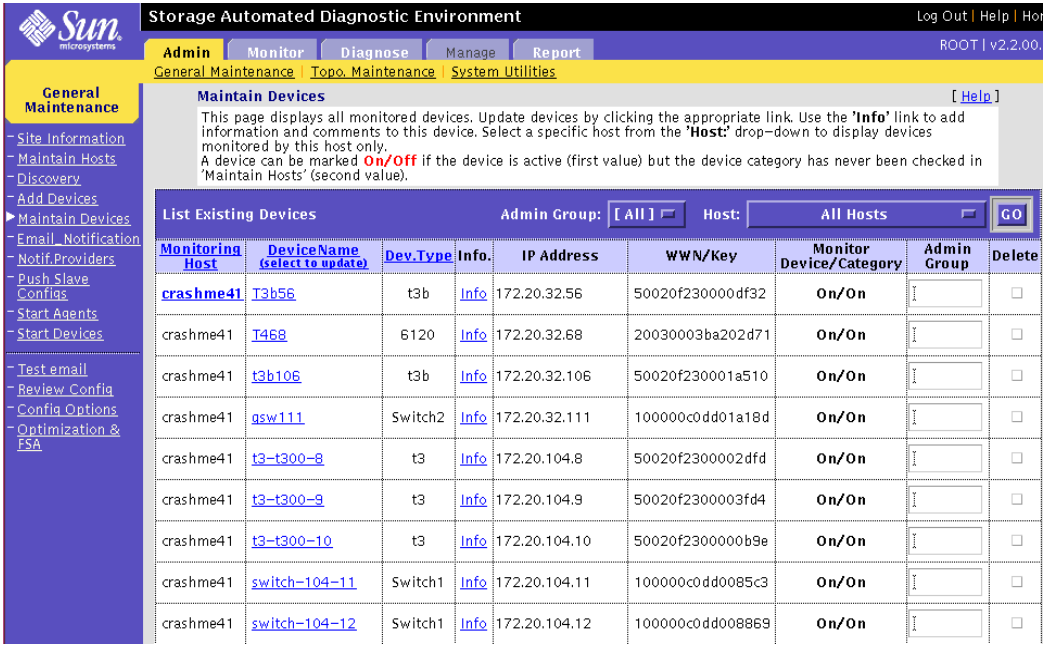


FIGURE 3-13 Maintain Devices

2. **In the Maintain Devices window, select and click the device you want to update from the Device Name column**

   The corresponding Maintain Devices screen is displayed, as the example shown in FIGURE 3-14.

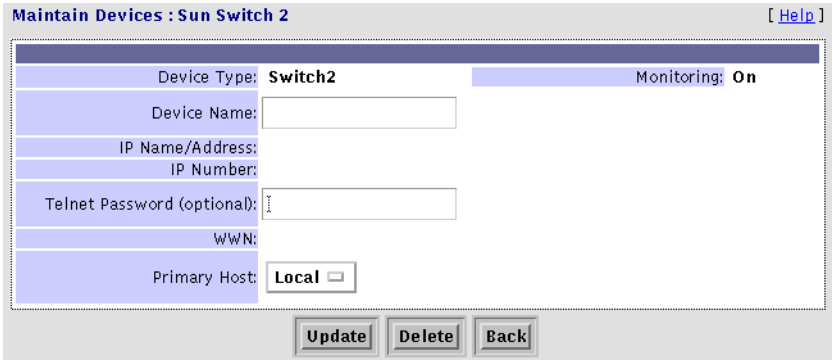


FIGURE 3-14 Maintain Devices window

3. **Update the necessary fields and click Update.**

Note – Changing the name of the device changes only the *reference* to that device within the Storage Automated Diagnostic Environment. It does not affect the access or reference to that device within the operating system.

Note – If you change the configuration of a device (for example, if you change the chassis ID of a switch), you must *delete* that unwanted device, using the functionality found in “To Delete a Device” on page 56.

The Storage Automated Diagnostic Environment displays a message stating that the previous device has been removed.

▼ To Delete a Device

You can delete an unwanted device once the device has been removed from the site or if device monitoring is no longer needed.

Note – You can delete a slave, but the only way to delete the master is to remove the package, which is described in Chapter 2.

---

1. **Click the Admin link on the Storage Automated Diagnostic Environment main window.**
2. **Click the Maintain Devices link on the Maintenance menu.**

   The Maintain Devices window is displayed.

3. **From the Maintain Devices window, select the device you want to delete from the Device Name column.**

   The device's maintenance screen is displayed.

4. **Click Delete.**
   - Deleting a device from the configuration does not remove access to the device instrumentation in the cache immediately. This will, however, be cleared the next time you manually run the agent, which is described in "To Run the Agent Manually" on page 92.
   - State information for that device is also maintained until the agent's next run. Therefore, a device can be removed from a configuration and still be viewed in the Topology window and Instrumentation window as a "snapshot in time" until you take a new Topology snapshot.

Renaming a Device

If you rename a device and then execute the agent from the command line or from the GUI, the Storage Automated Diagnostic Environment displays a message that the previous device has been removed. The Storage Automated Diagnostic Environment topology will not, however, display the renamed device until you rediscover the device and take a new Topology snapshot.

You can avoid this problem by manually adding the world wide name (WWN) into the Storage Automated Diagnostic Environment configuration file, which is located in the file `/var/opt/SUNWstade/DATA/rasagent.conf`.

Note – Unless you remove the SUNWstade directory or perform a clean `ras_install`, the configuration file remains on the system between upgrades.

Customizing Email Deliveries

You can use the Local Email / Pager Notifications window to customize the generation of emails to yourself or to other administrators at their companies. For example, if you are interested in receiving only high-priority alerts coming from Sun StorEdge T3, T3+, and 6120 arrays, you can create a specialized notification for this instance only.

This section is divided into the following subsections:

- "To Set Up Local Email and Pager Notifications" on page 57
- "To Send a Customizable Subset of the Event-Driven Messages From the Host" on page 61

▼ To Set Up Local Email and Pager Notifications

Alerts are sent only to valid email addresses that you have entered through the Email Notification function. Local notification does *not* send mail to the provider.

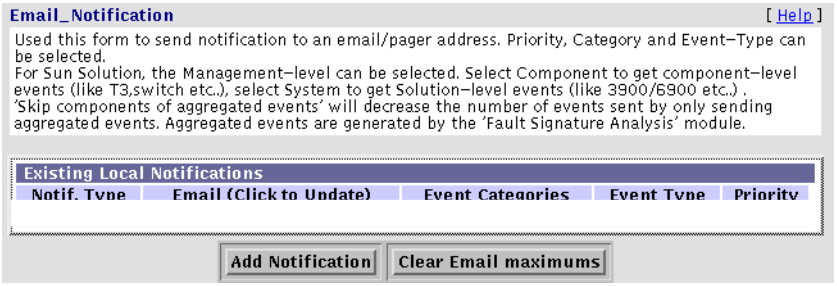


FIGURE 3-15 Local Email / Pager Notifications window

You can customize the following local notification information:

- Notification type
- Email address
- Category
- Event Type
- Priority

Note – The local email / pager notifications feature, shown in FIGURE 3-15, is optional and does not affect the main transmission functions of the Storage Automated Diagnostic Environment. The master instance of the Storage Automated Diagnostic Environment is the only instance generating emails based on local notifications. Slave instances of the Storage Automated Diagnostic Environment send their alerts to the master, which filters them and forwards them to the providers, if selected, and to local system administrators, if configured.

▼ To Update or Delete an Existing Email Address

- **Click an existing email link from the Email Notification window.**

  The Local Notification Information window appears, similar to the window shown in FIGURE 3-16.

▼ To Add a New Email Address

- **Click the Add Notification button to add new email addresses to the notification list.**

In addition to sending the RAS information collected by the Storage Automated Diagnostic Environment, you can send a customizable subset of the event-driven messages from the host (configured as master) directly to local system administrators at the customer's site by email You can specify that the message information sent is at a system level or a component level.

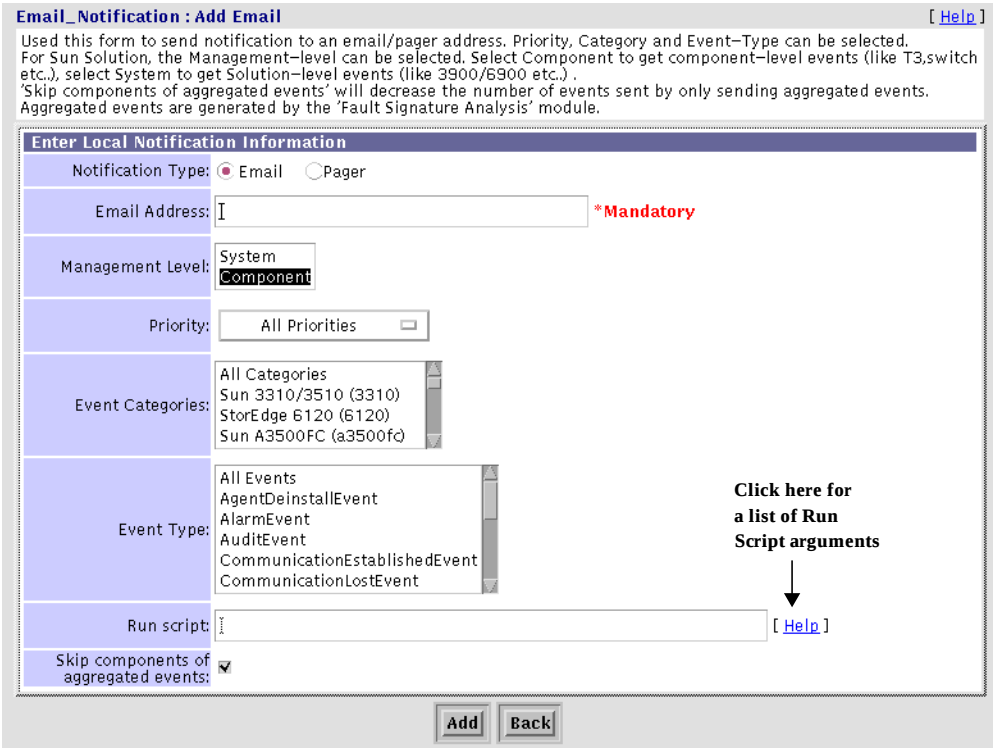


FIGURE 3-16 Email Notification: Add Email window

Note – Email might not be sent if the system is not properly configured to send mail to the recipient. This is primarily evident in Storage Service Processor environments where the Storage Service Processors are on a subnet and there is no gateway to the intended recipient.

Run Script Arguments

The Run Script text box enables you to run a script along with each event sent in an email. This script is executed for each new event and receives the following arguments:

TABLE 3-9 Run Script Arguments

Argument	Description
`-C [category]`	The category of the event (for example, t3)
`-S [severity]`	The severity of the event (for example, 1=warning, 2=error, 3=down)
`-E [event_type]`	Event type
`-T [target]`	The target number of the event (for example: switch:10000023EA345A)
`-N [TargetName]`	The name of the target (for example, switch-1a)
`-D [description]`	The description of the event

▼ To Send a Customizable Subset of the Event-Driven Messages From the Host

1. **Enter one or more email addresses into the Email Address/Filename textbox.**
2. **For each address, choose from**:
   - The Priority list:
     - 0 = information (green). This is the lowest priority.
     - 1 = warning (yellow)
     - 2 = error (red)
     - 3 = down (red)—the system is down.
     - Warning+Error+Down
     - Actionable only
   - The Category list—Select from the current suite of storage products that are monitored by the Storage Automated Diagnostic Environment.
   - The Event Type list—Select from a list of event types, categorized by device type.

     All Events is the default. Other Event options include:

     - Agent Deinstall Event
     - Alarm Event
     - Audit Event
     - Communication Established Event
     - Communication Lost Event
     - Discovery Event
     - Heartbeat Event
     - Location Change
     - Removal Event
     - State Change Event
     - Statistics
     - Topology Event
     - Link Event
     - Diagnostic Test
3. **Click Add.**

   The Storage Automated Diagnostic Environment sends the specific event-type messages, by device type, to one or more email addresses you specified.

Using Providers

Storage Automated Diagnostic Environment Providers encode data and interface with transport mechanisms, which transmit information to the storage management platforms about configured storage devices. A provider's main function is to relay events generated by health monitors.

The Storage Automated Diagnostic Environment supports seven providers: Email, SAE, Sun Remote Services (SRS), NetConnect, Simple Network Management Protocol (SNMP), Sun StorEdge Remote Response (SSRR), and SunMC.

This section discusses the following topics:

- "To Set Up Notification Providers" on page 63
- "Email Provider" on page 64
- "SAE Provider" on page 66
- "NetConnect Provider" on page 67
- "SRS Provider" on page 65
- "SSRR Provider" on page 68
- "SNMP Traps" on page 71
- "SunMC Provider" on page 69

▼ To Access the Notification Provider Maintenance Window

1. **Click the Notific. Providers link on the General Maintenance menu.**

   The Notification Provider Maintenance window is displayed.

▼ To Set Up Notification Providers

- **Complete the required fields shown in** TABLE 3-10**.**

TABLE 3-10 Notification Providers

Provider	Required Action
Email	• Enable the Active checkbox.
SAE	• Enable the Active checkbox. • Type the IP address of the SSDE management console • Type the number of hours for heartbeat frequency.
NetConnect	• Enable the Active checkbox. • Type the maximum size, in Kbytes, of RAS information that the Storage Automated Diagnostic Environment agent will collect and transport.
SRS	• Enable the Active checkbox. • Type the IP address of the SRS console • Type the number of hours for heartbeat heartbeat.
SSRR Sun StorEdge Remote Response	• Enable the Active checkbox. • Type the number of hours for heartbeat frequency
SunMC	• Enable the Active checkbox. • Type the SunMC console IP address. • Type the number of hours for heartbeat frequency.
SNMP Traps	• Enable the Active checkbox. • Type the IP name and address that identifies the host to the network. You can provide information for up to five IP addresses. • Specify the port number. Default is 162. • Specify the minimum alert level: Warnings, Error, or Down.

Email Provider

The Email Provider enables specific events to be emailed to local administrators. Events can also be summarized and sent to a pager's email address. This is an Intranet mechanism for transporting reliability, availability, and serviceability (RAS) information collected by the Storage Automated Diagnostic Environment agent. Although the information extracted is used to improve products and service, the information is not monitored by Sun Service personnel.

For information on how to categorize events by device type, severity level, and event type, See "To Set Up Local Email and Pager Notifications" on page 57.

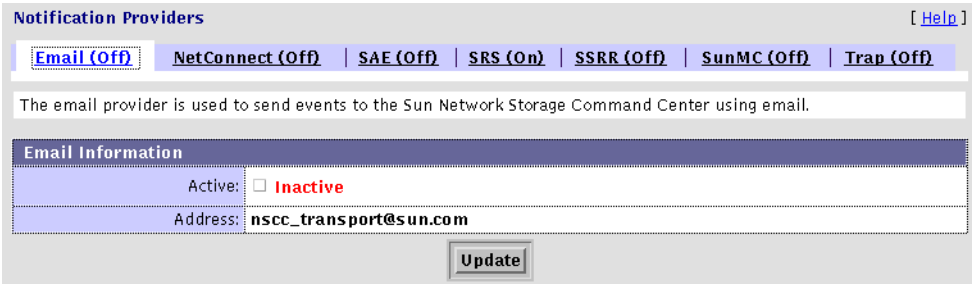


FIGURE 3-17 Email Provider window

Requirements for Email Provider	Necessary for this Provider?
Sun Service contract	No
Additional software	No
Additional hardware	No

SRS Provider

The Storage Automated Diagnostic Environment pulls the storage device events and channels them through a sender, which sends the event data, written in XML, to the SRS station.

The SRS Notification Provider is a frame relay mechanism for transporting reliability, availability, and serviceability (RAS) information collected by the monitoring agent. All available instrumentation, events, and topology information is sent to the Network Storage Command Center (NSCC). This information is used to improve products and service and is monitored by Sun Service personnel.

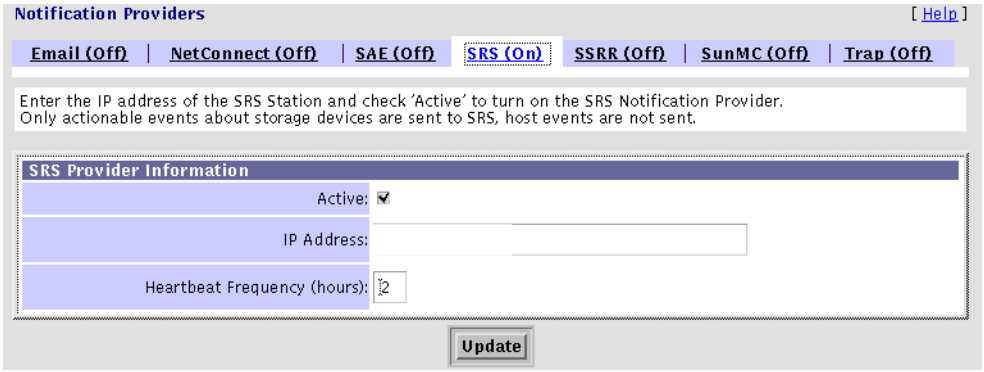


FIGURE 3-18 SRS Provider window

Requirements for SRS Provider	Necessary for this Provider?
Sun Service contract	Yes
Additional software	Yes
Additional hardware	Yes

SAE Provider

When the SAE Provider is activated, the Storage Automated Diagnostic Environment sends events to the Sun StorEdge Diagnostic Expert. This provider is used primarily when the Storage Automated Diagnostic Environment is installed on a Storage Service Processor in a Solution

With the DataHost Transfer option activated, each run of the Storage Automated Diagnostic Environment agent sends information to the Sun StorEdge Diagnostic Expert about the HBAs of the host where the Storage Automated Diagnostic Environment is installed. HBA information includes port status, Fibre Channel counters for each port, and the World Wide Name (WWN) of each port. The Sun StorEdge Diagnostic Expert uses the HBA information to complete its topology.

Note – The IP:port should include the IP address of the Sun StorEdge Diagnostic Expert management station, followed by the station's port number. Currently the port number is `8088`. For example: `http://123.45.67.89:8088`

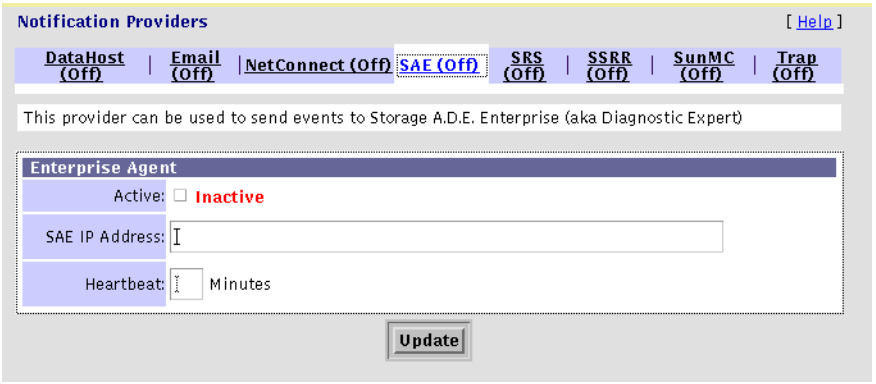


FIGURE 3-19 SAE Provider window

NetConnect Provider

The NetConnect Provider is a part of the SRS family of products. NetConnect uses internet-based technology which avoids the need for additional dedicated network connections at the customer site. All available instrumentation, events, and topology information is sent to the Network Storage Command Center (NSCC).

Although the information extracted is used to improve products and service, the information is not monitored by Sun Service personnel. Currently, the storage information is not available by way of the NetConnect portal.

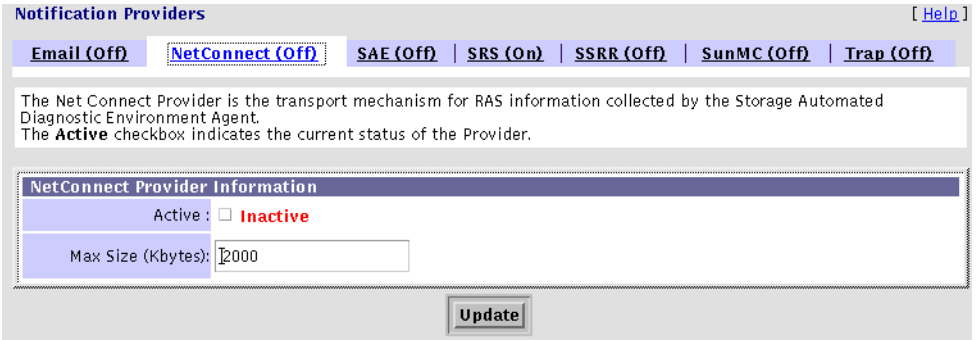


FIGURE 3-20 NetConnect Provider window

Note – The host with the master agent must be the same host that is configured as the relay in an SRS Net Connect Provider configuration.

Requirements for Net Connect Provider	Necessary for this Provider?
Sun Service contract	No
Additional software	SRS Net Connect, available on the Sun Download Center
Additional hardware	No

SSRR Provider

The Sun StorEdge Remote Response Provider uses modem technology with UNIX-to-UNIX Communication Protocol (UUCP). SSRR software is required on the customer data host. The SSRR Provider is intended for customers who have purchased a remote support service offering and have supplied phone lines to enable the modem phone home capability. The Storage Automated Diagnostic Environment, which records events, resides on the Storage Service Processor.

All available instrumentation, events, and topology information is sent to the Network Storage Command Center (NSCC). This information is used to improve products and service and is monitored by Sun Service personnel.

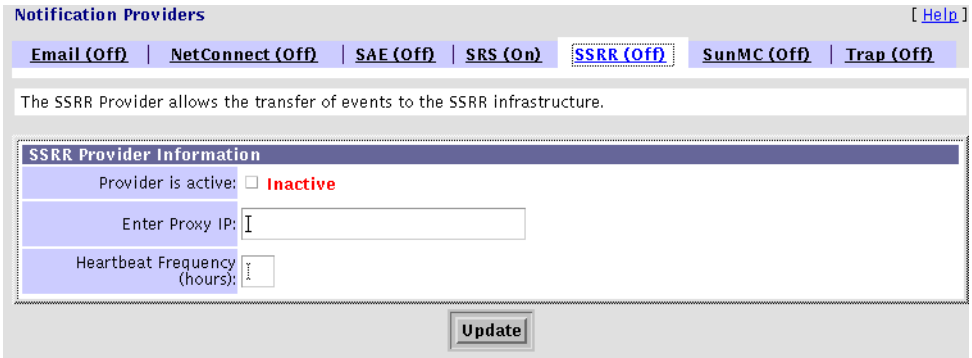


FIGURE 3-21 SSRR Provider window

After the Storage Automated Diagnostic Environment identifies the event:

1. **The Storage Automated Diagnostic Environment logs the event and alerts Sun engineers by email or pager, if the data falls outside of pre-defined tolerances.**
2. **The Sun engineer, located behind a firewall, accesses the SSRR server and runs a script.**

   The script initiates a call to the customer's modem and supplies logins and passwords to the client Network Terminal Concentrator (NTC) and the Storage Service Processor.
3. **The script negotiates a secure point-to-point protocol (PPP) connection between the customer's Storage Service Processor and the SSRR Server and automatically logs the Sun engineer on to the customer's Storage Service Processor.**
4. **The Sun engineer can then access SAN components to remotely diagnose and perform a number of maintenance routines.**

Note – If the Storage Automated Diagnostic Environment is run either manually or from the `cron`, and the SSRR Provider is selected, but the SSRR software is not installed or is not configured properly, the following error message appears: `***ERR: Cannot find Machine name in Permissions file.`

Requirements for SSRR Provider	Necessary for this Provider?
Sun Service contract	Yes
Additional software	Yes
Additional hardware	Yes

SunMC Provider

The SunMC Provider enables the Storage Automated Diagnostic Environment to send actionable events and monitoring topologies to the SunMC Console, which displays the alarms and alert text. SunMC information is similar and compatible with Sun Remote Services (SRS). SunMC can send information to SRS, in which case the SRS Provider need not be activated in the Storage Automated Diagnostic Environment.

All available instrumentation, events, and topology information is sent to the Network Storage Command Center (NSCC). This information is used to improve products and service and is monitored by Sun Service personnel.

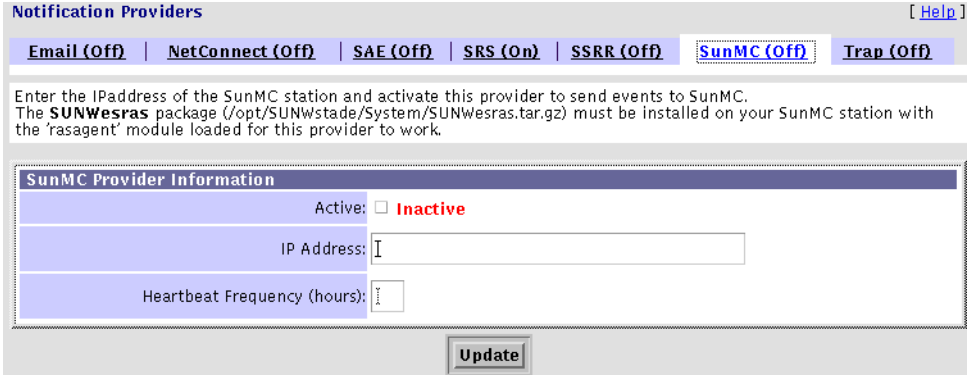


FIGURE 3-22 SunMC Provider window

Caution – If two masters point to the same SunMC Provider console, the Storage Automated Diagnostic Environment cannot access events in the SunMC console.

Therefore each Storage Automated Diagnostic Environment master must point to its own SunMC console, preferably the SunMC console on the host where the master is installed.

The SunMC Console window is shown in FIGURE 3-23.

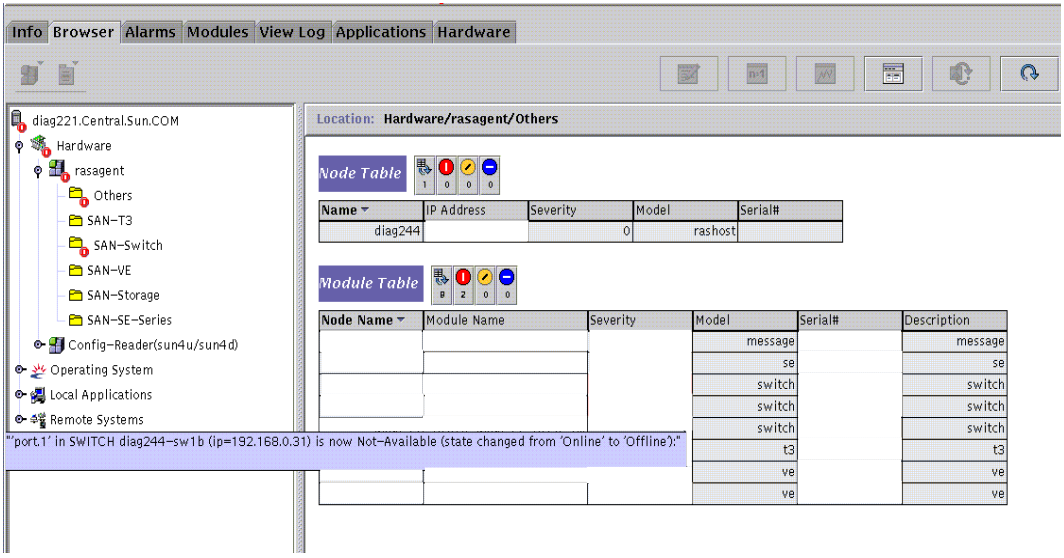


FIGURE 3-23 SunMC Console window

SNMP Traps

The SNMP Traps Provider enables the Storage Automated Diagnostic Environment to send traps, for all actionable events that occur during monitoring, to external management systems.

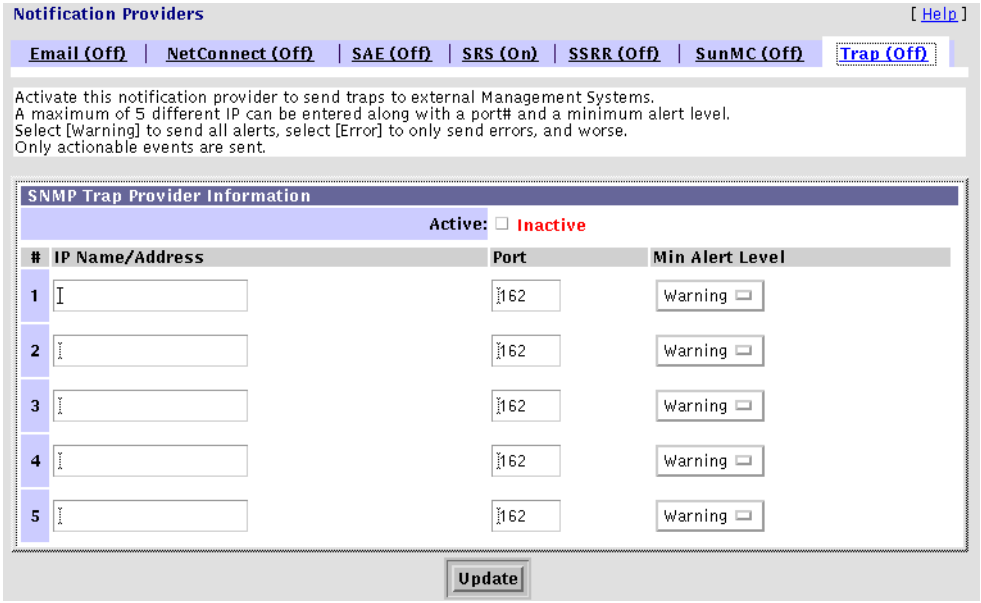


FIGURE 3-24 SNMP Traps Provider window

When an alert occurs, it is sent to the SNMP transport as an SNMP trap. An SNMP trap listener can use the `StorAgent.mib SNMP MIB` file, which is included in the SUNWstade package to decode these alerts.

The alerts contain the following information:

- Storage Automated Diagnostic Environment agent location
- Storage Automated Diagnostic Environment device to which alert pertains
- Alert level
- Message content

Note – SNMP-capable management application software is required for the SNMP Provider

---

Starting and Stopping Agents

You can control agent activity to temporarily stop the Storage Automated Diagnostic Environment from running on a selected host. You can also avoid creating email notifications on false errors when a device is being tested and faults are injected intentionally.

Note – By default, the master Monitoring function does not automatically default to *On*. You must manually enable Monitoring to *On*.

The subsections associated with controlling agent activity are as follows:

- "To Access the Start Agents Window" on page 72
- "To Activate or Deactivate Monitoring on a Device-by-Device Basis" on page 73

▼ To Access the Start Agents Window

1. **Click the Admin link in the Storage Automated Diagnostic Environment main window.**
2. **Click the Start Agents link on the General Maintenance menu.**

   The Start Agents window is displayed.

FIGURE 3-25 Start/Stop Agents window

Using the Start Agent(s) function to avoid creating email notifications on false errors works only if you are monitoring a *single* device type and all of the devices are monitored simultaneously, as in an upgrade.

To control email notifications for specific devices, See "To Activate or Deactivate Monitoring on a Device-by-Device Basis" on page 73.

▼ To Activate or Deactivate Monitoring on a Device-by-Device Basis

To access the Start Devices Monitoring window:

1. **Click the Admin link on the Storage Automated Diagnostic Environment main window.**
2. **Click the Start Devices link from the General Maintenance menu.**

   The Start Devices window is displayed.

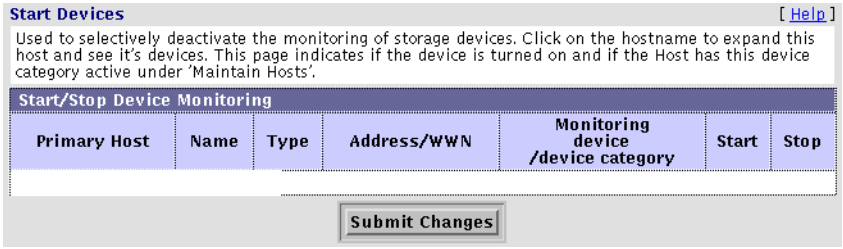


FIGURE 3-26 Start / Stop Devices window

3. **To start or stop devices, check the appropriate checkbox.**
   - When Monitoring is *on*, the “Stop” checkbox is available.
   - When Monitoring is *off*, the “Start” checkbox is available.
4. **Click Submit Changes.**

   The Storage Automated Diagnostic Environment must update the configuration files on all the slave hosts configured with this master. To accomplish this, use the Push Configs function on the Admin menu.
5. **If the device is being tested or if faults are being injected into the device intentionally, you can temporarily stop the local notifications for a specific device by using the Start/Stop Device Monitoring window.**

Note – Monitoring continues when the device is deactivated (turned off). However, email notifications will not occur for any faults that are detected while the device monitoring is in this state. Consequently, any errors that may have been detected will be logged and sent by means of the NetConnect or HTTP Providers, but not by means of email notification.

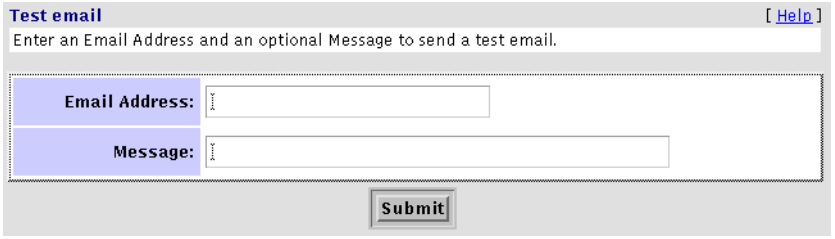
▼ To Send Test Email

Use the Test Email window to send test emails and a message, and to verify that the mailing capability of the Storage Automated Diagnostic Environment is installed and working properly.

▼ To Access the Test Email Window

1. **Click the Admin link in the Storage Automated Diagnostic Environment main window.**
2. **Click General Maintenance.**
3. **Click the Test Email link from the General Maintenance menu.**

   The Test Email window is displayed.



4. **Type your email address into the Email Address textbox.**
5. **Type a brief comment into the Message textbox.**

   If you leave the Message text box blank, the test email contains a default message with the words *Test Message* in the subject line. If you place a carriage return in the Message field, you cannot enter text. To restart, click in the Message textbox and enter text.

▼ To Review the Configuration

1. **Once you have completed your configuration and you want to verify all settings, select the Review Configuration link on the General Maintenance menu.**
2. **If necessary, follow the displayed instructions for settings that you might have missed or for those that you need to double-check.**

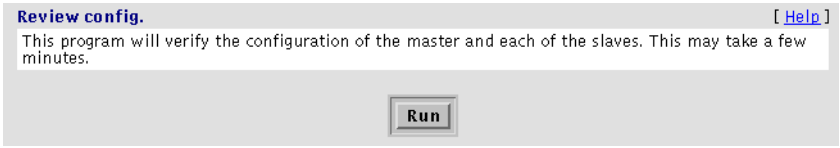


FIGURE 3-27 Review Configuration window

Config Options

The Configuration Options window enables you to change the defaults on selected configuration options. Use the information in TABLE 3-11 to update existing configuration option

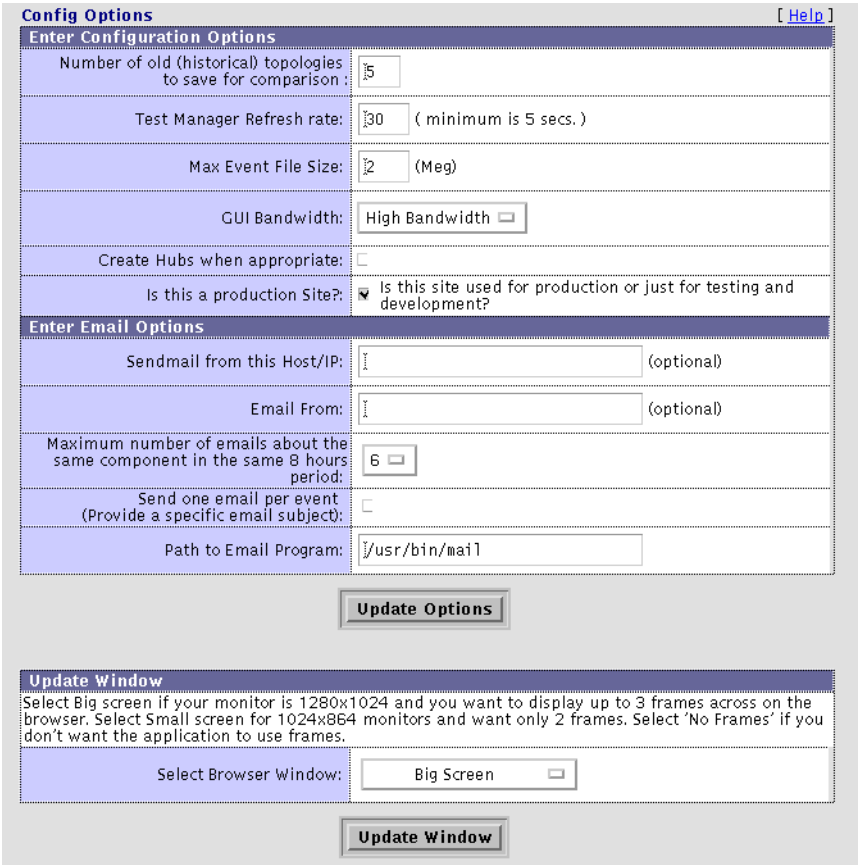


FIGURE 3-28 Configuration Options

TABLE 3-11 Config Options

Configuration Option	Description
Enter Configuration Options	
Number of old (historical) topologies to save	Type the number of topologies to save in Topology History for comparison. The default is 5.
Test Manager Refresh Rate	Specify the window refresh (re-load) rate for test output. The default is 30 seconds, and the minimum refresh rate is 5 seconds.
Max Event File Size	Specify, in megabytes, the maximum event file size. Used to limit data packet size to notification providers. The default is 2.
GUI Bandwidth	Specify the bandwidth for low and high speed local area network (LAN). The default is High Bandwidth.
Create Hubs when appropriate	Enable this checkbox if you want Hubs to be drawn in the Topology.
Is this a production site?	Specify Y (the default if checked) or N.
Enter Email Options	
Send mail from this Host/IP (optional)	
Email From (optional)	Type the From email address.
Maximum number of emails about the same component in the same 8-hour period	Specify the maximum number of messages that will be sent within an 8-hour period about a specific event. The default is no maximum. Options include 2, 4, 6, or 8. You can also clear the specified maximum number of messages using “Customizing Email Deliveries” on page 57.
Send one email per event (Provide a specific email subject)	Select this check box to limit the number of messages sent about a specific event to one message per event.

TABLE 3-11 Config Options

Configuration Option	Description
Path to Email Program	Use to change the local email program path.
Update Window	
Select Browser Window	Use to configure the default GUI screen size. • Big Screen—displays three frames: the left frame window, the top window (with tracking links), and the main topic window. • Small Screen—displays three frames, as with the Big Screen selection, but the frames are smaller. • No Frames—displays the top window (with tracking links) and the main topic window only. • No Frames + Accessible—displays the top window (with tracking links) and the main topic window, as with No Frames, but enables the user to use keystroke combinations to perform tasks instead of using the mouse. **NOTE:** The browser does not support Topology if the No Frames + Accessible option is selected. If you want to use the Topology functionality, select Big Screen, Small Screen, or No Frames.

Using Fault Signature Analysis

The Fault Signature Analysis (FSA) option enables the aggregation of alerts that share common suspect FRUs. With FSA enabled, a one-probing cycle delay makes sure that all slaves have reported their events to the master agent.

▼ To Aggregate Events

Select the appropriate check box based on the information shown in the following table.

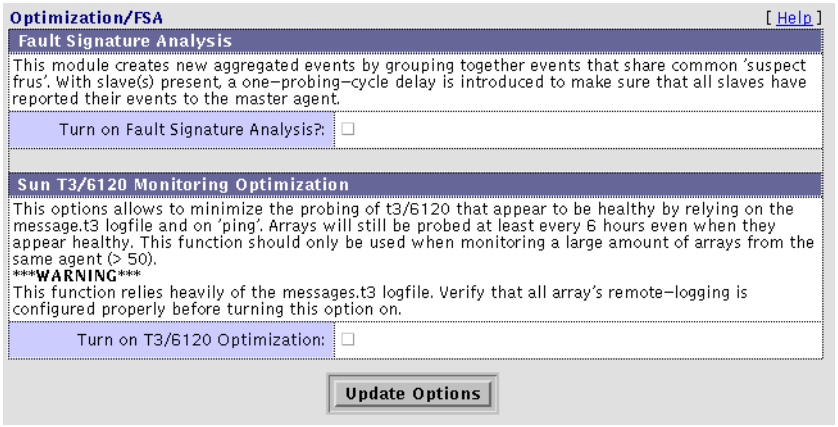


FIGURE 3-29 Optimization / Fault Signature Analysis window

Note – Fault Signature Analysis requires two agent intervals to run. For example, if the agent is set to run every five minutes, 10 minutes are needed for the first analysis.

TABLE 3-12 Fault Signature Analysis Options

FSA Feature	Description
Optimization / FSA	The FSA module collects the events and summarizes them into fewer and more specific, actionable events. The collection of events often points to a root cause of a problem, whereas single events are merely symptoms of the problem.
Sun StorEdge T3, T3+, and 6120 array Monitoring Optimization	Enable this option to minimize probing of Sun StorEdge T3, T3+, and 6120 arrays that appear to be healthy. The Storage Automated Diagnostic Environment determines the health of the arrays by pinging them and by referring to the output in the mirrored syslog file.

Topology Maintenance

The Storage Automated Diagnostic Environment's graphical storage area network (SAN) interface displays all fabric components and the state of those components. Fabric components include HBAs, switch ports, storage controllers, and disks, along with more specialized components such as fans, batteries, power, and volumes.

Note – Only HBAs connected to storage devices are displayed in Topology.

SAN agents collect counter information based on error messages and telemetry information. This information is then used in the topology drawing to indicate link failures.

This section includes the following SAN maintenance functions that you can perform using the Storage Automated Diagnostic Environment:

- "To Access the Admin Window" on page 28
- "To Create a Topology Snapshot" on page 81
- "To Merge Topologies" on page 83
- "To Display Topology History" on page 84
- "Grouping" on page 85

▼ To Access the Topology Window

1. **Click the Admin link in the Storage Automated Diagnostic Environment main window.**

   Administration is divided into three sections: General Maintenance, Topology Maintenance, and System Utilities.

2. **Click Topology Maintenance.**

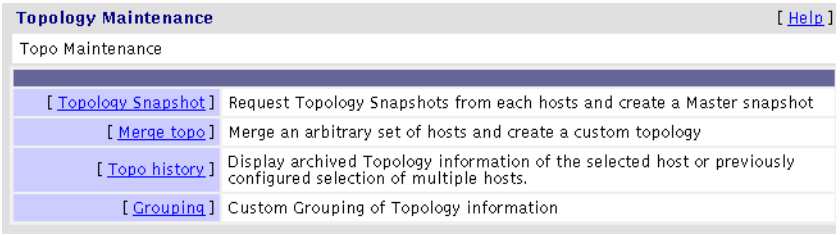


FIGURE 3-30 Topology Maintenance window

Note – In order to view a topology and create a snapshot, you must first execute the `ras_install` command to start the Storage Automated Diagnostic Environment services.

▼ To Create a Topology Snapshot

Use this function to create and update the topology view from the host or to review error details. Once the individual host topologies are updated, the merged topology views are also updated.

Note – This function requires Solaris 8 4/01 or newer. If using Solaris 8 4/01, the host must have the `SUNWsan` package installed, along with the latest 111413-*xx* `luxadm` patch.

To view topologies in the Monitoring and Diagnostic windows, you must first create a snapshot.

Before you create a Topology snapshot, make sure there are no failed over paths. If there are failed over paths, the Topology view will not properly display them.

1. **From the Topology Maintenance window, select Topology Snapshot.**

   The Topology Snapshot window is displayed.

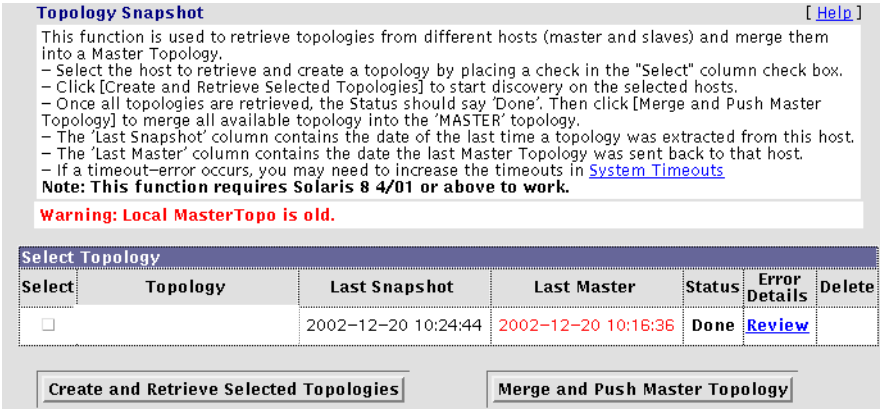


FIGURE 3-31 Create Topology Snapshot window

2. **To retrieve the selected master or slave topology, select the checkbox that corresponds to the topology and click Create and Retrieve Selected Topologies.**

   While the system creates the selected topology, the status will be in one of two states:

   - Running—discovery is running on the selected host and the system creates and retrieves the selected topology.
   - Done—the topology has been created and is ready for you to retrieve.
     - Click the Review link to review the error details, if applicable.
     - Click the Clear link in the Delete column to clear a selected topology.

3. **Once the individual host snapshots have been retrieved, click Merge and Push Master Topology to synchronize the master and slaves.**

   If a timeout occurs during this process, you may need to increase the timeout specifications using the System Timeout functionality, found in "To Change System Timeout Settings" on page 89.

4. **Once the topology has been created, verify the Topology view.**

▼ To Merge Topologies

A master configuration topology includes the master and all slaves and is automatically generated. You can, however, merge or delete selected topologies if you would like to create a topology that is something *less* than the master and all slaves. By merging topologies, multiple-host topology drawings are combined into a single topology drawing.

1. **From the Topology Maintenance window, select Merge Topologies.**

   The SAN Merge Topologies window is displayed.

2. **Select two or more topologies from the Available Topologies section, and select the corresponding Select check box.**

3. **Type a unique name for the merged topology, and click Create.**

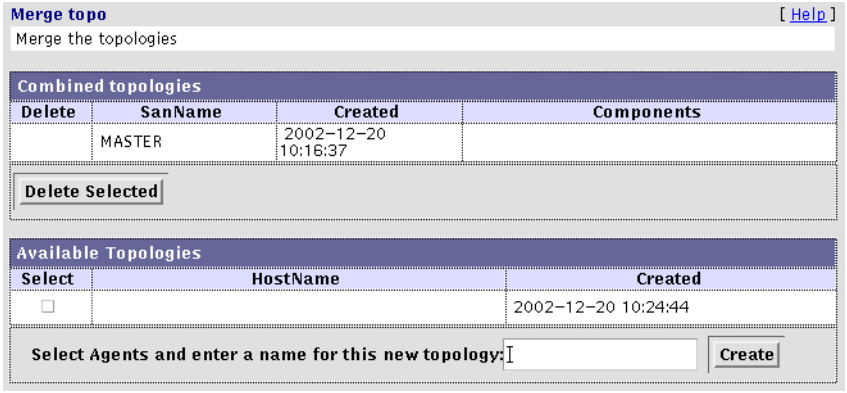


FIGURE 3-32 Merge Topology Snapshot window

▼ To Delete a Merged Topology

- **Select the topology from the Combined topologies section, and click Delete Selected.**

Note – If you want to delete a merged topology, use the SAN Merge Topologies functionality, not the Snapshot History functionality.

▼ To Update a Topology

The only way to update a topology is to create a new topology snapshot, which overwrites the old snapshot. Merged topologies automatically incorporate new snapshots.

▼ To Display Topology History

With this function, you can compare and delete current Topology snapshots, or you can view, compare or delete previously stored Topology snapshots.

1. **From the Topology Maintenance window, select Topology History.**

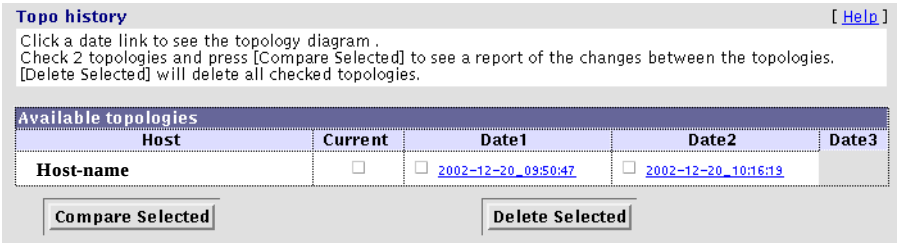


FIGURE 3-33 Display Topology History

2. **To see a summary of the changes between two topologies, select two hosts and enable the corresponding Current checkbox, then click Compare Selected. The host must have at least two topologies to use the Compare Selected feature.**
3. **To delete a topology, select one or more topologies and enable the corresponding checkbox, then click Delete Selected.**
4. **To view a previously stored Topology snapshot, double click the date link from the Date1, Date2, or Date3 columns. The oldest snapshot is displayed first.**
5. **To compare or delete previously stored Topology snapshots, click the corresponding checkbox on the Date1, Date2, or Date3 columns.**

   a. **To compare two or more previously stored snapshots, click Compare Selected.**

   b. **To delete one or more previously stored snapshots, click Delete Selected.**

Grouping

The Storage Automated Diagnostic Environment Topology Grouping function enables you to display multilevel topologies and to aggregate a large number of devices in a single view.

This section discusses the following functions that are associated with Topology grouping:

- "To Create and Maintain Groups" on page 85
- "To Add Devices to a Particular Group" on page 87

▼ To Create and Maintain Groups

1. **From the Topology Maintenance window, select Grouping.**
2. **In the Grouping window, create a group name.**

   To create a new group name, you must specify a host name or merged topology name, a group code, and a description.

   The code and group name (description) can be arbitrary, but you should choose a name that adequately defines the group. An example of this might be Code name of Building 1 and a Group Description of Campus1.

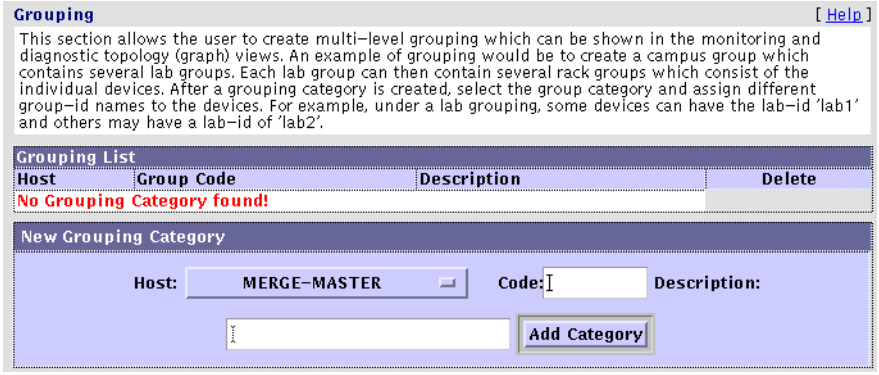


FIGURE 3-34 Topology Grouping window

3. **Click Add Category to add the group name.**

4. **Click the Merge Master link to create the new group.**

   The Group Detail window is displayed, showing a list of all the devices contained in the host or merged topology you chose.

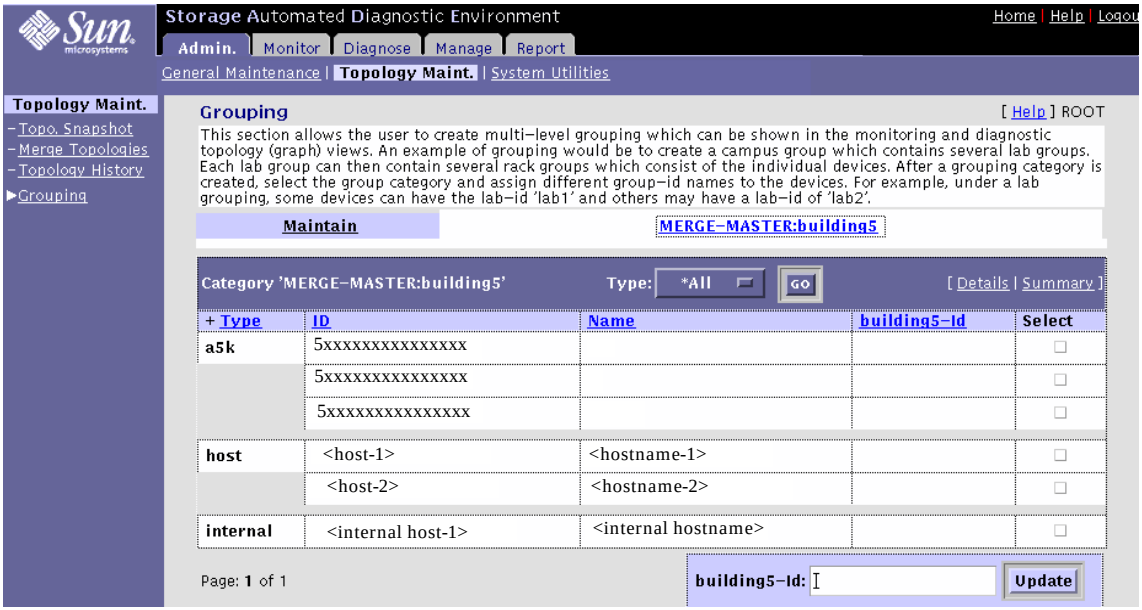


FIGURE 3-35 Topology Group Detail window

▼ To Add Devices to a Particular Group

1. **From the Group Detail window, select the device's corresponding check box.**
2. **In the group's corresponding text box, type an identifier.**

   The Group ID enables multiple instances of similar objects. An example of this is rack1, rack2, rack3, and so on.

   You can also create subgroups by using the dot ('.') notation in the ID field. By using names such as lab1.rack1 and lab1.rack2, you create a lab1 group that contains two separate rack groups. The dot notation enables multilevel grouping.

3. **Click the Summary link, located in the upper-right corner of the Group Detail window to access the Group Summary window.**

   a. **This menu enables you to select the color and type of group icon that you want displayed.**

   b. **From this window, you can also add a description, which will appear next to the icon in the topology view.**

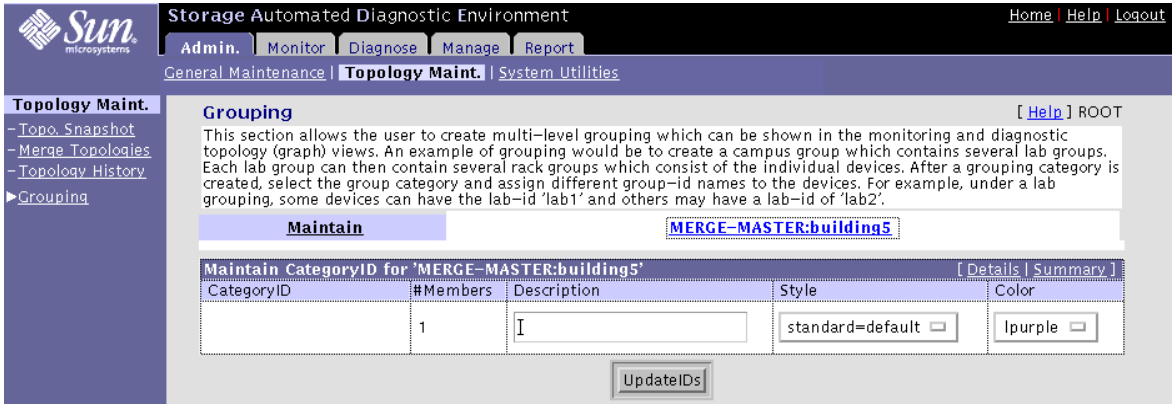


FIGURE 3-36 Group Summary window

▼ To Delete a Component From a Group

- **Clear the Description field of the component you want to delete, and click UpdateIDs.**

System Utilities

The Utilities section contains optional tools you can use for Storage Automated Diagnostic Environment administration.

The sections that follow explain how to perform the administrative tasks.

- "To Change System Timeout Settings" on page 89
- "To Erase a Device's Cache" on page 91
- "To Run the Agent Manually" on page 92
- "To Email Configuration Information" on page 93
- ".To Change the Security Password" on page 97

▼ To Access the System Utilities Page

1. **Click the Admin link in the Storage Automated Diagnostic Environment main window.**
2. **Click the System Utilities link.**

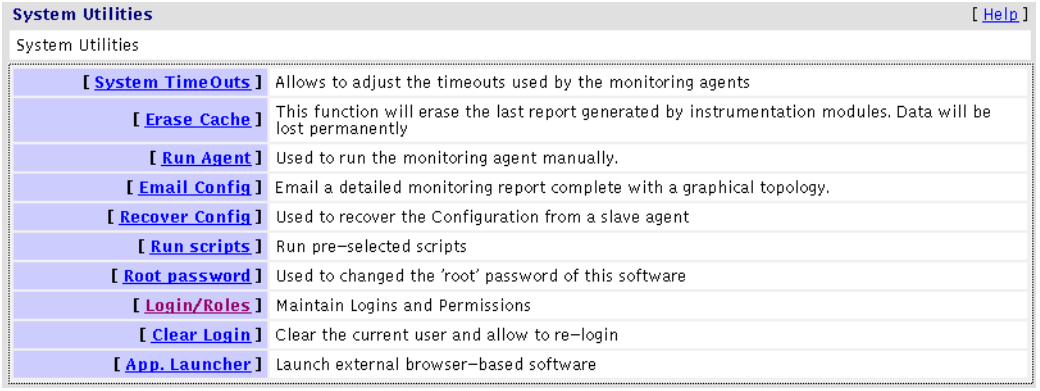


FIGURE 3-37 System Utilities window

System Timeouts

System timeouts are the values the Storage Automated Diagnostic Environment agent uses to ensure that it does not spend too much time waiting on a response for commands to return.

▼ To Change System Timeout Settings

1. **Click System TimeOuts in the System Utilities window.**

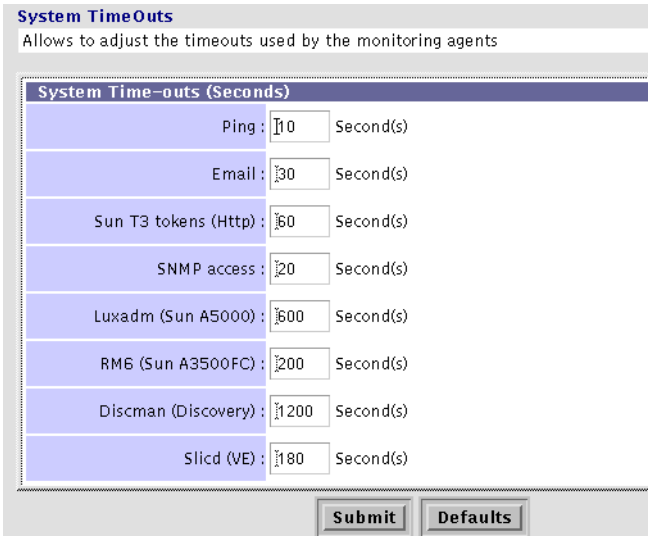


FIGURE 3-38 System TimeOuts window

2. **Change the default settings for scheduled time-outs and click Submit.**

   See TABLE 3-13 for definitions of timeout settings.

3. **To return to the default settings, click Defaults.**

TABLE 3-13 Timeout Settings

Setting	Definition
Ping	The timeout used to perform a ping. The default is 10 seconds.
Email	The timeout used when email messages. The default is 30 seconds.
Sun T3 tokens (Http)	The timeout used when extracting token information from a Sun StorEdge T3 or T3+ array. The default is 60 seconds.
SNMP access	The timeout used to query switches that support simple network management protocol (SNMP). The default is 20 seconds. For more information on SNMP, see "SNMP Traps" on page 71.
`Luxadm` (Sun A5000)	The timeout used to query the Sun StorEdge A5000 array device that are using `luxadm`(1M). The default is 600 seconds (10 minutes). For more information, refer to the `luxadm`(1M) man page.
RM6 (Sun A3500FC)	The timeout used to query the Sun StorEdge A3500FC array device that are using the rm6 library. The default is 200 seconds (3.33 minutes). **Note:** To find the device name for the Sun StorEdge A3500FC array, use the RM6 command `drvutil -l` *devName*, where *devName* is from the `/usr/lib/osa/bin/lad` command.
Discman (Discovery)	The timeout used to discover HBAs and storage devices in topology that are using `discman`(1M). The default is 1200 seconds (20 minutes). For more information, refer to the `discman`(1M) man page.
`Slicd` (VE)	The timeout used to query the virtualization engines that are using the `slicd` daemon and libraries. The default is 180 seconds (3 minutes). For more information, See the *Sun StorEdge™ 3900 and 6900 Series Version 1.1 Reference and Service Guide*.

Erase Cache

When you select an existing device, the last report in the cache for that device is erased. This forces the Storage Automated Diagnostic Environment agent to regenerate discovery events.

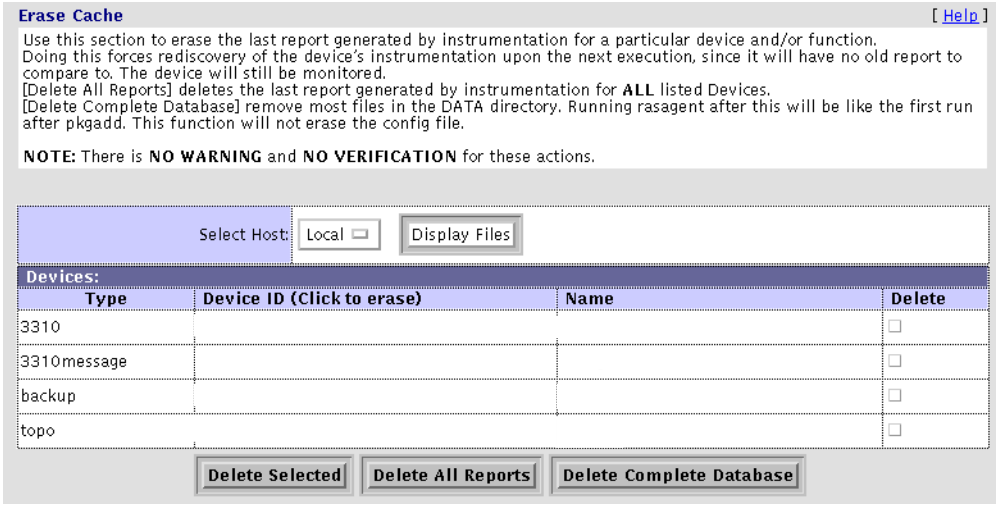


FIGURE 3-39 Erase Cache window

▼ To Erase a Device's Cache

Caution – There are no safeguard messages for this function. Once you have selected a device, the instrumentation report for that device is immediately erased.

The Erase Device Cache function erases the cache of all the selected devices and the list is removed. Although the device's cache is erased, however, the device will continue to be monitored.

1. **Select a host from the Select host pull-down menu and click Display Files.**

   A list of devices for the selected host is displayed.

2. **Click the device's corresponding Delete checkbox to erase the device's cache.**

   The device is removed from the list.

Run Agent

Although the Storage Automated Diagnostic Environment is normally run from the `cron` facility, the Run Agent function enables you to run the Storage Automated Diagnostic Environment manually.

▼ To Run the Agent Manually

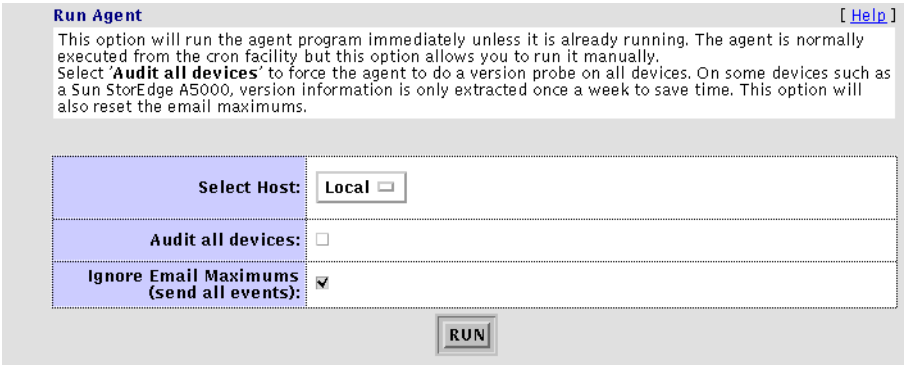


FIGURE 3-40 Run Agent Manually window

1. **Select a host from the Select Host pull-down menu.**

Note – Select and run the slaves first. The master should be manually run last.

---

2. **In the section "Config Options" on page 76, you can specify the maximum number of emails that will be sent within an 8-hour period about a specific event. The default is no maximum.**

   If you check *Ignore Email Maximums*, the system overrides current specifications and sends all events. You can also clear the specified maximum number of emails using "Customizing Email Deliveries" on page 57.

3. **On some devices, such as the Sun StorEdge A5000 device, the Storage Automated Diagnostic Environment automatically extracts revision information once a week.**

   If you check *Audit All Devices*, you manually force the Storage Automated Diagnostic Environment to run an extensive probe of all devices, rather than having to wait until the next scheduled run.

4. **After you have selected or deselected the options, click RUN.**

   A summary report displays the status of all the components that are running.

Email Configuration

Using the Email Configuration functionality, you can forward a detailed configuration report to specified email recipients. The configuration report includes a list of all monitored devices and the most recent instrumentation report available for each device. Topology information can also be forwarded via email.

Note – Email might not be sent if the system is not properly configured. This is primarily evident in Storage Service Processor environments where the Storage Service Processors are on a subnet and there is no gateway to the intended recipient. See the *Sun StorEdge 3900 and 6900 Series Hardware Installation and Service Manual* for more information.

▼ To Email Configuration Information

1. **Click the Email Config link in the System Utilities window.**

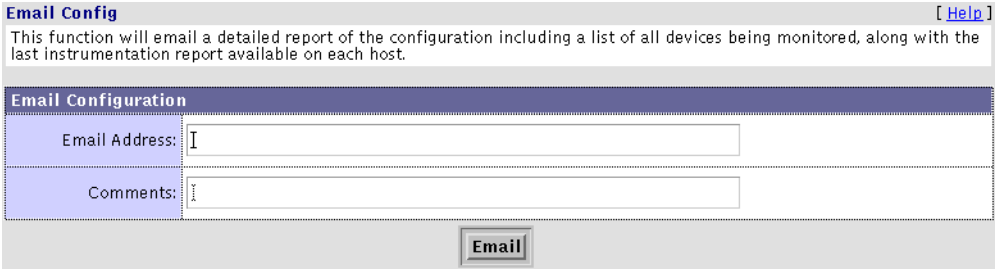


FIGURE 3-41 Email Configuration window

2. **Type an email address into the Email Address text box and click EMAIL.**

Note – The Email Configuration function enables Sun personnel to view customer information. Note, however, that in order to view the topology in an emailed configuration report, the browser must have access to Sun's Internal Wide Area Network (SWAN).

Recover Configuration

The Recover Configuration function enables you to recover the configuration from the alternate master. The configuration includes identification information, along with device, host, and email notification information.

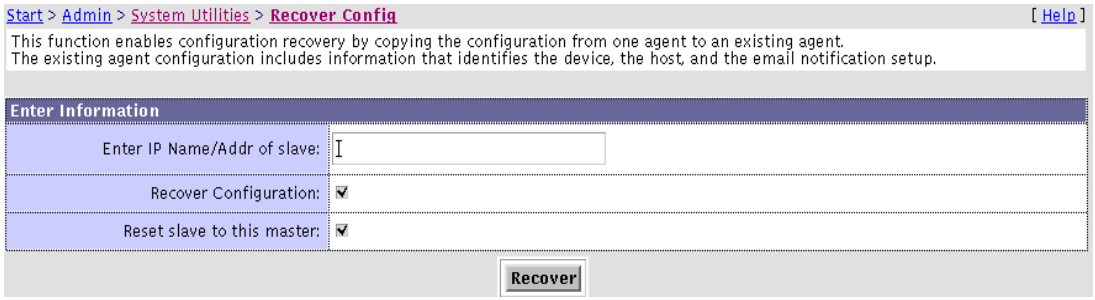


FIGURE 3-42 Recover Configuration window

Once the system has completed running, a message displays confirming recovery of the Configuration file. A message is also sent to the email address specified in the Configuration file.

Run Scripts

The Run Scripts window enables the user to run several command line programs from the GUI.

▼ To Run Scripts

1. **Click Run Scripts in the System Utilities window.**
2. **Select and click on a script from the Script List, shown in** FIGURE 3-43**. An example of a script is shown in** FIGURE 3-44**.**

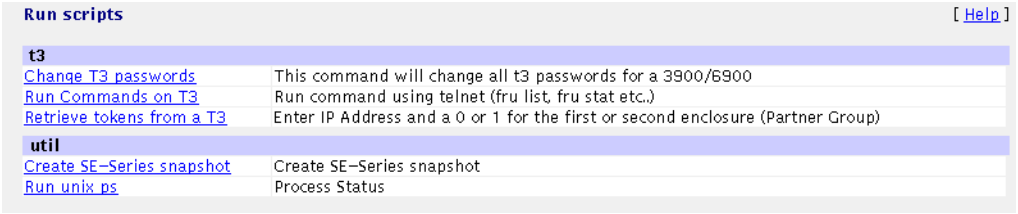


FIGURE 3-43 Script List

TABLE 3-14 provides a brief description of the scripts that are currently available for the Sun StorEdge T3+ Array.

TABLE 3-14 Run Scripts Options for the Sun StorEdge T3+ Array

Script Option	Description
Sun StorEdge T3+ Array Scripts	
Change T3 passwords	This command changes the password of all Sun StorEdge T3+ Array that are components of a Sun StorEdge 3900 and 6900 Series system.
Run Commands on T3	This command enables the user to run Sun StorEdge T3+ Array commands, such as `fru list` and `fru stat`, using Telnet.
Retrieve tokens from a T3	This script enables the user to enter IP number 0 or 1 for the first or second enclosure.

3. **Make changes, if necessary, to the script and click Run Command.**

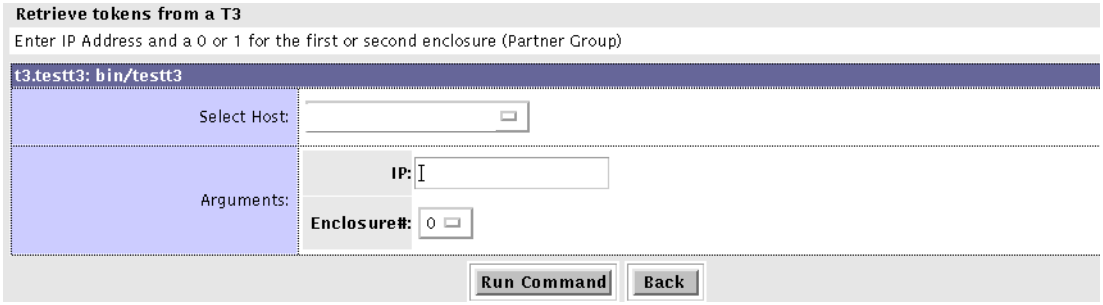


FIGURE 3-44 Script List Example—Retrieve Tokens from a Sun StorEdge T3 Array

Password Maintenance

Use the Password Maintenance window to change the security password for the Storage Automated Diagnostic Environment GUI.

▼ .To Change the Security Password

1. **Click Root password in the System Utilities window.**

   The Password Maintenance window is displayed.

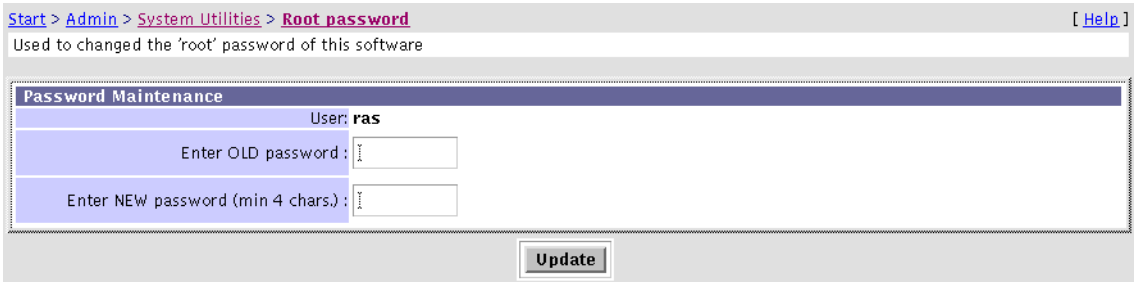


FIGURE 3-45 Change Password window

2. **If you do not know the current password, use the** `save_password`**(1M) utility to create a new password.**

Note – The default login and password after initial installation are `ras/agent` (all lowercase).

---

3. **Enter the OLD password.**
4. **Enter a new password, with a minimum of four characters.**
5. **Click Update.**

   The security password is changed.

Login / Roles

The Storage Automated Diagnostic Environment administrator can assign permission privileges for the categories listed in TABLE 3-15. In addition to assigning privileges, the administrator can add a new user, maintain passwords, and update or remove existing users.

▼ To Add User Roles

1. **Click Login/Roles in the System Utilities window.**

   The Login / Roles window is displayed.

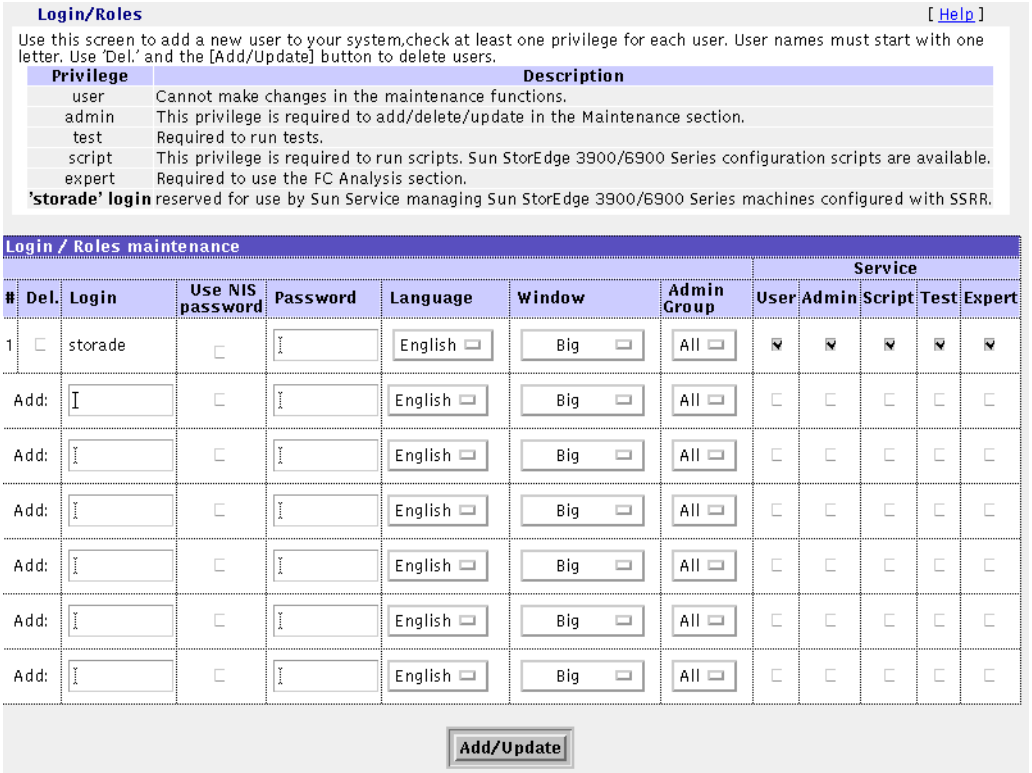


FIGURE 3-46 Update User Login / Roles window

2. **Add a user name and assign one or more service roles to the user. Roles are defined in** TABLE 3-15**.**

TABLE 3-15 Update User Roles

Privilege	Description
user	The user does not have privileges to make changes in the maintenance functions
admin	This privilege is required to add, delete, or update information in the Maintenance section
test	This privilege is required to run tests
script	This privilege is required to run scripts. Currently, Sun StorEdge 3900 and 6900 Series configuration scripts are available.
expert	This privilege is required to use the Fibre Channel Counter Analysis section.

3. **Type a password, which is encrypted, or select the Use NIS password check box.**

4. **Select an option from the Window pull-down menu.**

   Big—displays three frames: the left frame window, the top window (with tracking links), and the main topic window.

   Small—displays three frames, as with the Big Screen selection, but the frames are smaller.

   No Frame—displays the top window (with tracking links) and the main topic window only.

   Accessible—displays the top window (with tracking links) and the main topic window, as with No Frames, but enables the user to use keystroke combinations to perform tasks instead of using the mouse.

   Note – The browser does not support Topology if the Accessible option is selected.

   If you want to use the Topology functionality, select Big Screen, Small Screen, or No Frames.

   ---

5. **Click Add/Update.**

▼ To Remove a User

- **Delete the encrypted password and click Add/Update.**

Clear Login

The Clear Login screen enables you to clear a current user and log in again as another user without having to exit the browser.

▼ To Clear the Login Screen

1. **Click Cancel to the question “Authorization Failed. Retry?”**
2. **To return to the Login screen, reload the browser window.**

Application Launcher

The Application Launcher, shown in FIGURE 3-47, enables users to store URL bookmarks in the Storage Automated Diagnostic Environment on a device-by-device basis.

Note – The Application Launcher provides an easy way to launch the Brocade Silkworm Switch Management Interface directly from the Storage Automated Diagnostic Environment without having to open a new browser window and type the URL of the Brocade Silkworm switch manually.

Currently the devices for which URL bookmarks can be stored include the following:

- Sun StorEdge T3, T3+, and 6120 arrays
- Brocade Silkworm switches
- Sun StorEdge Network FC Switches
- Sun StorEdge 3900 and 6900 series
- Sun StorEdge 6320 or 6320 SL series
- Fibre Channel Tape devices
- Virtualization engines (Sun StorEdge 3900 and 6900 series only)

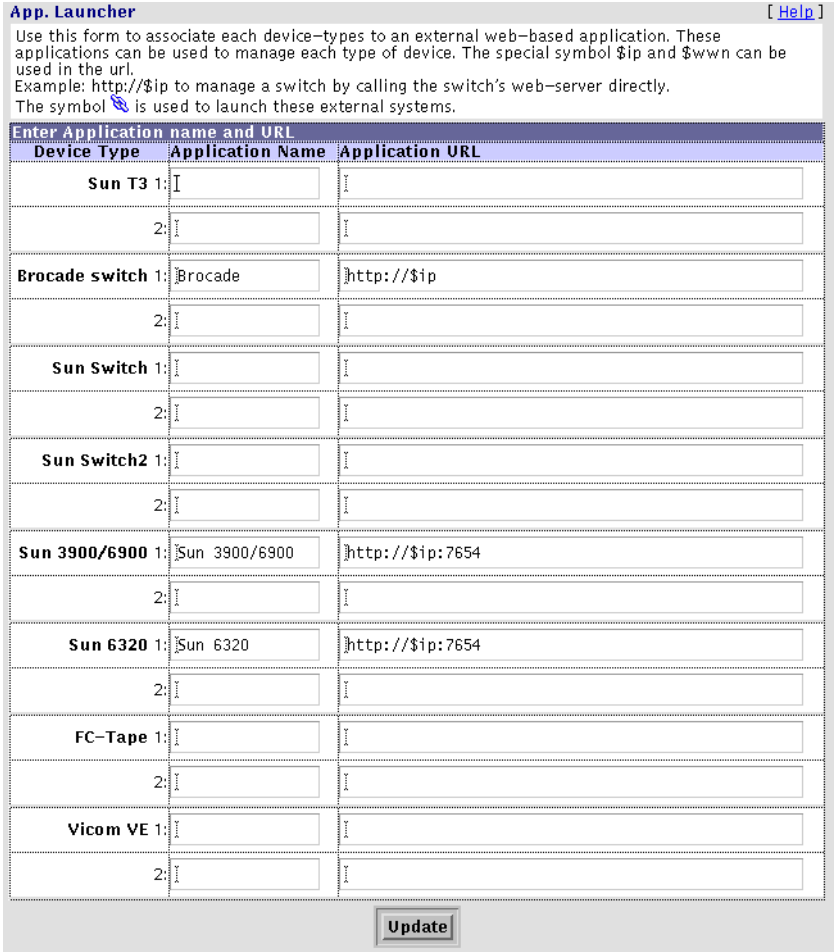


FIGURE 3-47 Application Launcher

CHAPTER 4

Monitoring

This section discusses the following monitoring functions you can perform using the Storage Automated Diagnostic Environment:

- "Monitoring Devices" on page 104
- "Monitoring Topology" on page 111
- "Monitoring Logs" on page 119
- "Monitoring Utilities" on page 126

▼ To Access the Monitor Window

- **Click the Monitor link on the Storage Automated Diagnostic Environment main window.**

  Monitoring is divided into four sections: Monitor Devices, Monitor Topology, Monitor Log, and Utilities.

FIGURE 4-1 Monitor Window

Monitoring Devices

You can use the Monitor Devices window to review all FRU-level information and to access components of a selected device.

Instrumentation agents are very different from one another because they are specialized modules designed to probe a specific type of device. Each instrumentation agent produces reports and, when available, reads new entries into the logs accessed by the `/var/adm/messages` function.

Events, Alerts, and Alarms

The terms event, alert, and alarm are often mistakenly used interchangeably. The terms are defined as follows:

- An *event* is a notification that contains information about something that happened on a device. There are many types of events and each type describes a separate occurrence.
- An *alert* is a subtype of an event that requires user intervention. Often, the term actionable event describes an alert.
- An *alarm* is the user interface mechanism by which a user manages an alert. It is a warning of an existing or approaching alert.

▼ To View Device Reports

1. **Click the Monitor Devices link on the Monitor main window.**

   The Monitor Devices window is displayed.

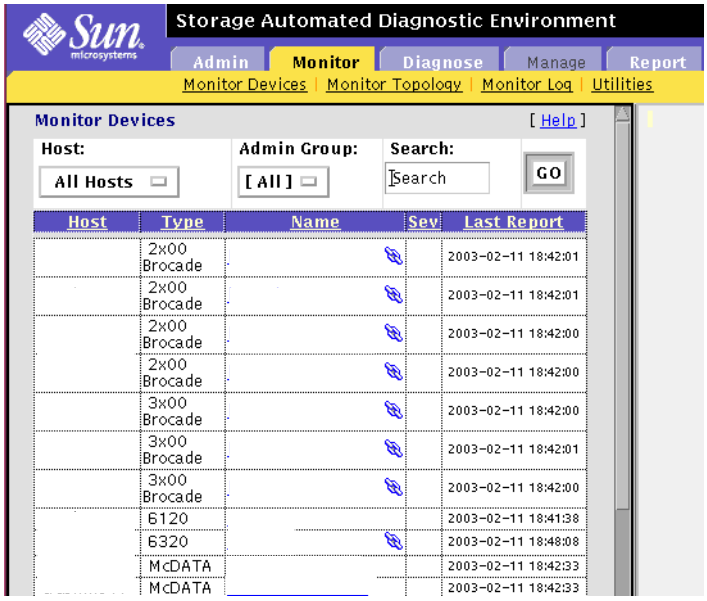


FIGURE 4-2 Monitor Devices window

The Monitor Devices window, displayed in FIGURE 4-2, contains:

- A list of all monitored devices
- The severity column, which shows current errors and warnings on a selected device. To access the Alerts page, drag your mouse over a severity button and left click the mouse button. The Alerts summary is displayed.
- The report date on which alerts, logs, and report summaries were generated.

2. **To narrow the list of devices, enter at least a portion of the device name or IP address to display specific devices into the Search text box.**

   For example, if you enter ‘192,’ the search returns both ‘diag-192’ and device ‘192.xx.xx.x.’

3. **Click a device from the Name column to view a list of all of the device’s components.**

   A summary of the device is displayed, as shown in FIGURE 4-3.

Note – You can also access the content of the Monitor Devices Report window, using the Topology view, by right-clicking an icon and clicking Report.

4. **Click on a component's corresponding Summary, Health, Log, Report, or Graph link.**

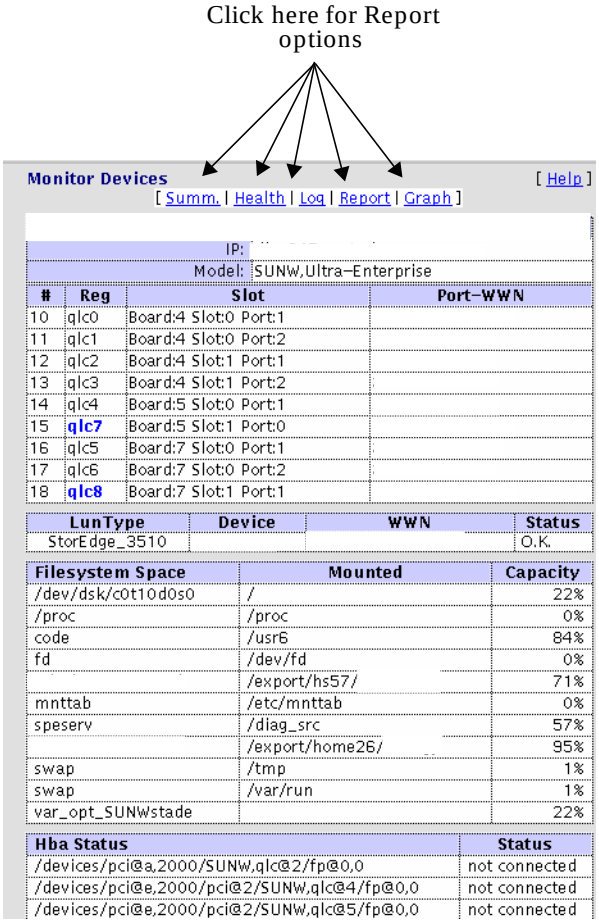


FIGURE 4-3 Monitor Devices Report Options window

Monitoring Options

Options from the Monitor Devices Report window include:

- A Summary Report page about the selected device
- A Health page showing any problem with the selected device
- A Log page showing all events generated against the selected device
- A Report page showing, in detail, all monitored attributes for the selected device
- A Graph summary, displaying a summary of the component in graphical format

Summary Report

- **Access the Summary Report by clicking the Summary link from the Monitor Devices window.**

The Summary Report page provides detailed information about the selected device. Sun StorEdge 6120 array detail includes the following:

- Product information—array name, monitoring host name, WWN number, and communication status.
- Array type (for example, disk, controller, midplane, loop, port, volume)
- Array identifier
- Array status (for example, ready-enabled, fault-enabled, online, normal, mounted)
- Revision number and additional information.

Health Report

1. **Access the Health Report by clicking the Health link from the Monitor Devices window.**

   A list of all events and alarms on the device and a summary of the health of every FRU for the device is displayed, along with its severity level.

2. **If you want to delete the Health Summary, click Delete Health.**

Event Log

1. **To access the Event Log Report, click the Log link from the Monitor Devices menu.**

   The Event Log contains the following information.

   - Date and time the event occurred.
   - Severity icon

   Note – Mouse over the severity icon to find the numerical value associated with each severity level:

     - 0 = green
     - 1 = yellow (warning)
     - 2 = red (error)
     - 3 = down (component is down)
   - Event
   - Description of the event

2. **Click the Event's link to access the Event Grid.**

   The device's EventGrid Info screen is displayed.

   The Event Grid, also known as the *Service Advisor* shows all of the actionable and non-actionable events the Storage Automated Diagnostic Environment generates. See "Service Advisor" on page 173.

Device Report Detail

The Device Report Detail page provides detailed information about a selected device. From the Summary Report page, you can gather very detailed information about each component of the device. The information is nested for easy navigation.

To access the Device Report Detail page:

1. **Click the Report link from the Summary Report page.**
2. **Click the plus (+) icon that corresponds to the component for which you need detailed information.**

   The subtopics for that component are displayed.

3. **Click the link on the subtopic.**

   The details for the subtopic are displayed in a second window, below the main menu.

   Topics for the Sun StorEdge 6120 are listed below.

   - Controller (+)
   - Disk (+)
   - ID
   - Info
   - Location
   - Loopcard (+)
   - LUN
   - Midplane (+)
   - Port (+)
   - Power (+)
   - Slice
   - Sys
   - System
   - Unit
   - Volume (+)

Graph Summary

When you select Graph from the Monitor Devices Report window, the status of the component is displayed in graphical format.

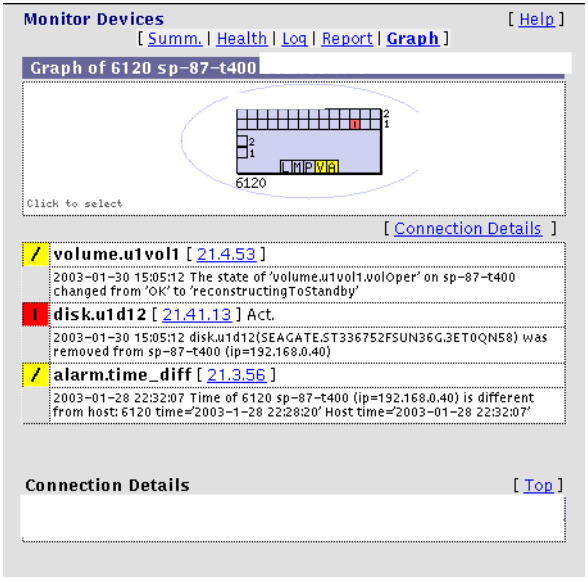


FIGURE 4-4 Monitor Devices in Graphical Format

Monitoring Topology

This section discusses Topology monitoring functions you can perform using the Storage Automated Diagnostic Environment. Use the Topology section to display a host-based topology and SAN-based topologies.

The browser does not support Topology if the No Frames + Accessible option, available in “To Change Configuration Options” on page 72, is selected.

▼ To Access the Monitor Topology Page

1. **Click the Monitor link on the Storage Automated Diagnostic Environment main window.**
2. **Click the Monitor Topology link.**

   The Topologies window is displayed.

   To view a topology, you must do the following:

   1. Execute the `ras_install` command to start the Storage Automated Diagnostic Environment services. This is part of the normal installation process, as documented in “To Install SUNWstade” on page 13.
   2. After device discovery, create a Topology snapshot. See “To Create a Topology Snapshot” on page 81 for more information.

▼ To Display Host-Based Topology

1. **Select Monitor Topology from the Monitor Menu.**

   The Topology menu appears.

2. **Using your left mouse button, select an individual host or a merged (master) topology.**

   The index displays all host topologies that include that device, as shown in the following example.

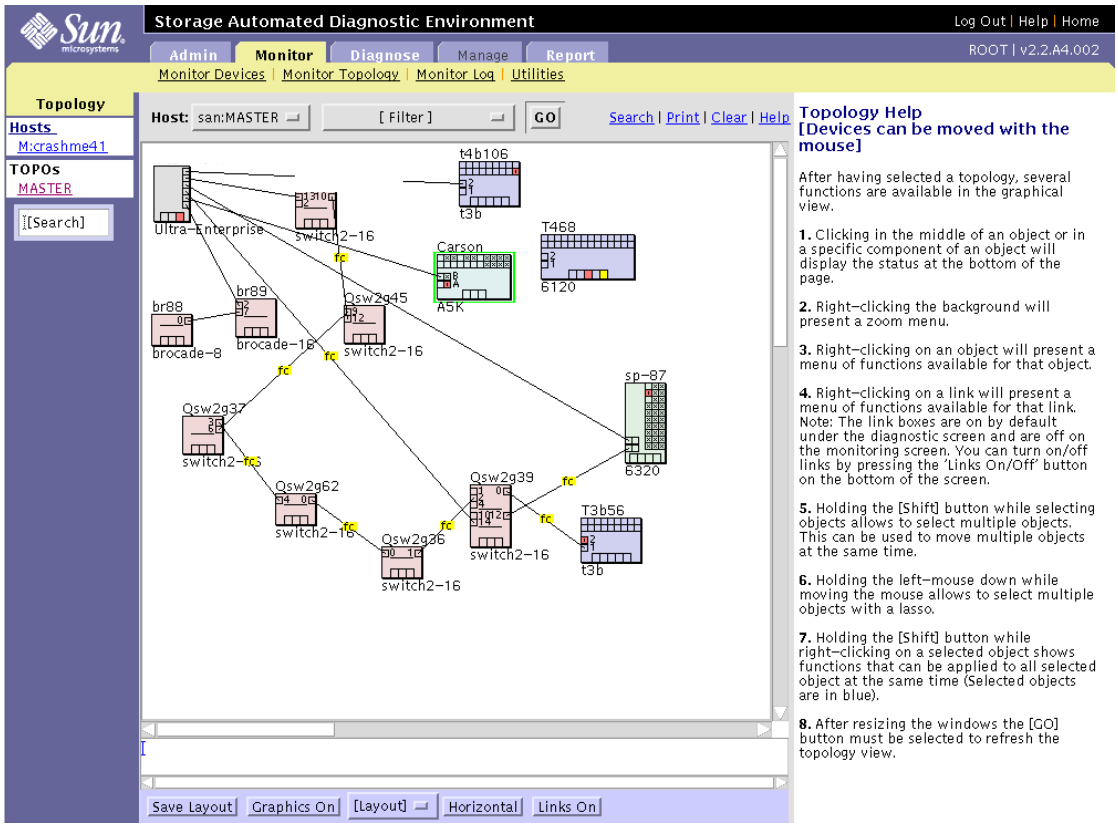


FIGURE 4-5 Sample Topology View

Note – If two hosts (one master host and one slave host) are connected to the same set of switches, always select Master Topology from the Monitor Topology menu.

Whereas the master topology displays an accurate representation of a two-host topology, the slave topology inaccurately displays the devices as direct-attached.

You might see red, yellow, or down-arrow symbols in the topology: The symbols indicate the following:

Symbol	Severity
	Red—critical (error)
	Yellow—alert (warning)
	Down—the system is down

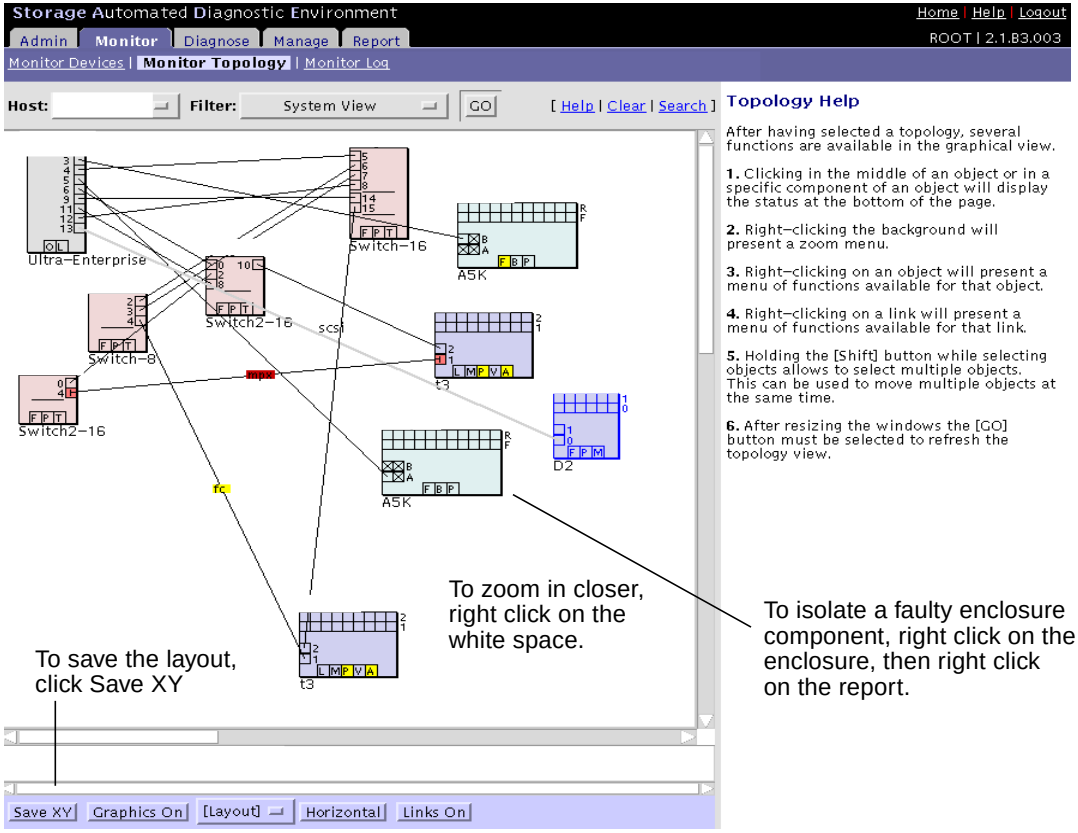


FIGURE 4-6 Topology in System View

▼ To Clear Alerts

Green Links

- **Select the Clear link in the Topology view.**

  All green links are removed from the Topology.

Yellow or Red Links

Note – Yellow or red links must be removed manually and should not be removed until you are certain the faults have been corrected.

---

1. **Right click on a device that has one or more yellow or red alerts.**
2. **From the menu, select Alerts.**

   A list of all Alerts is displayed.
3. **Click Delete Alerts to clear all alerts for the device.**

Caution – Red and yellow alerts are removed from the topology, even if the condition that caused the alert(s) still exists.

---

4. **To clear the red and yellow alerts for a link, right-click the link and select Display Error in the menu. Click Clear Link Errors in the description of the alerts.**

Topology Feature Hints

- To narrow the size of the topology, select a device from the Filter pull down menu and click GO.
- To zoom in closer, right click on the screen's white space. You can zoom by selecting the value with your left mouse button.

Note – After you adjust the screen, click GO. This forces the topology applet to resize the window.

- To isolate a faulty enclosure component, right click on the enclosure, then right click on the report. An Alert log will display all alerts for the enclosure's components separately.

Note – Some enclosures might have two power supplies but only one P box. In this case, the P box will turn red or yellow if *either* power supply is faulty.

- To save the layout, click Save Layout on the footer bar.
- To view actual illustrations of the devices vs. conceptual drawings of them, click the Graphics On button on the footer bar.
- To change the view from horizontal to vertical, click the Horizontal button on the footer bar.
- Show connections between devices by clicking the Links On/Off toggle button. After the links are displayed, right click the link to display link errors, or run the Link Test.
- To rearrange the topology, right click on a device, hold it, and move the device or multiple devices to the position of your choice. Once the topology is rearranged, click Save Layout.

Topology Help

Access the Topology Help window, and all other Help information, by clicking the Help link located in the upper right corner of every window.

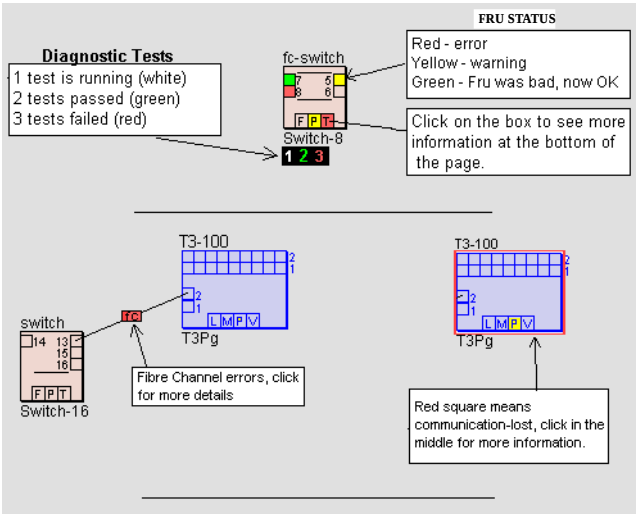


FIGURE 4-7 Topology Help

The icons shown in FIGURE 4-5 and FIGURE 4-7 symbolize the various storage devices that Storage Automated Diagnostic Environment monitors. Inside each storage device icon are boxes that represent:

- Disks inside the arrays
- Ports
- Other components

The “Other” category includes a variable set of boxes that represent components of the enclosures that are monitored. “Other” variables include the following:

- A=Alerts
- B = Backplane
- F = Fan
- l = loop card (on Sun StorEdge T3+ array)
- L = Lun
- M = Midplane
- O = Other
- P = Power
- T = Temp
- V = Volume

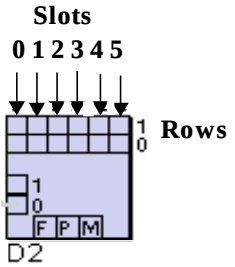
Note – Links that are labeled ‘mpxio’ in the Topology could indicate one of the following:

If a RED “mpxio” label is displayed in the Topology, a Sun StorEdge Traffic Manager failover has occurred on this path.

If a GREEN “mpxio” label is displayed in the Topology, a Sun StorEdge Traffic Manager failover has occurred on this path, but was later corrected.

Sun StorEdge D2 Arrays in the Topology

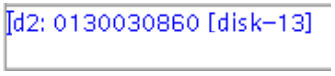
The Sun StorEdge D2 array unit has 12 slots for disk drives. These slots are accessed through the front door of the Sun StorEdge D2 array. In the topology view, these 12 slots are represented by two rows of squares, as shown in FIGURE 4-8.



Row 0 represents the six disk drives on the left side of the unit.

Row 1 represents the six disk drives on the right side of the D2 unit.

Row 1, Slot 5 is the rightmost slot in the Sun StorEdge D2 array enclosure.



In this example, **disk-13** represents the fourth slot in Row 1.

FIGURE 4-8 Sun StorEdge D2 array Topology View

Monitoring Logs

This section discusses the following log monitoring functions you can perform using Storage Automated Diagnostic Environment:

- "To Review the Most Recent Entries on a Host" on page 120
- "To View an Event Log for a Host" on page 121
- "To View Alert Logs" on page 123
- "To Display Agent Errors" on page 125

▼ To Access the Log Page

1. **Click the Monitor link on Storage Automated Diagnostic Environment main window.**
2. **Click the Monitor Log link.**

   The Log window is displayed.

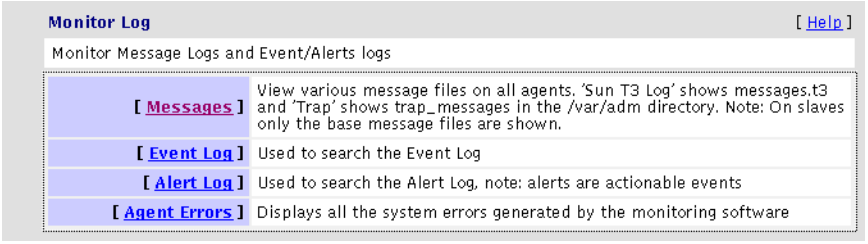


FIGURE 4-9 Monitor Logs window

▼ To Review the Most Recent Entries on a Host

You can review the content of the `/var/adm/messages` and T3 and T3+ message log files from a host. Log entries are displayed from the end of the file going back; the most recent entries are shown first. The Storage Automated Diagnostic Environment must be functioning properly on each host for the `/var/adm/messages` log file to display the entries correctly.

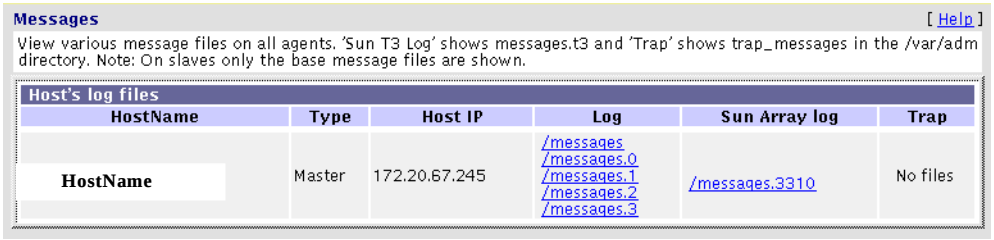


FIGURE 4-10 /var/adm/messages window

- **Select a host from the HostName column and click the corresponding `/messages` or `/messages/t3` link.**

  A descending list of `/var/adm/messages` on the local host is displayed.

▼ To View an Event Log for a Host

1. **From the Monitor Log menu, select Event Log.**

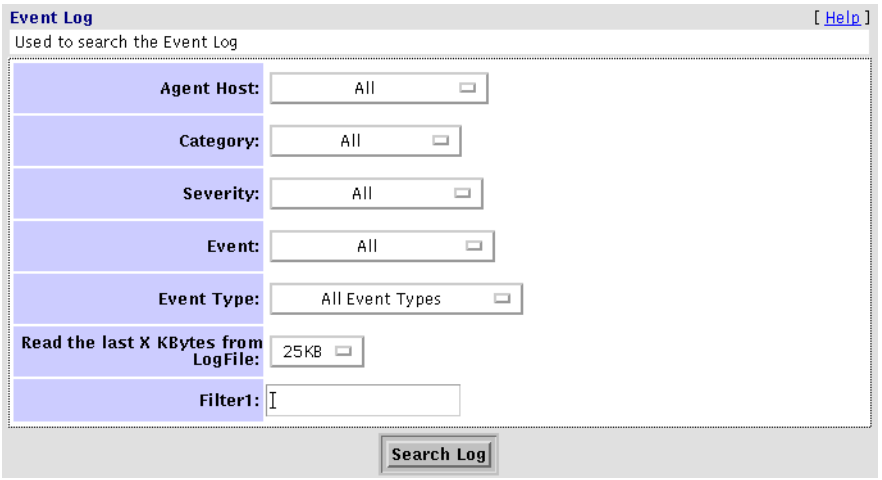


FIGURE 4-11 Event Logs window

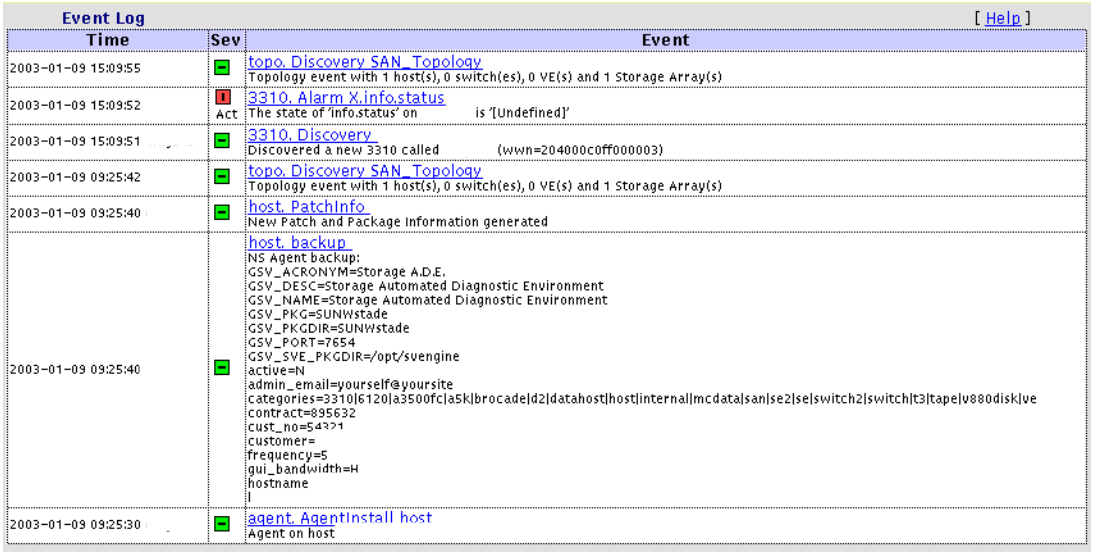
Customize the report by using the following pull-down menus

- Agent Host
- Category-All is the default.

  The device types supported by the current Storage Automated Diagnostic Environment version will be displayed in the pull-down menu.
- Severity-options include All (the default), System Down, Critical (error), Alert (warning), and Caution (information).
- Event-All is the default.
- Event Type-options include All (the default), System Component Events, and System Events.
- Read the last X Kbytes from LogFile-options include 25KB (the default), 50 KB, 75KB, 100KB.
- Filter1-Type the IP address for which you want to view the Event Log into the Filter1 text box.

After you have altered each field (or accepted All as the defaults), click Search Log to produce a customized Event Log.

The corresponding event log window is displayed.



Event Log [Help]

Time	Sev	Event
2003-01-09 15:09:55		topo. Discovery SAN_Topology Topology event with 1 host(s), 0 switch(es), 0 VE(s) and 1 Storage Array(s)
2003-01-09 15:09:52	Act	3310. Alarm X.info.status The state of 'info.status' on is '[Undefined]'
2003-01-09 15:09:51		3310. Discovery Discovered a new 3310 called (wwn=204000c0ff000003)
2003-01-09 09:25:42		topo. Discovery SAN_Topology Topology event with 1 host(s), 0 switch(es), 0 VE(s) and 1 Storage Array(s)
2003-01-09 09:25:40		host. PatchInfo New Patch and Package Information generated
2003-01-09 09:25:40		host. backup NS Agent backup: GSV_ACRONYM=Storage A.D.E. GSV_DESC=Storage Automated Diagnostic Environment GSV_NAME=Storage Automated Diagnostic Environment GSV_PKG=SUNWstade GSV_PKGDIR=SUNWstade GSV_PORT=7654 GSV_SVE_PKGDIR=/opt/svengine active=N admin_email=yourself@yoursite categories=3310|6120|a3500fc|a5k|brocade|d2|datahost|host|internal|mcdata|san|se2|se|switch2|switch|t3|tape|v880disk|ve contract=895632 cust_no=54321 customer= frequency=5 gui_bandwidth=H hostname l
2003-01-09 09:25:30		agent. AgentInstall host Agent on host

FIGURE 4-12 Example of Event Log Messages on Local Host

▼ To View Alert Logs

1. **From the Monitor Log window, select Alert Log.**

   Alerts are actionable events. The Alert log is considerably shorter than the Event Log.

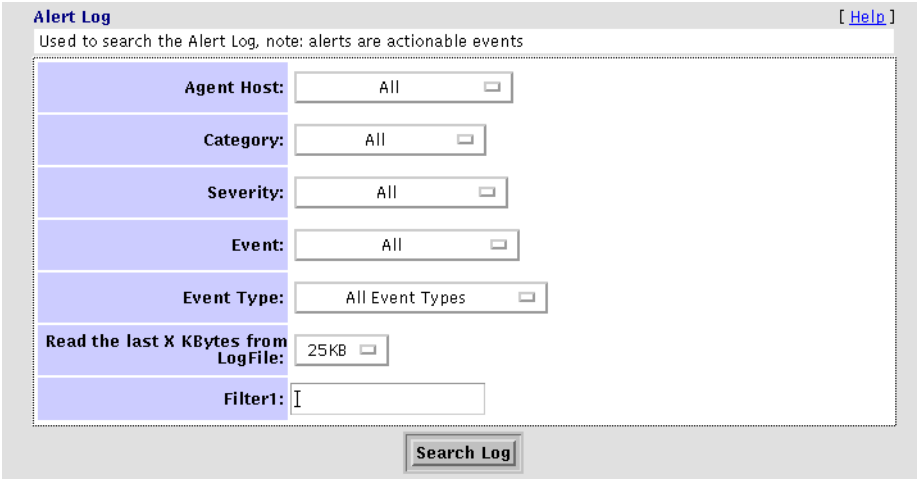


FIGURE 4-13 Alert Logs window

2. **Customize the report by using the following pull-down menus:**

   Customize the report by using the following pull-down menus

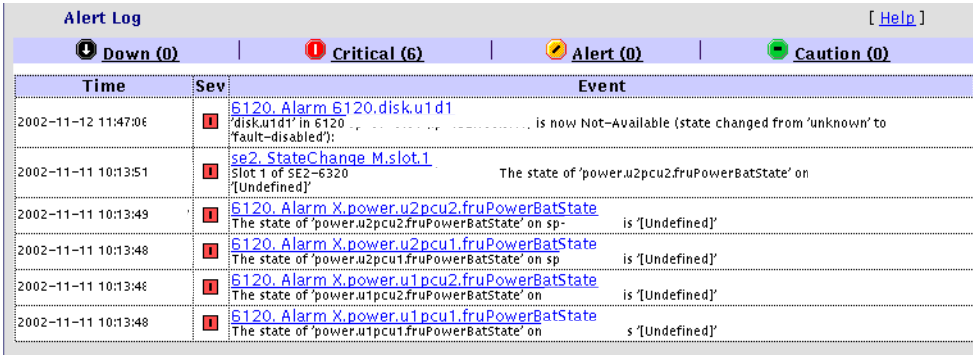
   - Agent Host
   - Category-All is the default.

     The device types supported by the current Storage Automated Diagnostic Environment version will be displayed in the pull-down menu.
   - Severity-options include All (the default), System Down, Critical (error), Alert (warning), and Caution (information).
   - Event-All is the default.
   - Event Type-options include All (the default), System Component Events, and System Events.
   - Read the last X Kbytes from LogFile-options include 25KB (the default), 50 KB, 75KB, 100KB.
   - Filter1-Type the IP address for which you want to view the Event Log into the Filter1 text box.

   After you have altered each field (or accepted All as the defaults), click Search Log to produce a customized Alert Log.

Note – The intent of this log is not to view the content of the Alert, but rather to view the list of Alert types that have been generated. You can obtain the actual content by scanning through the appropriate message logs or through the email that was sent for each notification.

The corresponding alert log window is displayed.



▼ To Display Agent Errors

The Storage Automated Diagnostic Environment System Errors window displays system errors that have occurred on a given host.

1. **To access the Storage Automated Diagnostic Environment System Errors window, click Agent Errors on the Monitor Log window.**

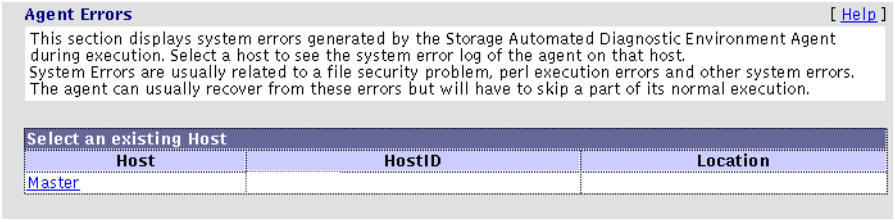


FIGURE 4-14 Display Agent Errors window

2. **Select an existing host.**

The corresponding Storage Automated Diagnostic Environment Agent Error Logfiles window is displayed.

Monitoring Utilities

This section discusses the Clear Device Health function you can perform from the Monitoring Utilities window.

▼ To Access the Monitoring Utilities Window

1. **From the Monitor window, click Utilities.**

   The Monitor Utilities window is displayed.

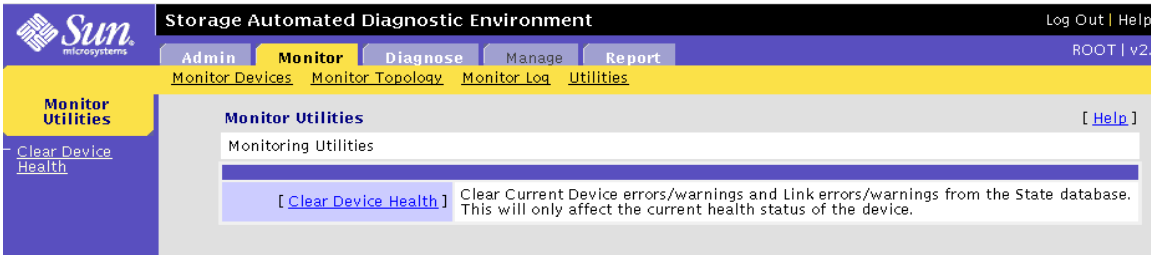


FIGURE 4-15 Monitor Utilities Window

The Clear Device Health function enables you to clear current device errors and warnings and link errors and warnings from the State database.

▼ To Clear the Health Status of a Device

2. **Click Clear Device Health from the Monitor Utilities menu.**

   A window that shows the component's current state is displayed (see FIGURE 4-16).

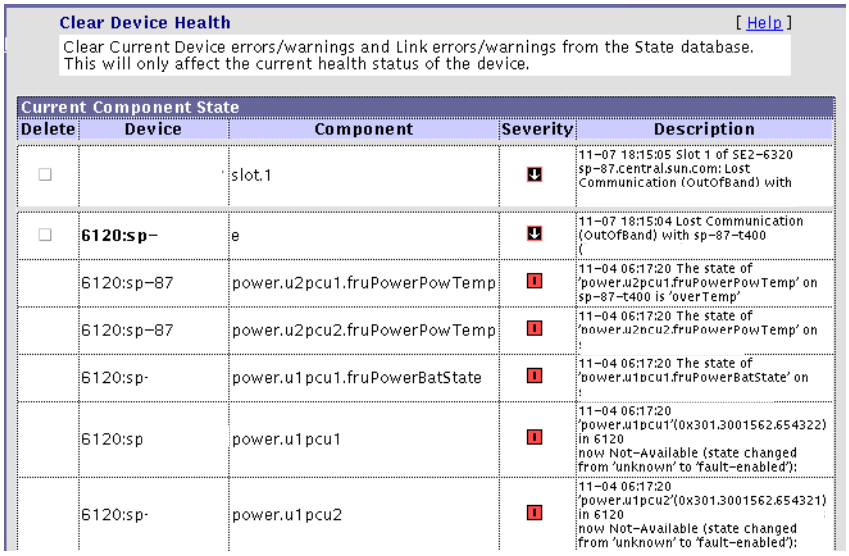


FIGURE 4-16 Clear Device Health Window

3. **Select the device component and click its corresponding Delete button. Scroll down to the bottom of the window and select your deletion option:**

   - Delete Selected
   - Delete All Green
   - Delete All Warnings
   - Delete All Link Alerts
   - Delete All Alerts

CHAPTER 5

Diagnostics

This chapter provides an overview of the diagnostic tests available from the Storage Automated Diagnostic Environment GUI and the command line interface. In addition, this chapter covers test options, requirements, and rules.

This chapter includes the following sections:

- "Diagnostics Test Rules" on page 129
- "Selecting a User Interface" on page 130
- "Diagnostic Tests" on page 141
- "Revision Checking" on page 192

Diagnostics Test Rules

Certain tests have limitations and cannot be run with other tests. The following rules exist with Storage Automated Diagnostic Environment diagnostic tests:

- All tests are offline tests that can be used to verify and replace FRUs.
- All devices and paths must be quiesced prior to invocation of diagnostic tests.
- `a5ksestest` cannot be run concurrently with the `qlctest` or the `socaltest`.
- `qlctest` cannot be run concurrently with any child test (while any attached device is running).
- `switchtest` can run only on one port on a single switch instance at a time.
- `linktest` cannot be run with other tests, and can only be run using Test from Topology. You cannot run `linktest` using Test from List.

Note – Any attempts to ignore or circumvent diagnostic test rules will cause pop-up warnings to display.

Selecting a User Interface

You can run the Storage Automated Diagnostic Environment tests either from the Storage Automated Diagnostic Environment graphical user interface (GUI) or from the command line.

TABLE 5-1 describes the basic differences between the user interfaces.

TABLE 5-1 Storage Automated Diagnostic Environment Diagnostics User Interfaces

Interfaces	Description
GUI Window	You can select tests and test options inside the Storage Automated Diagnostic Environment GUI's Topology section in one of two ways: • While in the Topology view, point to a device or host and click the right mouse button. • Select a test from the Test from List window.
Command line	You run each test individually from a shell tool command line. All diagnostics are located in `/opt/SUNWstade/Diags/bin`. See the man pages for more details. **Note:** You must log in to the appropriate host or slave for testing.

Running Diagnostic Tests From the Command Line

In some cases it is more convenient to run a single Sun StorEdge diagnostic test from the command line rather than through a Storage Automated Diagnostic Environment interface.

When running a test from the command line, you must specify all test options in the form of command-line arguments. Standard arguments are common to most tests. See TABLE 5-2 for details.

The standard syntax for most tests is as follows :

```
% testname [-uvf][-o test-specific-arguments]
```

Standard Command-Line Arguments

TABLE 5-2 describes the standard command-line arguments.

TABLE 5-2 Standard Command-Line Arguments

Argument	Description
`-u`	Displays command-line Usage information.
`-v`	Runs the test in Verbose mode and displays messages with more detailed information about the testing process. The default is False.
`-f`	Runs the test in full Functional test mode. This mode assumes that the test has complete control of the device being tested. The default is False.
`-o`	Indicates that the Options and arguments that follow are test-specific.

Note – All options must be listed in a quoted list following the standard `-o` argument. The options must be separated by a pipe (|); for example:

```
command_name -o “dev_path | ...”
```

Running Diagnostic Tests From the GUI Window

If you run the diagnostic test using the Storage Automated Diagnostic Environment, you can easily access test configuration, control, and results, using the buttons in the dialog boxes. In addition, you can use the GUI to perform the following tasks.

- Enables you to access diagnostic tests from a topology view.
- Enables you to access diagnostic tests from a list.
- Enables you to adjust the default settings for selected diagnostic tests.
- Enables you to review, delete, or archive diagnostic tests.
- Enables you to review the results of old tests.

The diagnostic tests are designed to test the target FRU and to operate on an in-band or out-of-band data path. The Storage Automated Diagnostic Environment scheduler dispatches the test to be run on the appropriate server (host).

▼ To Access the Diagnostic Tests

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

   The Diagnose menu is displayed.

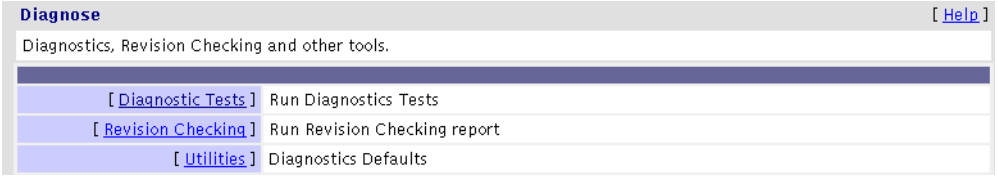


FIGURE 5-1 Diagnose window

2. **Click the Diagnostic Tests link in the Diagnose window.**

The Diagnostic Tests window is displayed.

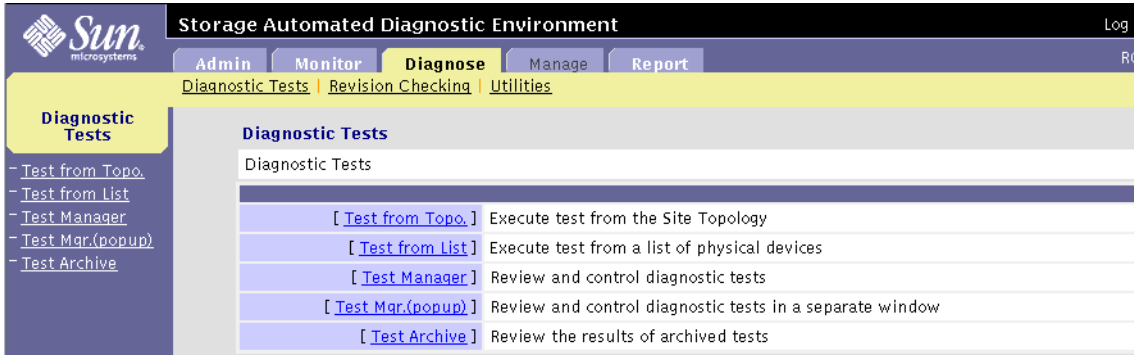


FIGURE 5-2 Diagnostic Tests window

With *two exceptions*, you can run Storage Automated Diagnostic Environment diagnostic tests from either Test from List or Test from Topology.

- You can invoke the Link Test by right-clicking the box in the link displayed in the topology. You cannot invoke the Link Test functionality using Test from List.
- Unconnected HBAs (HBAs that are not connected to any device) can only be tested using the Test from List option.

Test from Topology

Storage Automated Diagnostic Environment's implementation of diagnostic tests verify the operation of all the user-selected components. Tests are selected from a graphical view of the system's topology.

The Storage Automated Diagnostic Environment Graph view shows the physical topology of a system or merged system. Using the Topology view, you can select specific subtests and test options. The monitoring status of devices and links appears both in the Test from Topology view and in the Test from List menu.

▼ To Test from Topology

1. **Click the Test from Topology link.**

   The Test from Topology window is displayed.

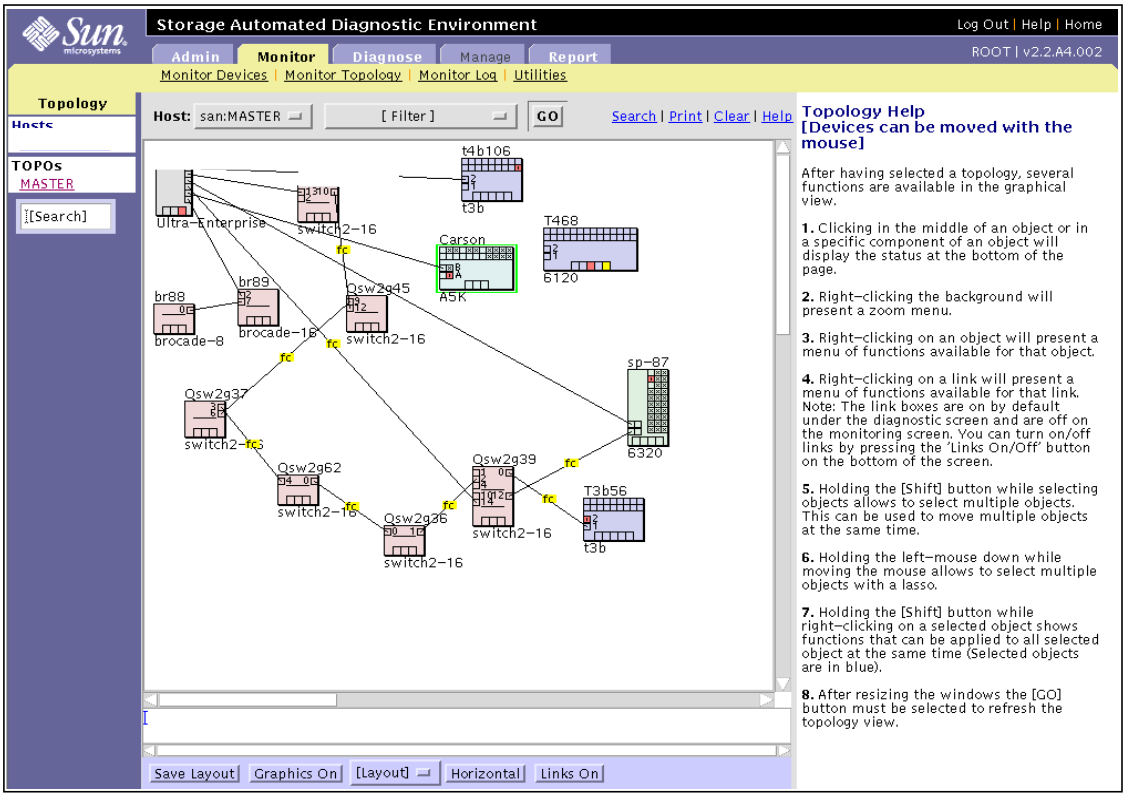


FIGURE 5-3 Test from Topology window

2. **Select a host from the host pull-down menu.**

3. **To narrow the size of the topology, select a device from the Filter pull-down menu and click GO.**

4. **Using your right mouse button, select the device.**

   A list of test options appears.

5. **With your left mouse button, select the test you want to run on the device.**

   The applicable test is displayed in the right pane.

6. **Select the Clear link in the Topology view to remove all the green links from the topology. The red and yellow links remain in the topology until all faults have been corrected.**

Note – If a red “mpxio” label is displayed in the Topology, a Sun StorEdge Traffic Manager failover has been discovered on this path.

If a green “mpxio” label is displayed in the Topology, a Sun StorEdge Traffic Manager failover has occurred on this path, but was later corrected.

While a test is running, you can access Test Manager to view the status of the test.

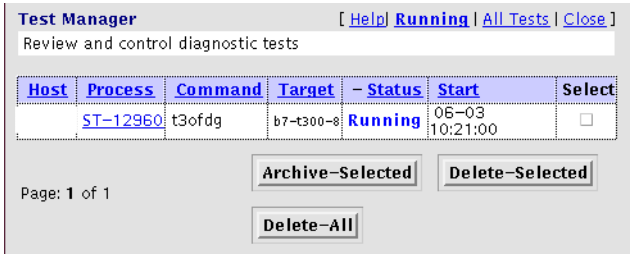


FIGURE 5-4 Status of Test Running in Test Manager

After the test has completed its run, an email message is sent to the specified email recipient.

Notes

1. The Storage Automated Diagnostic Environment Link Test enables FRU isolation for Fibre Channel devices. You can invoke the Link Test from the Topology view by selecting the link.
2. In-band tests can be run from the Test from Topology view with no restrictions.
3. An out-of-band test (that is, `t3ofdg`, `t3volverify`, or `switchtest`) can be run from the Test from Topology view under the following conditions:
   - It is run from the monitoring host view, or
   - It is run from the merged topology view.

Test from List

Storage Automated Diagnostic Environment's implementation of diagnostic tests verifies the operation of all the user-selected components. Tests are selected from a list of physical devices.

The Test from List view shows the devices and their associated tests. This list also includes warnings and errors reported by the monitoring agents. In addition, Test from List displays all available host/HBA tests and not just the connected ports, as the Test from Topology view displays.

Using Test from List:

- You can sort by host, device type, test type, and device status.
- You can select options for a specific device, select multiple devices, or select all devices.
- You can specify the number of passes each test will run.

▼ To Invoke the Test Option Pane for a Particular Device

1. **In the Test from List window, select the diagnostic test that you want.**

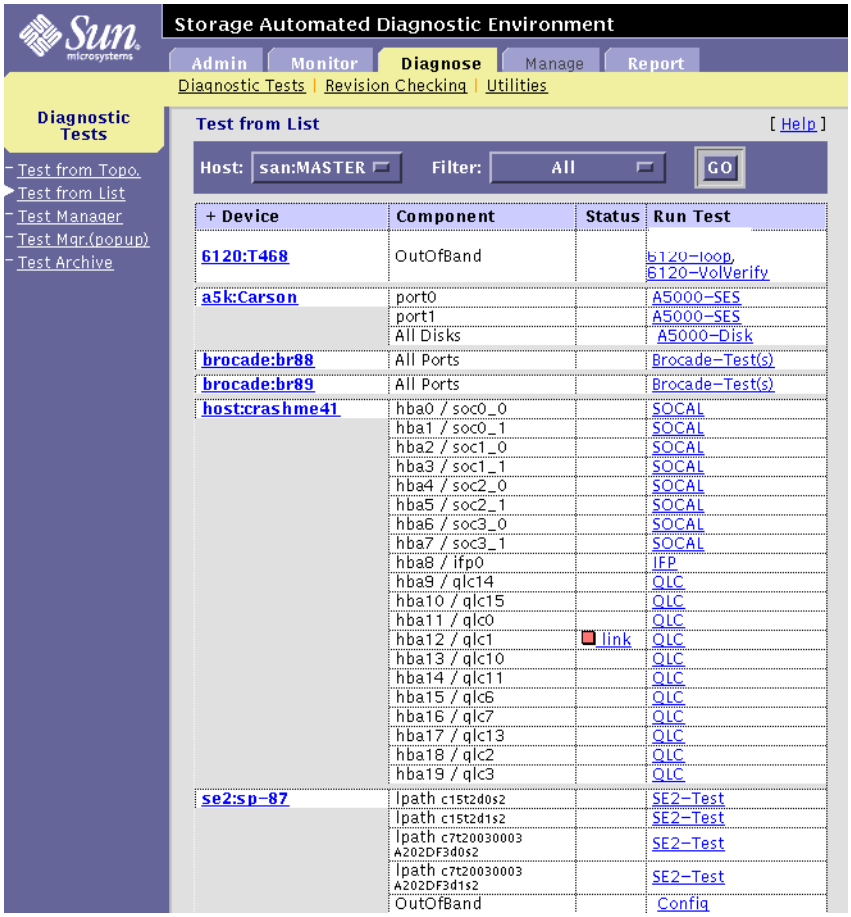


FIGURE 5-5 Test from List window

2. **Select a host from the host pull-down menu.**
3. **From the Filter pull-down menu, select a specific device, multiple devices, or click All to display all devices.**
4. **Click GO.**

   A list that is customized to your criteria is displayed.

5. **Select the test name link in the Run Test column to run diagnostics.**

   The appropriate test window is displayed in the right frame

Test Manager

The Storage Automated Diagnostic Environment's integration with diagnostic tests implements the Test Manager to track and control the progress of the user-selected tests.

The Test Output view enables you to view test output for active and completed tests in the Test Monitor view.

Note – All tests are keyed by the unique process identifier (PID) that Test Manager assigns during test invocation.

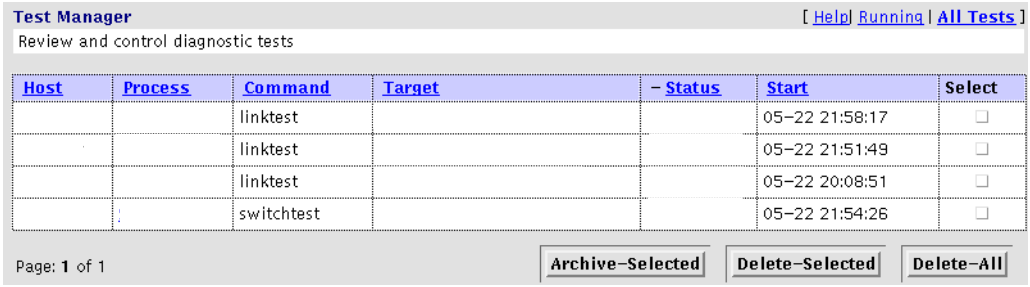


FIGURE 5-6 Test Manager window

The Storage Automated Diagnostic Environment runs the device tests in a distributed manner. The master calls the proper host to begin tests.

Note – To sort in Test Manager, click on the header for any column and the list sorts the entries in that column. A plus ("+") indicator signifies that this is the current sort.

For test processes, the status can be:

- Running—User intervention is required for the test to continue. *User intervention* may involve answering a question or replacing the cables or the gigabit interface converters (GBICs).
- Done OK—The test ran successfully with no errors.
- Done Error—The test failed and no longer continues to run.
- Done Aborted—The user manually stopped the test before it had finished running.

Note – There is a system timeout associated with the Waiting state. If you want to change the default settings for scheduled time-outs, See “System Timeouts” on page 89.

▼ To Archive or Delete Tests

Storage Automated Diagnostic Environment’s implementation of diagnostic tests enables you to view archived diagnostic logs saved by the Test Manager.

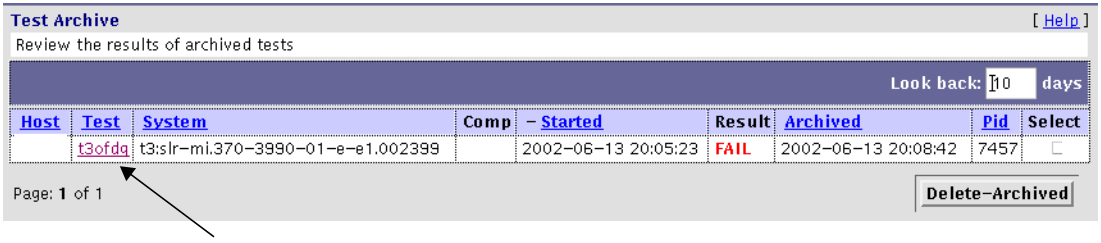
1. **Click the Select check box for the test from the Test Manager window.**
2. **Click the Archive-Selected (to archive) or Delete-Selected (to delete) check box.**

The Archived Tests view lists all archived tests and their associated output based on the criteria you specify.

▼ To View a List of Archived Tests

- **Click the Test Archive link from the Diagnostic Tests menu.**

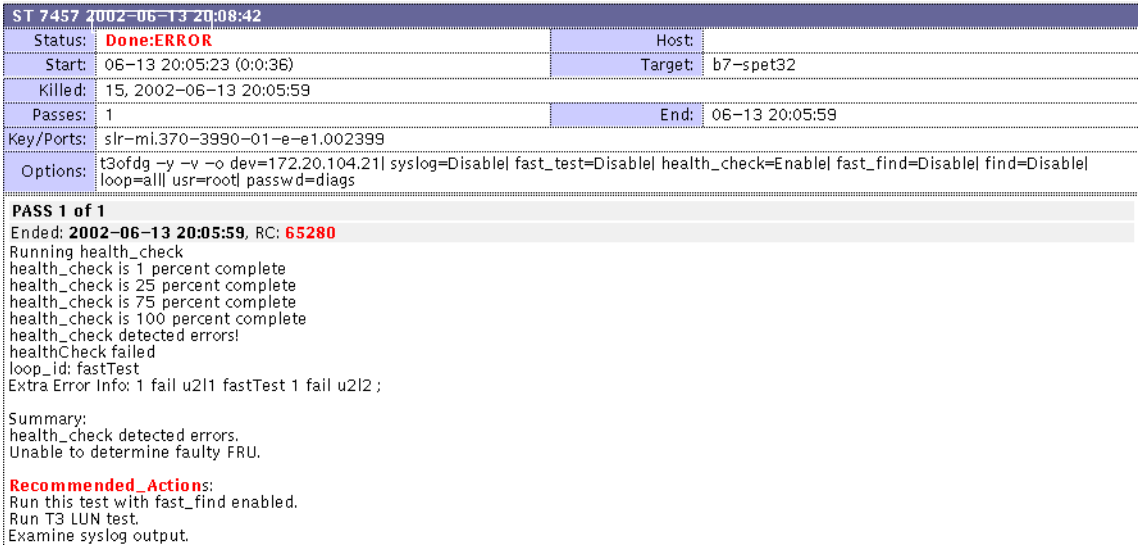
.The Test Archive window is displayed.



Click a test to review the result of an archived test.

Use the Test Archive functionality to view tests that have previously run on a host, or to delete an archived test.

A summary of the test is displayed, along with recommended actions you can take to run a more successful test.



ST 7457 2002-06-13 20:08:42

Status:	Done:ERROR	Host:	
Start:	06-13 20:05:23 (0:0:36)	Target:	b7-spet32
Killed:	15, 2002-06-13 20:05:59		
Passes:	1	End:	06-13 20:05:59
Key/Ports:	slr-mi.370-3990-01-e-e1.002399		
Options:	t3ofdg -y -v -o dev=172.20.104.21| syslog=Disable| fast_test=Disable| health_check=Enable| fast_find=Disable| find=Disable| loop=all| usr=root| passwd=diags		

PASS 1 of 1

Ended: **2002-06-13 20:05:59**, RC: **65280**

Running health_check
health_check is 1 percent complete
health_check is 25 percent complete
health_check is 75 percent complete
health_check is 100 percent complete
health_check detected errors!
healthCheck failed
loop_id: fastTest
Extra Error Info: 1 fail u2l1 fastTest 1 fail u2l2 ;

Summary:
health_check detected errors.
Unable to determine faulty FRU.

Recommended_Actions:
Run this test with fast_find enabled.
Run T3 LUN test.
Examine syslog output.

Note – Test Manager offers the same functionality as Test Archive.

Diagnostic Tests

This section describes the following Storage Automated Diagnostic Environment Diagnostic tests that are available from the Storage Automated Diagnostic Environment GUI or the command line.

- "Sun StorEdge A3500FC LUN Test (`a3500fctest`)" on page 142
- "Sun StorEdge A5000 and A5200 Array Enclosure Test (`a5ksestest`)" on page 145
- "Sun StorEdge A5000 and A5200 Array Test (`a5ktest`)" on page 147
- "Brocade Silkworm Test (`brocadetest`)" on page 149
- "Sun StorEdge D2 Array Disk Test (`d2disktest`)" on page 151
- "Sun Fire V880 FC-AL Disk SES Test (`daksestest`)" on page 153
- "Sun Fire V880 FC-AL Disk Test (`daktest`)" on page 154
- "Sun StorEdge Internal Fibre Channel Disk Test (`fcdisktest`)" on page 156
- "Sun StorEdge FC Tape Test (`fctapetest`)" on page 158
- "Sun StorEdge PCI Fibre Channel-100 Host Adapter Test (`ifptest`)" on page 160
- "Sun StorEdge 6120 Array Echo Test (`6120loop`)" on page 162
- "Fibre Channel Link Diagnostic (`linktest`)" on page 165
- "Sun StorEdge PCI Dual Fibre Channel Host Adapter Board Test (`qlctest`)" on page 169
- "Sun StorEdge SBus Fibre Channel-100 Host Adapter Board Test (`socaltest`)" on page 172
- "Sun StorEdge Network 2-Gbit Fibre Channel Switch Test (`switch2test`)" on page 175
- "Sun StorEdge Network FC Switch-8 and Switch-16 Switch Test (`switchtest`)" on page 177
- "Sun StorEdge T3 and T3+ Array Test (`t3ofdg`)" on page 179
- "Sun StorEdge T3 and T3+ Array Test (`t3LUN`)" on page 181
- "Sun StorEdge T3 and T3+ Array Test (`t3volverify`)" on page 184

- “Sun StorEdge 6120 Array LUN Test (`6120LUN`)” on page 186
- “Sun StorEdge 6120 Array Test (`6120volverify`)” on page 189

Using the procedures in “Test from Topology” on page 134 or “Test from List” on page 136, you can run the tests listed in the following pages.

Sun StorEdge A3500FC LUN Test (`a3500fctest`)

The `a3500fctest`(1M) test verifies the functionality of the Sun StorEdge A3500FC array by using four subtests: Media, File System, Synchronous I/O and Asynchronous I/O, and Write/Read Device Buffer. These subtests are described in TABLE 5-3.

TABLE 5-3 `a3500fctest` Subtests

Subtest	Description
Media	Verifies LUN media by reading data from the LUN. The Media subtest treats a LUN as one large portion of contiguous data.
File System	Verifies the LUN system’s integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or premounted, the test is blocked. The test opens two temporary files (of the size specified on `File System File Size`) and performs a read/write test.
Synchronous I/O and Asynchronous I/O	Uses the asynchronous read/write feature of the Solaris LUN driver to exercise the LUN. In read-only mode the test sends a maximum of four asynchronous read packets, each with a random size and a random offset, into the selected partition. The test then waits for all outstanding I/O activity to complete before issuing another round of packets. This process continues until the whole area is tested. In read/write mode, one write packet is issued in every four read packets as a spot check of the write operation.
Write/Read Device Buffer	This test verifies the Fibre Channel loop by performing a pattern test. If the Write/Read Device Buffer subtest fails on a particular device, there is a problem with an upstream Fibre Channel component that might not be on the actual device where the test failed.

Note – An instance of `a3500fctest` is present for each LUN. The File System subtest can be run only if the selected partition is mounted.

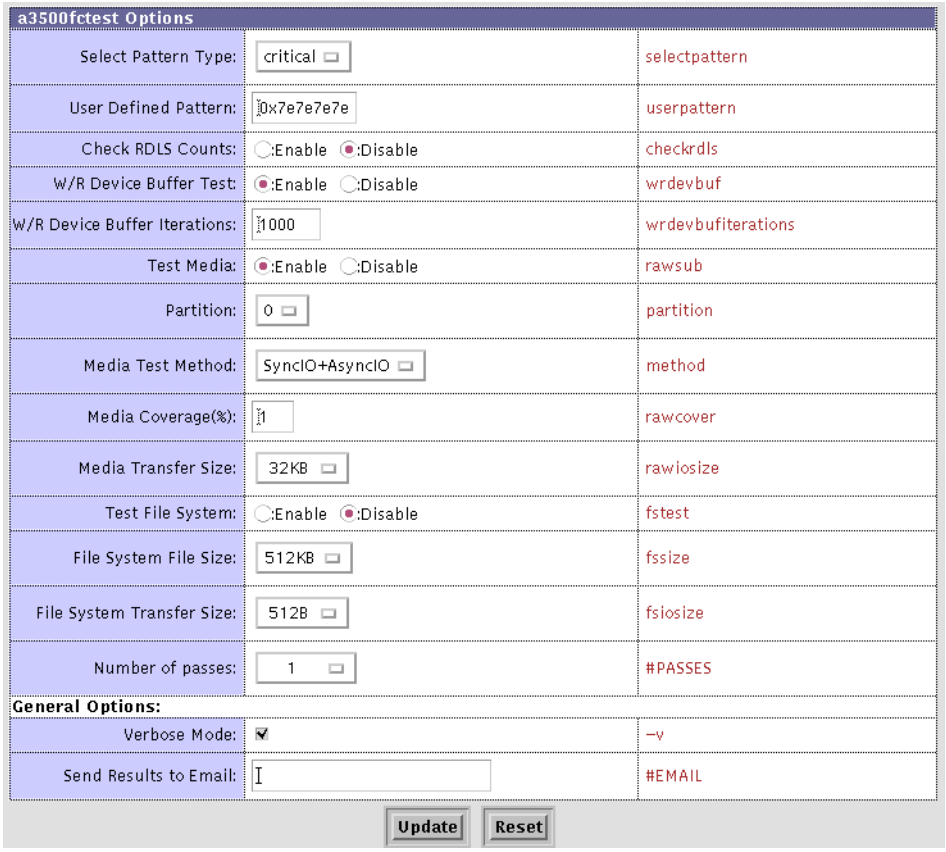


FIGURE 5-7 `a3500fctest` Test Options Dialog Window

TABLE 5-4 describes the test options for the `a3500fctest` test.

TABLE 5-4 `a3500fctest` Options

Option	Description
Select Pattern Type	Enables you to choose user, critical, or all pattern options.
User Defined Pattern	Defines the pattern specified by the user.
Check RDLS Counts	Monitors the read link status (RDLS) counts.
W/R Device Buffer Test	Enables or disables the write/read actions of the Device Buffer Test **Note:** The Sun StorEdge A3500FC array firmware level must be at 3010360 or greater to support the W/R Device Buffer Test.
W/R Device Buffer Iterations	Specifies the number of times W/R iterations are done to the internal buffer of the Sun StorEdge A3500FC array.
Test Media	Enables or disables the Media subtest.
Partition	Specifies the partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Media Test Method	Enables or disables the Media Test Method (SyncIO or AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	Specifies the transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System File Size	Creates a file twice the size of what is specified.
File System Transfer Size	Specifies the transfer size of the File System subtest.
Number of passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge A5000 and A5200 Array Enclosure Test (a5ksestest)

The a5ksestest(1M) test provides configuration verification, fault isolation, and repair validation of the disks in the Sun StorEdge A5000 array. It tests both Sun StorEdge A5000 14-slot and 22-slot disk enclosures.

The a5ksestest test detects all Sun StorEdge A5000 arrays that are connected to the HBA and collects relevant configuration information.

Note – The Sun StorEdge A5000 array was formerly known as the Sun Enterprise Network Array™ systems. The a5ksestest tests both versions of this disk array subsystem.

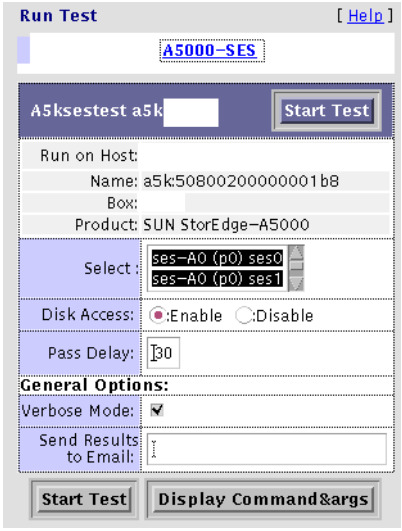


FIGURE 5-8 a5000sestest Test Options Dialog Box

The diagnostic software attaches at least one instance of a5ksestest whenever a Sun StorEdge A5000 SCSI enclosure services (SES) device is found. Normally, two instances occur for each path to a Sun StorEdge A5000 array.

Note – To prevent test failures, do not run the a5ksestest and socaltest tests at the same time.

TABLE 5-5 describes the test options for the `a5ksestest` test.

TABLE 5-5 `a5ksestest` Options

Option	Description
Select	Select one of the Sun StorEdge A5000 SCSI enclosure service (SES) devices: device 0 or device 1.
Disk Access	During testing, each disk is accessed through each active connection leading to that disk. The `a5ksestest` test opens partition 2 on the disk and reads 512 bytes of raw data.
Pass Delay	Specifies the number of seconds between passes. The default is 30 seconds.

Sun StorEdge A5000 and A5200 Array Test (a5ktest)

The a5ktest(1M) test verifies the functionality of the Sun StorEdge A5000 array using five subtests: Media, File System, Synchronous I/O and Asynchronous I/O, Write/Read Device Buffer, and Self Test.

The a5ktest subtests are listed in TABLE 5-6.

TABLE 5-6 a5ktest Subtests

Subtest	Description
Media	Verifies disk media by reading data from the disk. The Media subtest treats a disk as one large portion of contiguous data.
File System	Verifies the file system's integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or premounted, then the test is blocked. The test opens two temporary files (of the size specified on File System File Size) and performs a read/write test.
Synchronous I/O and Asynchronous I/O	Uses the asynchronous read feature of the Solaris disk driver to exercise the disk. In read-only mode, the test sends a maximum of four asynchronous read packets, each with a random size and a random offset into the selected partition. The test then waits for all outstanding I/O activity to complete before issuing another round of packets. This process continues until the whole area is tested.
Write/Read Device Buffer	Verifies the Fibre Channel loop by performing a pattern test. If the Write/Read Device Buffer subtest fails on a particular device, there is a problem with an upstream Fibre Channel component that might not be on the actual device where the test failed.
Disk Self Test	Instructs a device to run its internal diagnostics. If the device fails this test, check the error message for a more detailed description of the error.

The a5ktest Test Options dialog box shows all the partitions that are available for testing. The File System subtest can be run only if the selected partition is mounted (described in TABLE 5-6). An instance of a5ktest is present for each disk in a Sun StorEdge A5000 array.

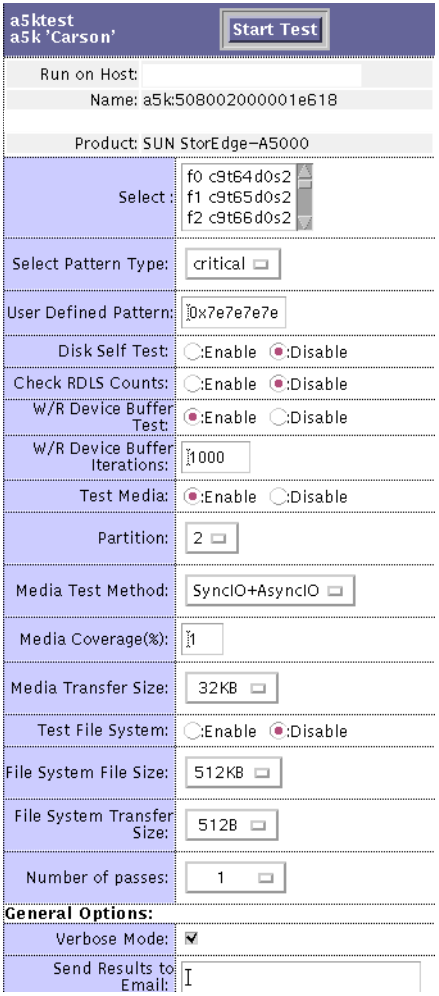


FIGURE 5-9 a5ktest Test Options Dialog Box

Brocade Silkworm Test (brocadetest)

The brocadetest(1M) test is used to diagnose Brocade switch devices. The brocadetest process also provides command line access to Brocade Silkworm switch diagnostics. Brocadetest supports testing on all Brocade Silkworm switches that have network access from the testing host.

Brocadetest runs the port diagnostic on connected switch ports. While brocadetest is running, the port statistics are monitored for errors.

The brocadetest(1M) options are shown in FIGURE 5-10.

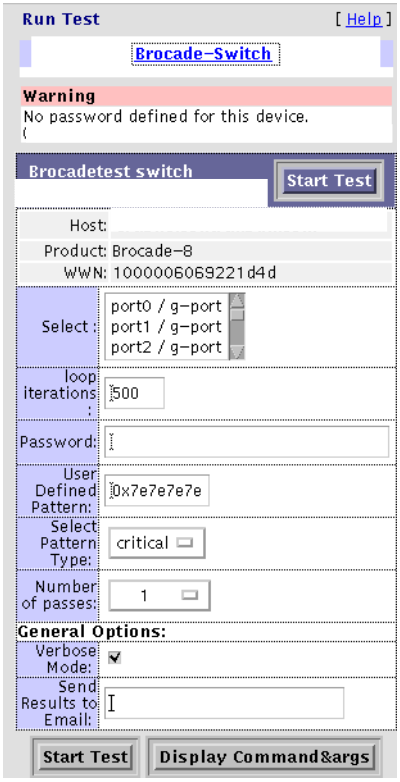


FIGURE 5-10 brocadetest Test Options Dialog Box

Note – The brocadetest(1M) uses a telnet session from which to run the diagnostics. For the diagnostics to run correctly, no users can have a telnet session open to the switch while the diagnostics are running. If there is a telnet session open, the brocadetest fails, indicating that another user might be logged in to the switch.

TABLE 5-7 describes the test mode options for the `brocadetest` test.

TABLE 5-7 `brocadetest` Test Options

Option	Description
Loop iterations	Specifies the number of iterations the port test should run, between 0 and 1,000,000.
Password	Specifies the password used by the admin user of the switch. There is no default value, and this a required field.
User Defined Pattern	Specifies the default pattern, in hexadecimal format, to be used for the port test. You can also enter the hexadecimal pattern to run for the test.
Select Pattern Type	Gives the user the choice of running the one user pattern, critical patterns (10 of the most critical patterns), or all patterns (a complete list of test patterns).
Number of passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge D2 Array Disk Test (d2disktest)

The d2disktest(1M) test verifies the functionality of the internal Sun StorEdge D2 array by using five subtests: Media, File System, Synchronous I/O and Asynchronous I/O, Write/Read Buffer, and Self Test.

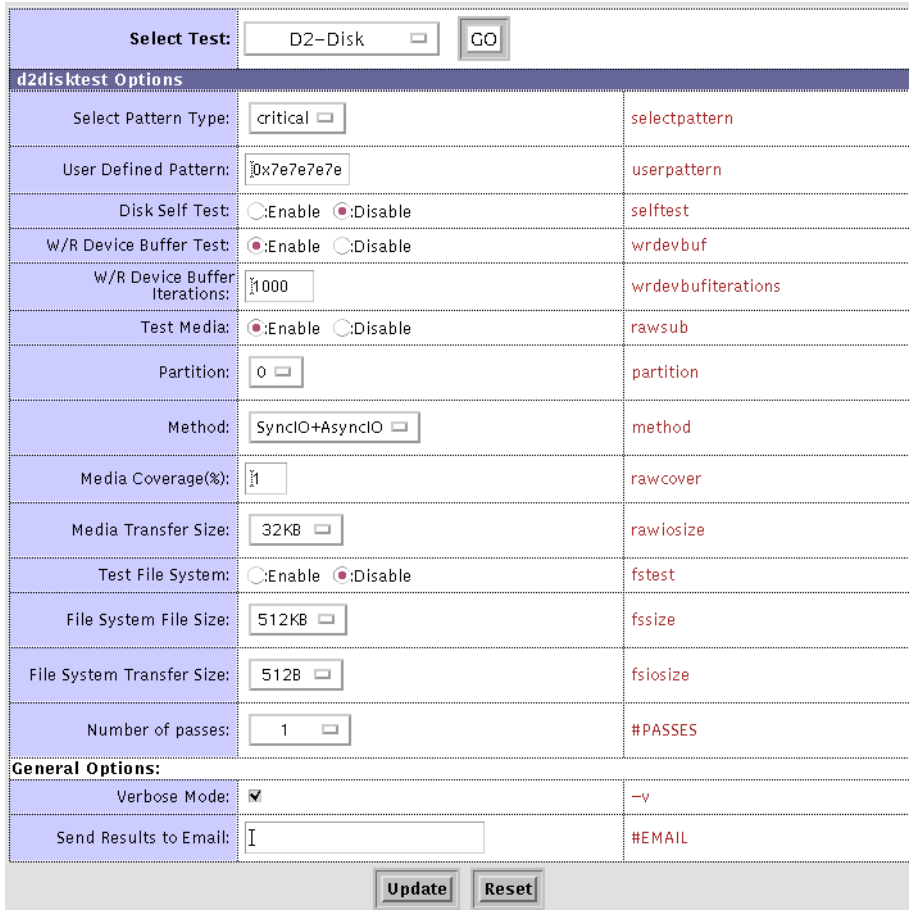


FIGURE 5-11 d2disktest Test Options Dialog Box

TABLE 5-8 describes the test mode options for the `d2disktest` test.

TABLE 5-8 `d2disktest` Test Options

Option	Description
Select Pattern Type	Enables you to choose critical, user, and all options. Critical is the default.
User Defined Pattern	Defines the pattern specified by the user.
Disk Self Test	Instructs a device to run its internal diagnostics. If the device fails this test, check the error message for a more detailed description of the error.
W/R Device Buffer Test	Enables or disables the write/read actions of the Device Buffer Test.
W/R Device Buffer Iterations	Specifies the number of times the W/R Device Buffer Test runs.
Test Media	Enables or disables the Media subtest.
Partition	Specifies the partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Media Test Method	Enables or disables the Media Test Method (SyncIO or AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System Test Size	Creates a file twice the size of what is specified.
File System Transfer Size	Specifies the transfer size of the File System subtest.
Number of Passes	Specifies the number of times the test runs. The default is 1.

Sun Fire V880 FC-AL Disk SES Test (daksestest)

The daksestest(1M) tests the Sun Fire V880 FC-AL disk backplane. The daksestest verifies the operation of the embedded SES controllers and the disk enclosure system of the Sun Fire V880 workgroup server.

No special hardware is required to run the daksestest test.

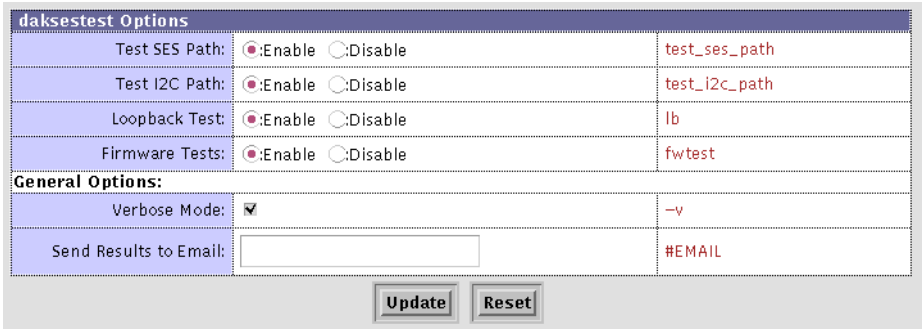


FIGURE 5-12 daksestest Test Options Dialog Box

TABLE 5-9 describes the test mode options for the daksestest test.

TABLE 5-9 daksestest Test Options

Option	Description
Test SES Path	The daksestest tests the device over the Fibre Channel interface.
Test I2C Path	The daksestest tests using the I2C interface.
Loopback Test	When enabled, the subtest causes the SES device to loop a packet around the fiber bus with varying data patterns. The device reads the packet after the packet is received, and verifies that the data payload is correct.
Firmware Test	When enabled, this subtest runs the embedded firmware tests on the SES/SSC100 device.

Sun Fire V880 FC-AL Disk Test (daktest)

The daktest(1M) test verifies the functionality of the Internal Fibre Channel disk by using five subtests: Media, File System, Synchronous I/O and Asynchronous I/O, Write/Read Buffer, and Self Test.

Note – The File System subtest can also be run if the selected partition is mounted.

The daktest(1M) options are shown in FIGURE 5-13.

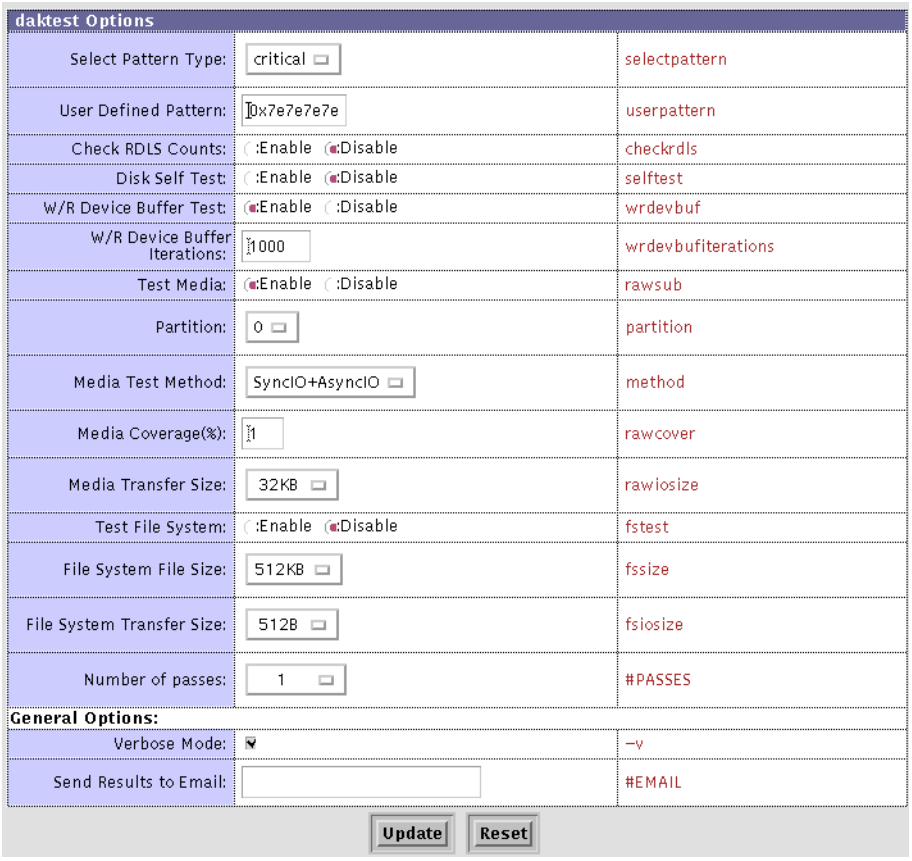


FIGURE 5-13 daktest Test Options Dialog Box

TABLE 5-10 describes the test mode options for the `daktest` test.

TABLE 5-10 `daktest` Test Options

Option	Description
Select Pattern Type	Enables you to choose critical, user, and all options. Critical is the default.
User Defined Pattern	Defines the pattern specified by the user.
Check RDLS Counts	Monitors the read link status (RDLS) counts.
Disk Self Test	Instructs a device to run its internal diagnostics. If the device fails this test, check the error message for a more detailed description of the error.
W/R Device Buffer Test	Enables or disables the write/read actions of the Device Buffer Test.
W/R Device Buffer Iterations	Specifies the number of times the W/R Device Buffer Test runs.
Test Media	Enables or disables the Media subtest.
Partition	Specifies the partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Media Test Method	Enables or disables the Media Test Method (SyncIO or AsyncIO)
Media Coverage (%)	Tests all or part of a partition (in percentages)
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System Test Size	Creates a file twice the size of what is specified.
File System Transfer Size	Specifies the transfer size of the File System subtest.
Number of Passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge Internal Fibre Channel Disk Test (`fcdisktest`)

The `fcdisktest`(1M) test verifies the functionality of the Internal Fibre Channel disk by using five subtests: Media, File, System, Synchronous I/O and Asynchronous I/O, Write/Read Buffer, and Self Test.

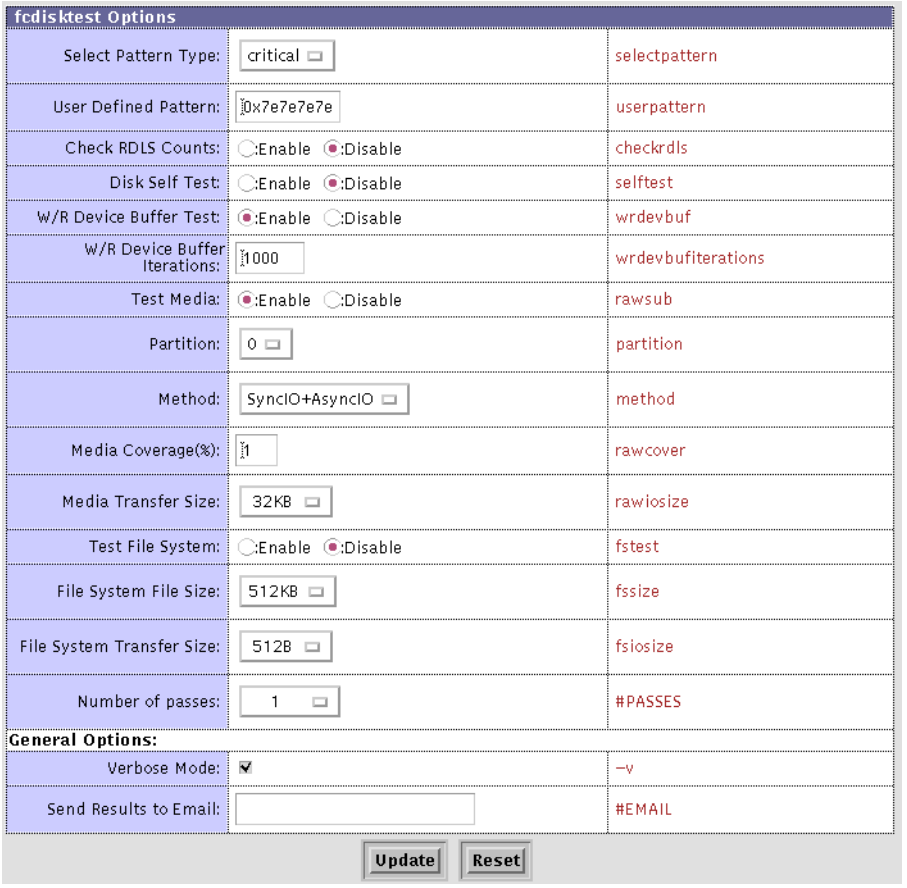


FIGURE 5-14 `fcdisktest` Test Options Dialog Box

TABLE 5-11 describes the test mode options for the `fcdisktest` test.

TABLE 5-11 `fcdisktest` Test Options

Option	Description
Select Pattern Type	Enables you to choose `critical`, `user`, and `all` options. `Critical` is the default.
User Defined Pattern	Defines the pattern specified by the user.
Check RDLS Counts	Monitors the read link status (RDLS) counts.
Disk Self Test	Instructs a device to run its internal diagnostics. If the device fails this test, check the error message for a more detailed description of the error.
W/R Device Buffer Test	Enables or disables the write/read actions of the Device Buffer Test.
W/R Device Buffer Iterations	Specifies the number of times the W/R Device Buffer Test runs.
Test Media	Enables or disables the Media subtest.
Partition	Specifies the partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Media Test Method	Enables or disables the Media Test Method (SyncIO or AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System Test Size	Creates a file twice the size of what is specified.
File System Transfer Size	Specifies the transfer size of the File System subtest.
Number of passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge FC Tape Test (`fctapetest`)

The `fctapetest`(1M) writes a pattern on the tape. `fctapetest` then rewinds the tape and reads and compares the data just written. The `fctapetest` file test writes four files to the tape and then reads them back, comparing the data.

The `fctapetest` diagnostic provides a variety of tests for Sun-supported Fibre Channel tape drives. The `fctapetest` does not test the tape library. It presumes that the user of the diagnostic either uses tape-library management software or manually inserts tapes into the drives.

`fctapetest` Test Requirements

If you have a Sun Fibre Channel tape drive in your system, load a blank writable tape (scratch tape) before you start the diagnostic application.

Caution – If you mount a tape containing valid data, that data will be overwritten by the `fctapetest` diagnostic.

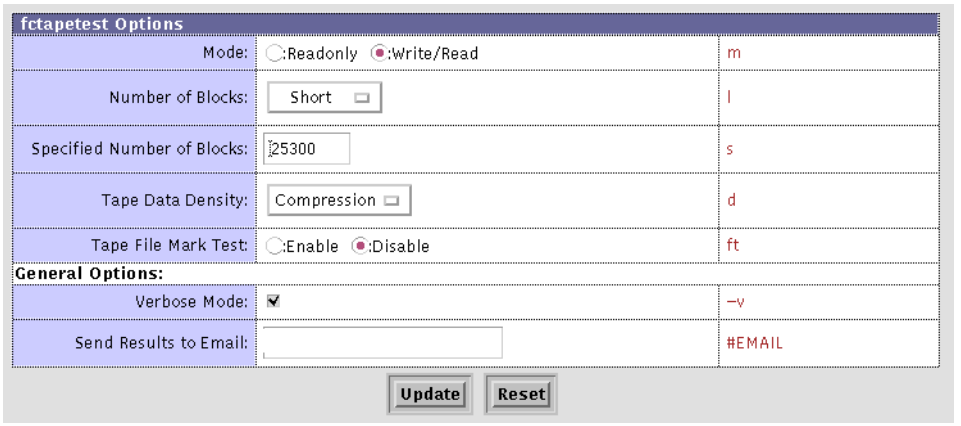


FIGURE 5-15 `fctapetest` Test Options Dialog Box

TABLE 5-12 describes the test options for the `fctapetest` test.

TABLE 5-12 `fctapetest` Options

Option	Description
Mode	If you enable write/read mode, the test first writes to the tape and then reads it back to compare. If you enable read-only mode, the test assumes the tape has already been written and merely reads it. Read-only mode is useful for checking proper head alignment.
Number of Blocks	The amount of the tape to be tested. The choices are: • `EOT`: The default; tests the entire tape. • `Long`: Tests 70,000 blocks of the tape. • `Short`: Tests only the first 1000 blocks. • `Specified`: Type the number of blocks to be tested in the `number of blocks` field.
Specified Number of Blocks	If you select Specified in the Number of Blocks field, you must type the number of blocks you want to test.
Tape Data Density	If you do not want the `fctapetest` test to run in the compression mode (the default), specify low, for *low* compression.
Tape File Mark Test	Verifies that the tape drive is able to correctly write and navigate file marks on the tape.

Sun StorEdge PCI Fibre Channel-100 Host Adapter Test (`ifptest`)

The `ifptest`(1M) test verifies the functionality of the Sun StorEdge PCI Fibre Channel-100 host adapter, which is a single-loop Fibre Channel card with an on-board gigabit interface converter (GBIC).

The `ifptest` tests the functionality when there are no devices attached to the loop. The driver checks for devices on the Fibre Channel loop. If any devices are detected, the driver blocks any diagnostic commands.

An error message is displayed if the device is attached to storage. If devices are attached to the loop, do not run `ifptest`. Instead, run the `t3test`(1M), `a3500fctest`(1M), `a5ktest`(1M), or `fctapetest`(1M) test on the individual devices.

The `ifptest` test uses the “mailbox” interface to the card, which enables certain firmware operations to be performed that normally would not be available to the application layer.

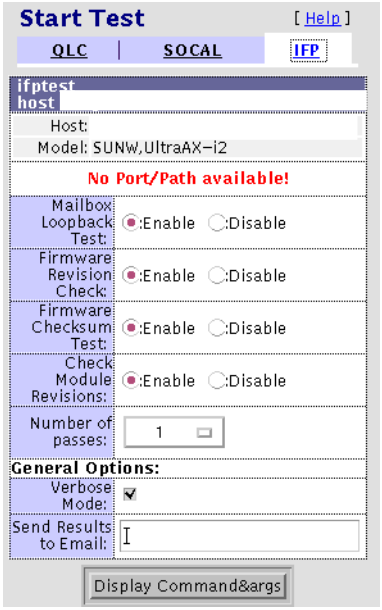


FIGURE 5-16 `ifptest` Options Dialog Box

TABLE 5-13 describes the `ifptest` Test Options dialog box.

TABLE 5-13 `ifptest` Options

Option	Description
Mailbox Loopback Test	Enables or disables the mailbox loopback command. This test writes data patterns into the mailboxes and then reads them back from the output mailboxes and verifies that the data is correct. It is run by default, but it can be disabled.
Firmware Revision Check	Enables or disables the firmware revision check command. This test extracts the firmware revision from the RISC firmware code and verifies it against expected values. It is run by default, but it can be disabled.
Firmware Checksum Test	Enables or disables the firmware checksum command. This command instructs the interface's RISC processor to calculate the current checksum on the microcode and then compare it to the checksum that was loaded with the microcode. It is run by default, but it can be disabled.
Check Module Revisions	Enables or disables the firmware check module command. This command returns the revision level of several modules on the interface card. Although this test is executed when enabled, the module revision levels are displayed only in verbose mode. It is run by default, but it can be disabled.
Number of Passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge 6120 Array Echo Test (`6120loop`)

The `6120loop`(1M) test tests the functions of the Sun StorEdge 6120 array controller. Each controller has three sims (chips) that run the Fibre Channel loops inside and outside the array.

The `6120loop`(1M) options are shown in TABLE 5-14

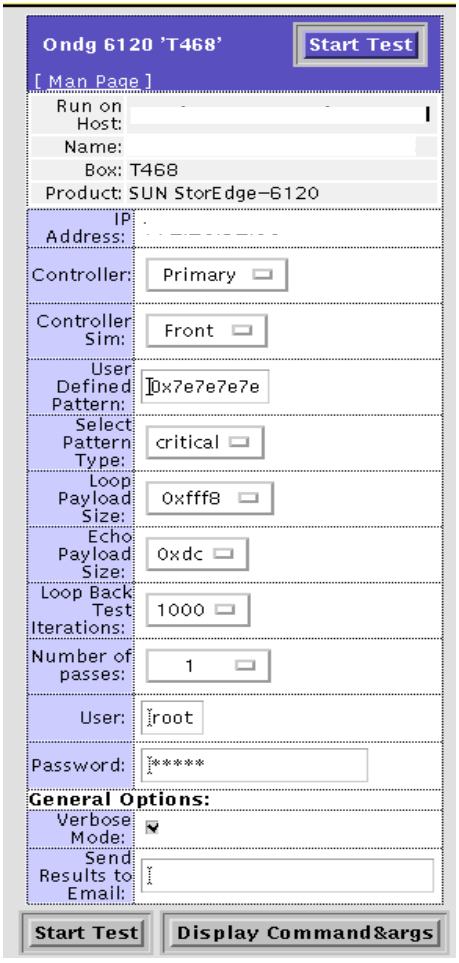


FIGURE 5-17 `6120loop` Test Options Dialog Box

TABLE 5-14 describes the `6120loop` Test Options dialog box.

TABLE 5-14 `6120loop` Test Options

Option	Description
IP Address	Specifies the Sun StorEdge 6120 array against which to run the test.
Controller	Specifies which controller sim (chip) will run the test. Options include: • Primary—the default. • Alternate—this is not an option if the Sun StorEdge 6120 array is a standalone unit. • All—the test will run on both controllers, if the configuration is a partner group.
Controller sim	Specifies which controller sim against which to run the test. Options include: • Front—the default. • Back-A—Run the test on the primary controller • Back-B—Run the test on the alternate controller • All—The test will run on both controllers, if the configuration is a partner group.
Pattern Type	Selects which data pattern to loop for the internal 10-bit, internal 1-bit, and external loopback tests. Options include user (user-defined), critical (the default), and all (all pattern types).
Loop Payload Size	Specifies the payload size for the `6120_echo` test. **Note:** If this test is run on a front end external loop, the attached device must support loopback and the specified payload size. Options range from 16 bytes to 220 bytes. The default is `0xfff8`.
Echo Payload Size	Specifies the payload size for the `6120_loop` test. **Note:** The attached device must support Echo and the specified payload size. Options range from 16 bytes to 65528 bytes. The default is `0xdc`.
Loop Back Test Iterations	Sets the number of times to loop the internal 10-bit, internal 1-bit, and external loopback tests. The default value is 1000.
Number of passes	Specifies the number of times the test will run. The default is 1. Options range from 1 to forever.
User	The user login for the Sun StorEdge 6120 array.
Password	The Sun StorEdge 6120 array telnet password enables the Storage Automated Diagnostic Environment to log into the Sun StorEdge 6120 array device. The password is required. **Note:** The user cannot change an existing Sun StorEdge 6120 array password.

Note – There is one front-end sim and two back-end sims per controller. The two back-end sims control the two back-end loops. For each sim, you can run the same tests, so most of the options listed in TABLE 5-14 are to specify on which sim the diagnostic tests will run.

Example of a `6120loop` *Test*

If the following conditions exist, the test will run the loopback tests on all 12 back-end loops and 4 front-end internal loops, and Echo out the external front-end loop.

- The Sun StorEdge 6120 array is a partner group.
- The partner group is attached to a Fibre Channel switch.
- You specify *All* (both) controllers and *All* Sims.
- You enable the Internal Loopback 10-bit Test, the Internal Loopback 1-bit Test, and the External Loopback Test.

Fibre Channel Link Diagnostic (`linktest`)

The `linktest`, which is packaged with the Storage Automated Diagnostic Environment software, verifies the functionality of passive Fibre Channel components in a SAN or DAS environment.

`linktest` provides failing FRU isolation for devices that have external loopback tests. Currently this is limited to:

- Sun StorEdge Network Fibre Channel switches
- SOC+ HBA
- QLogic HBAs

For link segments that do not provide an external loopback test (for example, SOC+ to the Sun StorEdge A5200 array), the Sun StorEdge A5000 array passive components are diagnosed by using the SOC+ external loopback test. The passive components include GBICs, media interface adapters (MIA), Sun StorEdge FC switches, and Fibre Channel network adapters. `linktest` tests both ends of the link segment (if possible) and enters a guided isolation when it detects a failure.

Note – `linktest` is available only from the Storage Automated Diagnostic Environment GUI, Test from Topology view.

`linktest` is *not* available by way of the command-line interface (CLI) or from the Storage Automated Diagnostic Environment GUI, Test from List view.

▼ To Invoke `linktest`

Run `linktest` if you detect a bad or intermittent link, either by receiving an alert or by visually detecting a red link on the topology graph.

1. **Click the Test from Topology link.**

The Test from Topology window is displayed.

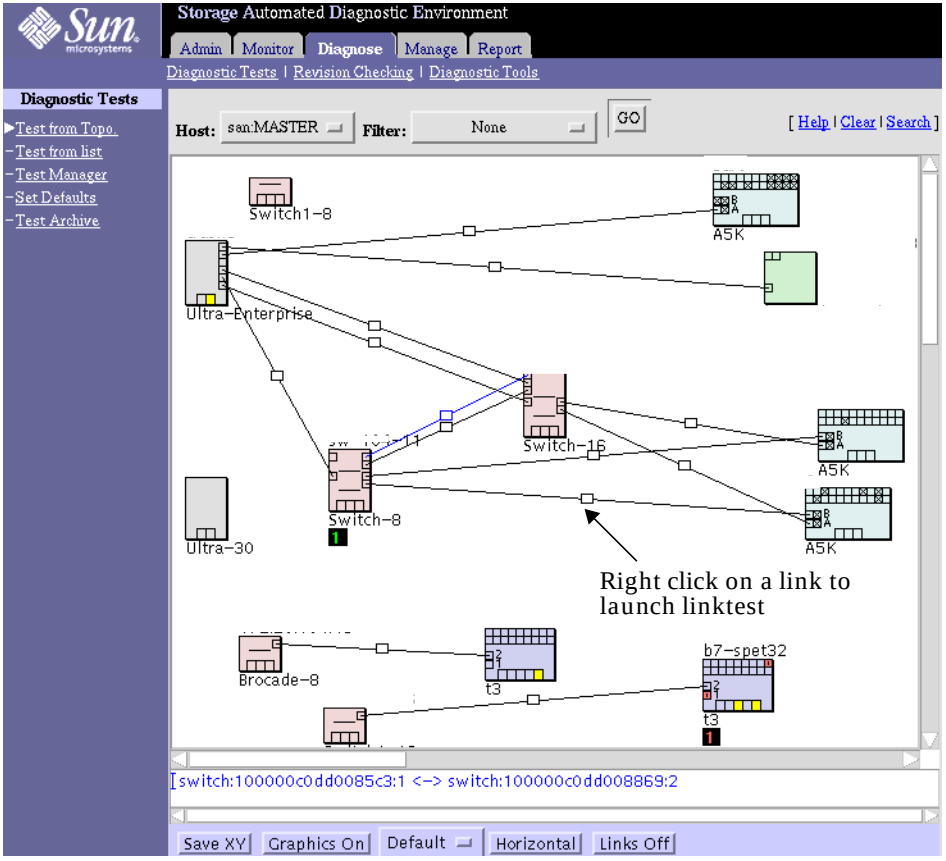


FIGURE 5-18 `linktest` from Test from Topology

2. **Right-click the defective or intermittent link displayed in the topology.**

The `linktest` dialog window is displayed.

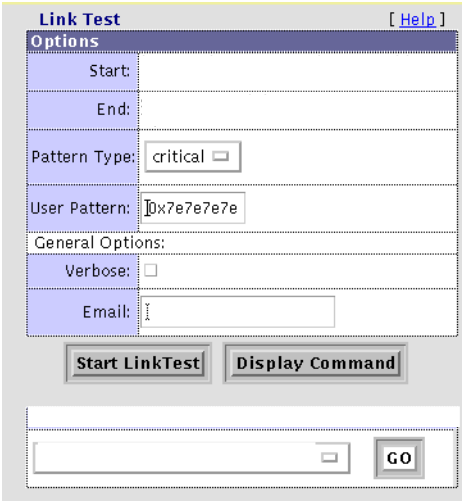


FIGURE 5-19 `linktest` Test Options Dialog Box

TABLE 5-15 describes the `linktest` Test Options dialog box.

TABLE 5-15 `linktest` Options

Item	Description
Pattern Type	Choices of pattern to run include user | critical | all. • critical is the I/O pattern causing device failure. • all is a complete list of patterns. • critical is the default pattern.
User Pattern	User-specified pattern in hexadecimal format. For example, pattern=`0x4a4a4a4a`.
Verbose	Runs the test in Verbose mode and displays messages with more detailed information about the testing process. The default is Off.
Email	Enter email addresses to where the test results need to be sent, for example, `email=email@address.com`. An entry in Send Results to Email from the Default Options window sends the results of all tests. To send results to email recipients on an individual test, access that test's Default Option window.

After starting `linktest`, Test Manager guides you through FRU isolation.

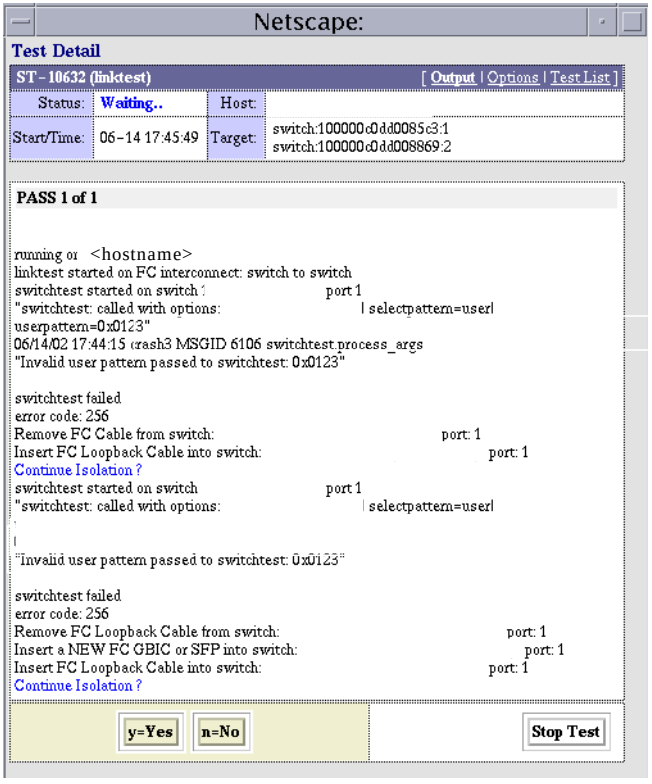


FIGURE 5-20 `linktest` Test Detail

Sun StorEdge PCI Dual Fibre Channel Host Adapter Board Test (qlctest)

The qlctest(1M) tests the functions of the Sun StorEdge 1-Gbit and 2-Gbit PCI and cPCI Fibre Channel network adapter boards. This diagnostic test is not scalable.

Note – To run the qlctest when connected to storage, select Yes in the "Test if Connected to Storage" field in the qlctest dialog box. This step is necessary only if you select an internal test.

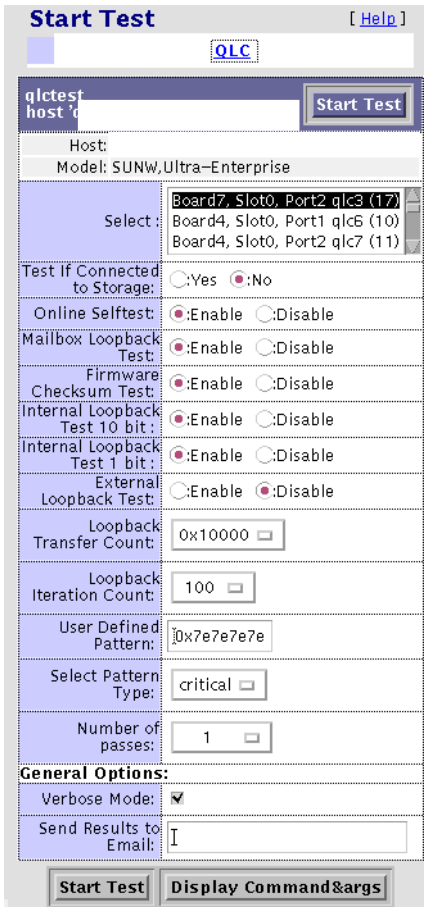


FIGURE 5-21 qlctest Test Options Dialog Box

Note the following:

- Do not run customer applications while running `qlctest`, because the test takes priority over customer data requests. Data cannot be accessed while the `qlctest` test is running.
- Do not run other tests while the `qlctest` test is running. The `qlctest` test might cause other tests to fail.
- Running the `qlctest` test can affect the switch counters along with the operation of the Storage Automated Diagnostic Environment agent.

TABLE 5-16 describes the `qlctest` Test Options dialog box.

TABLE 5-16 `qlctest` Options

Option	Description
Test if Connected to Storage	Runs `qlctest` while connected to storage. Set this option to Yes if another option other than the external loopback is selected and the port is connected to storage. The default is No. This step is necessary only if you select an internal test.
Online Selftest	Evaluates the functionality of ISP hardware by performing the following tests: • Transmit FIFO test • Receive FIFO test • SRAM test • Miscellaneous Register tests It runs by default, but it can be disabled.
Mailbox Loopback Test	Loads a series of registers into the input mailboxes on the card and then reads the output mailboxes and compares the results. Verifies that the system side of the card is operating correctly and that the internal data paths are correct. It runs by default, but it can be disabled.
Firmware Checksum Test	Runs an internal checksum test on the installed firmware. This test verifies that the RISC RAM on the card is fully functional and that the installed firmware is still intact. This test also serves as a quick RAM check of the RISC RAM. It runs by default, but it can be disabled.
Internal Loopback Test 10-bit	Performs an internal loopback test within the host adapter ISP hardware at the 10-bit interface. This test is done with data sourcing from the system memory. You select the desired data pattern, transfer count, and iteration count from the Test Options dialog box. It runs by default, but it can be disabled.

TABLE 5-16 `qlctest` Options *(Continued)*

Option	Description
Internal Loopback Test 1-bit	Performs an internal loopback test within the host adapter ISP hardware at the 1-bit interface. This test is done with data sourcing from the system memory. You select the data pattern, transfer count, and iteration count from the Test Options dialog box. It runs by default, but it can be disabled.
External Loopback Test	Performs an external loopback test. This test is done with data sourcing from the system memory. You select the data pattern, transfer count, and iteration count from the Test Options dialog box. This is an intervention test, because a loopback cable from the transceiver to the QLC receiver of the QLC port must be inserted when testing this port by itself. This subtest can also test the entire Fibre Channel loop when the loop is connected to the storage to be tested. It does not run by default, but it can be enabled.
Loopback Transfer Count	Controls the packet size used in the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `0x10000`.
Loopback Iteration Count	Sets the number of times to loop the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `10`.
User Defined Pattern	Uses the user-entered data pattern to loop for the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `0x7e7e7e7e`.
Select Pattern Type	Selects which data pattern to loop for the internal 10-bit, internal 1-bit, and external loopback tests. The default value is critical.
Number of Passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge SBus Fibre Channel-100 Host Adapter Board Test (`socaltest`)

The `socaltest`(1M) test aids the validation and fault isolation of the Sun StorEdge SBus Fibre Channel-100 host adapter board.

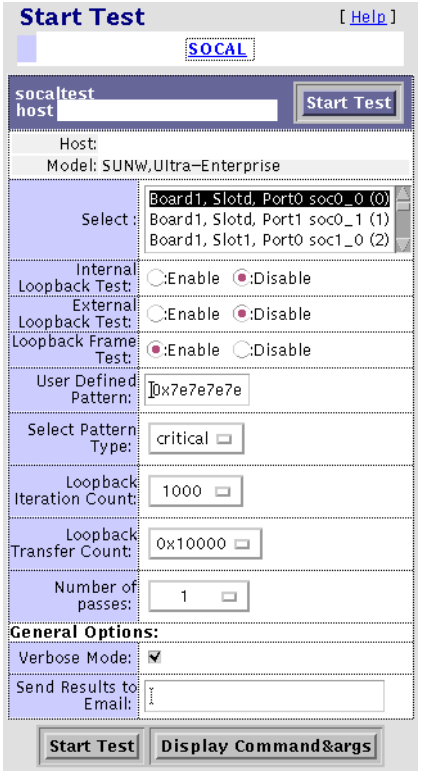


FIGURE 5-22 `socaltest` Test Options Dialog Box

Note – Do not run `socaltest` and `a5ksestest` at the same time. Otherwise, test failures might occur. Do not run `socaltest` with a high system load.

In addition to the tests described earlier, the `socaltest` test also tests the basic functions of the SOC+ chip, the on-board XRAM, and the host control buffer by invoking the appropriate tests implemented in firmware.

Note – You cannot run the Internal or External Loopback tests if the port is connected to a disk array.

TABLE 5-17 describes the `socaltest` Test Options.

TABLE 5-17 `socaltest` Options

Option	Description
Internal Loopback Test (with no storage attached)	Checks the host adapter card and the DMA with the host system, as follows: 1. A frame is created in the host adapter local memory, sent out through the SOC+ transmitter, and internally looped back to the SOC+ receiver. The received data is compared to the original data. 2. A frame is created in the host adapter local memory, sent out through the SOC+ transmitter, and looped back through the SERDES (serializer-deserializer) chip on the host adapter card. The received data is compared to the original data. 3. A frame is created in the host main memory, transferred through the DMA to the host adapter transmitter, looped back within the SOC+ chip, and transferred from the receiver to the host main memory through the DMA. The received frame is compared to the original transmitted frame, which tests the host memory to the host adapter DMA path. If the board is not connected to storage, the Internal Loopback test is selected by default. External Loopback and Loopback Frame tests are disabled.
External Loopback Test (with no storage attached)	Verifies the proper functioning of the GBIC module. A frame is created in the host adapter local memory and is sent out and looped back through the external loopback connector attached to the port. If the External Loopback test is run together with the Internal Loopback test, the DMA path is also tested by creating a frame in host main memory, transferring it to the host adapter through the DMA, looping it back through the external loopback connector, and transferring the received frame back to the host main memory by DMA. By default, this is always disabled.
Loopback Frame Test (with storage attached)	Sends out a buffer initialized with the selected pattern and compares it to the looped-back frame. It passes if the two match and fails if they do not. If the board is connected to storage, the Loopback Frame test is selected by default. Internal and External loopback tests are disabled.

TABLE 5-17 `socaltest` Options *(Continued)*

Option	Description
User Defined Pattern	User-specified pattern in hexadecimal. The default is `0x7e7e7e7e`.
Select Pattern Type	Applies only to Loopback Frame test. `user` uses the pattern entered by `user`. `critical` runs the 10 most critical patterns for fault detection. `all` runs the complete list of hexadecimal patterns for fault detection. The `all` pattern includes the `critical` pattern. The default is `critical`, which applies only to Loopback Frame Pattern.
Loopback Iteration Count	Sets the number of times to loop the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `10`.
Loopback Transfer Count	Controls the packet size used in the internal 10-bit, internal 1-bit, and external loopback tests. The default value is `0x10000`.
Number of Passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge Network 2-Gbit Fibre Channel Switch Test (`switch2test`)

The `switch2test`(1M) test is used to diagnose the Sun StorEdge network 1-Gbit and 2-Gbit Fibre Channel switches. The `switch2test` process also provides command-line access to switch diagnostics. `switch2test` supports testing on local and remote switches.

The `switch2test` runs the port diagnostic on connected switch ports. While the `switch2test` is running, the port statistics are monitored for errors.

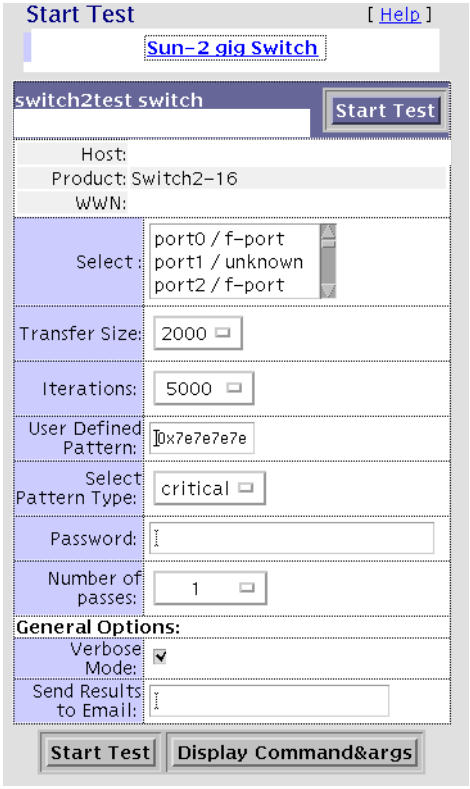


FIGURE 5-23 `switch2test` Test Options Dialog Box

TABLE 5-18 describes the test mode options for the `switch2test` test.

TABLE 5-18 `switch2test` Test Options

Option	Description
Transfer Size	Specifies the transfer count for the port test, between 200 and 2000.
Iterations	Specifies the number of iterations the port test runs, between 0 and 1,000,000.
User Defined Pattern	Specifies the default pattern, in hexadecimal format, to be used for the port test. You can also enter the hexadecimal pattern to run for the test.
Select Pattern Type	Gives the user the choice of running the one-user pattern, critical patterns (10 of the most critical patterns), or all patterns (a complete list of test patterns).
Password	A password is required for the Sun StorEdge Network 2 Gbit Fibre Channel switches.
Number of Passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge Network FC Switch-8 and Switch-16 Switch Test (`switchtest`)

The `switchtest`(1M) test is used to diagnose the Sun StorEdge network 1-Gbit FC switch-8 and switch-16 switches. The `switchtest` process also provides command-line access to switch diagnostics. `switchtest` supports testing on local and remote switches.

`switchtest` runs the port diagnostic on connected switch ports. While `switchtest` is running, the port statistics are monitored for errors.

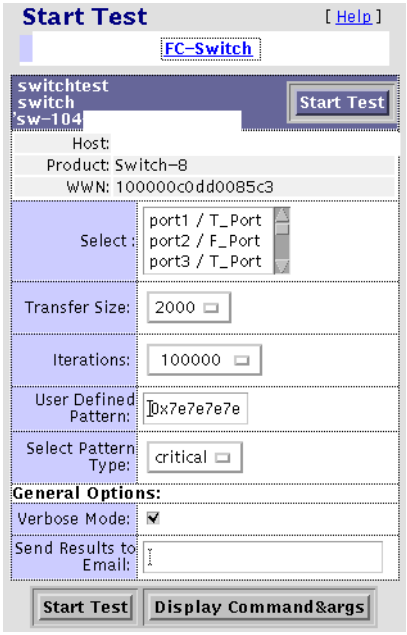


FIGURE 5-24 `switchtest` Test Options Dialog Box

TABLE 5-19 describes the test mode options for the `switchtest` test.

TABLE 5-19 `switchtest` Test Options

Option	Description
Transfer Size	Specifies the transfer count for the port test, between 200 and 2000.
Iterations	Specifies the number of iterations the port test runs, between 0 and 1,000,000.
User Defined Pattern	Specifies the default pattern, in hexadecimal format, to be used for the port test. You can also enter the hexadecimal pattern to run for the test.
Select Pattern Type	Gives the user the choice of running the one-user pattern, critical patterns (10 of the most critical patterns), or all patterns (a complete list of test patterns).

Sun StorEdge T3 and T3+ Array Test (t3ofdg)

The t3ofdg(1M) test runs the internal diagnostics of the Sun StorEdge T3 and T3+ array.

Before you run the t3ofdg(1M) test, you must do the following:

- Run the Storage Automated Diagnostic Environment manually by following the procedure “When To Run the ras_install Script” on page 16.
- Generate a report for the device against which you are running the test (for example, Sun StorEdge T3 and T3+ arrays).

If the numbers of existing volumes do not match, an error message is displayed.

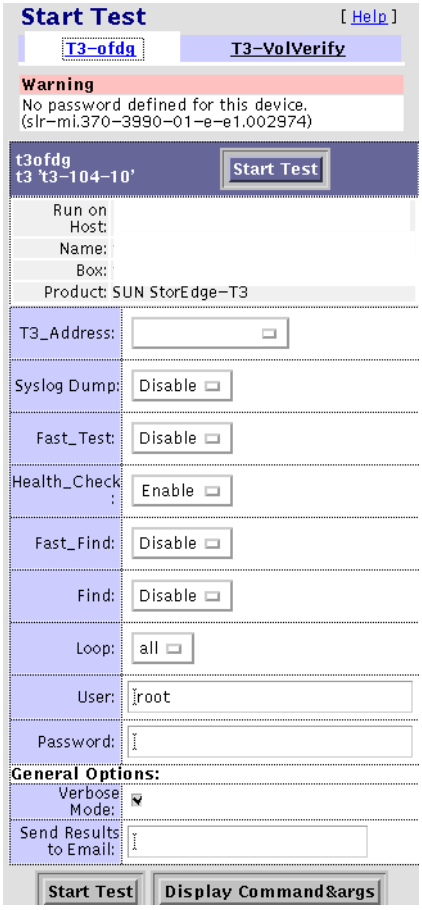


FIGURE 5-25 t3ofdg Test Options Dialog Box

Note – This test requires the user to enter the user ID and password options for the Sun StorEdge T3 or T3+ array that is being tested. See "To Maintain Devices" on page 48 for information about how to add an optional T3 password.

TABLE 5-20 `t3ofdg` Test Options

Syslog Dump	Enable dumps all syslog entries that have been added, while the test is running, to the screen. `ofdg` dumps only off-line diagnostic lines, that have been added to the syslog, to the screen. The default is Disable.
Fast_Test	Fast_Test performs a fast Go / No Go test of the selected enclosure and loop. It does not attempt to detect bad FRUs. The default is Enable.
Health_Check	Health_Check runs Fast_Test multiple times, one time for each loop per unit. The default is Disable.
Fast_Find	Fast_Find can be used to detect bad loop cards, interconnect cables, and controllers. Fast_Find does not attempt to isolate to a single disk port. Run Fast_Find before Find to eliminate loop cards, interconnect cables, and controllers as bad FRUs before the midplane or disks are suspended (which are checked using Find). The default is Disable.
Find	Find performs an extensive Go / No Go test. If loop failures are detected, Find automatically initiates the full-loop-fault-isolation diagnostic. The loop fault diagnostic has the capability to detect and isolate a single disk port but is very time-consuming. The default is Disable.
Loop	Loop specifies which loop to test. All tests both loops. The default is All.
Password	The Sun StorEdge T3+ array telnet password enables the Storage Automated Diagnostic Environment to log in to the Sun StorEdge T3+ array device. The password is required. **Note:** The user cannot change an existing Sun StorEdge T3+ array password.

Sun StorEdge T3 and T3+ Array Test (t3LUN)

The t3LUN(1M) test verifies the functionality of Sun StorEdge T3 and T3+ array logical unit numbers (LUNs) by using three subtests: Media, File System, and Synchronous I/O and Asynchronous I/O.

The File System subtest can be run only if the selected partition is mounted. An instance of the t3LUN test is present for each volume.

TABLE 5-21 describes the t3LUN subtests.

TABLE 5-21 t3LUN Subtests

Subtest	Description
Media	Verifies LUN media by reading data from the LUN. The Media subtest treats a LUN as one large portion of contiguous data.
File System	Verifies the LUN system's integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or premounted, the test is blocked. The test opens two temporary files (of the size specified on `File System File Size`) and performs a read/write test.
Synchronous I/O and Asynchronous I/O	Uses the asynchronous read/write feature of the Solaris LUN driver to exercise the LUN. In read-only mode, the test sends a maximum of four asynchronous read packets, each with a random size and a random offset into the selected partition. The test then waits for all outstanding I/O activity to complete before issuing another round of packets. This process continues until the whole area is tested. In read/write mode, one write packet is issued in every four read packets as a spot check of the write operation.

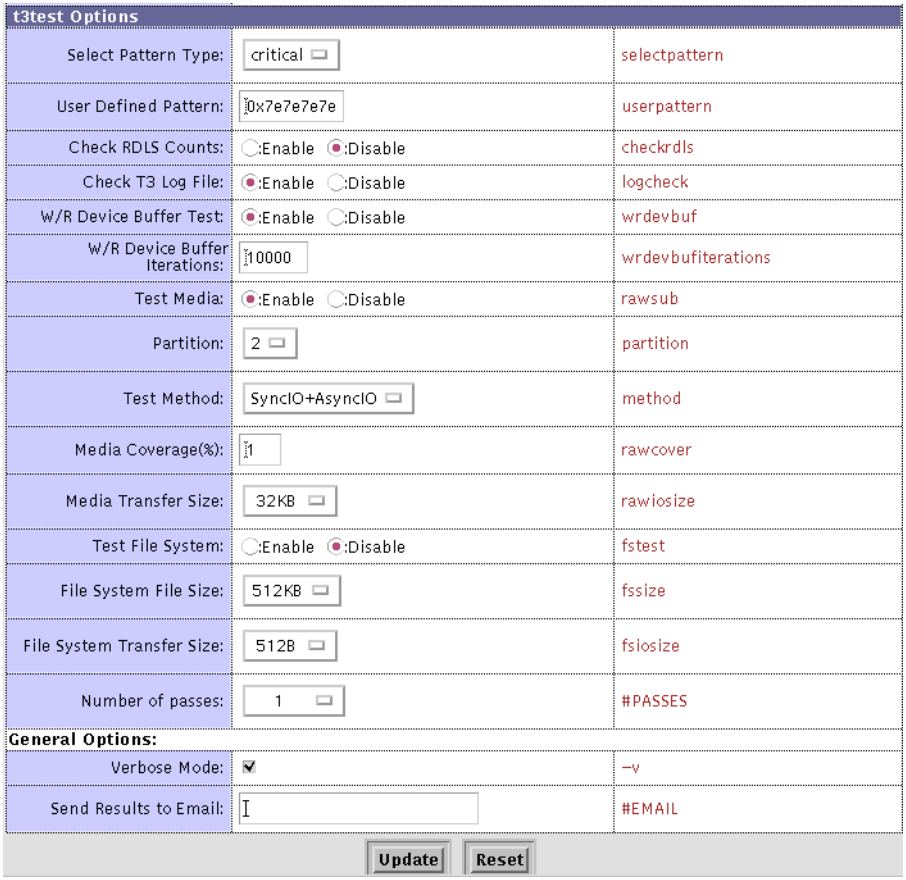


FIGURE 5-26 `t3LUN` Test Options Dialog Box

Caution – Before using the diagnostics package to monitor messages from a Sun StorEdge T3 or T3+ array, you must set up the array to mirror its `/syslog` messages to the host that is running the diagnostics package. The array messages can be mirrored to the `/var/adm/messages.t3` file on the host.

TABLE 5-22 describes the test mode options for the `t3LUN` test.

TABLE 5-22 `t3LUN` Options

Option	Description
Select Pattern Type	Selects which pattern to run. You will choose the user, critical pattern, or all patterns.
User Defined Pattern	User-defined test pattern.
Check RDLS Counts	Monitors the read link status (RDLS) counts.
Check T3 Log File	Scans Sun StorEdge T3 and T3+ array log file for errors during test.
W/R Device Buffer Test	Enables or disables the write/read actions of the Device Buffer Test. **Note:** Sun StorEdge T3+ 2.1 firmware must be installed to run this test.
W/R Device Buffer Iterations	Specifies the number of times the W/R Device Buffer Test runs.
Test Media	Enables or disables the Media subtest.
Partition	The partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Test Method	Enables or disables the Test Method (SyncIO and AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System File Size	Creates two files, half the size of what is specified.
File System Transfer Size	The transfer size of the File System subtest.
Number of Passes	Specifies the number of times the test runs. The default is 1.

Sun StorEdge T3 and T3+ Array Test (`t3volverify`)

The `t3volverify`(1M) test enables array administrators to execute manual parity checks on existing volumes. Parity checking applies only to RAID 1 and RAID 5 volumes. Check data parity by using the `t3volverify` test before performing tape backup overwrite cycles, approximately once every 30 days.

Before you run the `t3volverify` test, you must do the following:

- Run the Storage Automated Diagnostic Environment manually by following the procedure “When To Run the ras_install Script” on page 16.
- Generate a report for the device against which you are running the test (for example, Sun StorEdge T3 and T3+ arrays).

If the numbers of existing volumes do not match, an error message is displayed.

Caution – Ensure that system health is in optimal condition before running `t3volverify`. For example, make sure that no LUNs are under reconstruction, the status of all disks is zero, and other similar conditions are resolved before performing this procedure.

For more information, see the Sun StorEdge T3 and T3+ array documentation, which is listed in the section “Related Sun Documentation” on page 10.

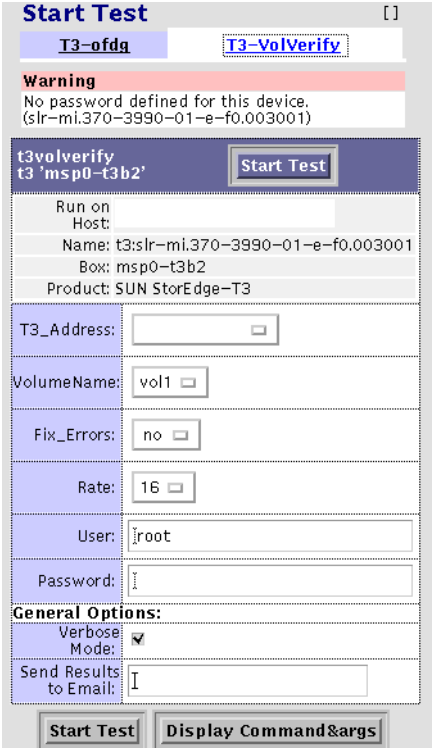


FIGURE 5-27 `t3volverify` Test Options Dialog Box

Sun StorEdge T3+ Array Passwords

The `t3volverify` test requires a user ID and password for the Sun StorEdge T3+ array that is being tested.

The Storage Automated Diagnostic Environment test uses the user ID and password that you set up according to the procedure “To Add a Device Manually” on page 48.

If no password exists for the Sun StorEdge T3+ array, you can add a password by using the information found in “To Update a Device Manually” on page 54.

Sun StorEdge 6120 Array LUN Test (6120LUN)

The 6120LUN(1M) test verifies the functionality of Sun StorEdge 6120 array logical unit numbers (LUNs) using three subtests: Media, File System, and Synchronous I/O and Asynchronous I/O.

The File System subtest can be run only if the selected partition is mounted. An instance of the 6120LUN test is present for each volume.

TABLE 5-23 describes the 6120LUN subtests.

TABLE 5-23 6120LUN Subtests

Subtest	Description
Media	Verifies LUN media by reading data from the LUN. The Media subtest treats a LUN as one large portion of contiguous data.
File System	Verifies the LUN system's integrity. The File System subtest exercises the partition being tested to determine if it is mounted. If the partition is not already mounted or premounted, the test is blocked. The test opens two temporary files (of the size specified on `File System File Size`) and performs a read/write test.
Synchronous I/O and Asynchronous I/O	Uses the asynchronous read/write feature of the Solaris LUN driver to exercise the LUN. In read-only mode, the test sends a maximum of four asynchronous read packets, each with a random size and a random offset into the selected partition. The test then waits for all outstanding I/O activity to complete before issuing another round of packets. This process continues until the whole area is tested. In read/write mode, one write packet is issued in every four read packets as a spot check of the write operation.

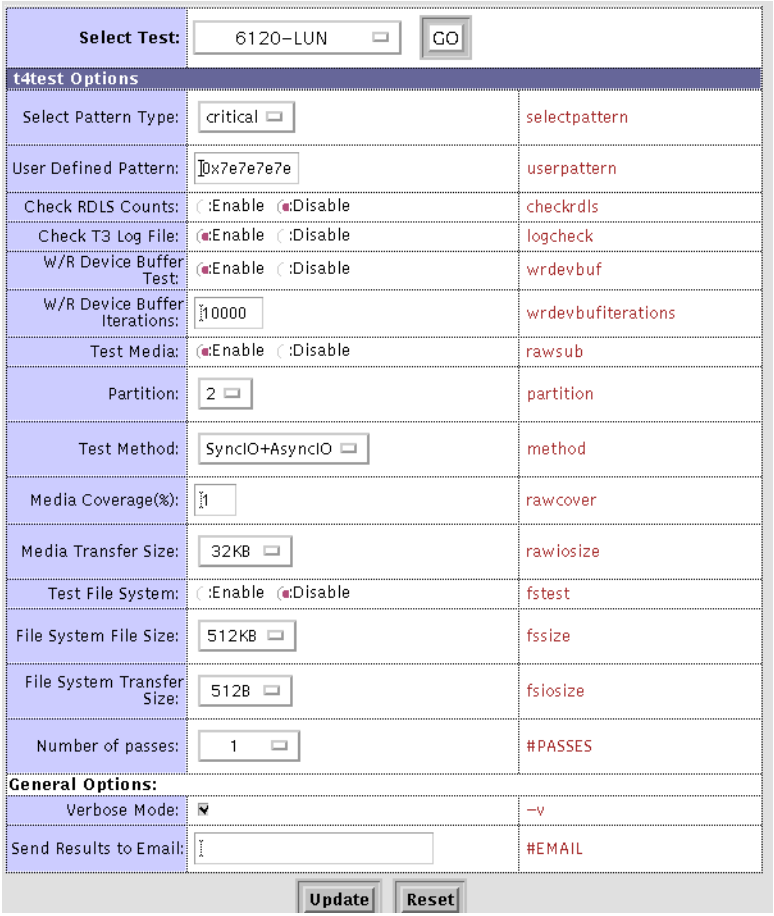


FIGURE 5-28 `6120LUN` Test Options Dialog Box

Caution – Before using the diagnostics package to monitor messages from a Sun StorEdge 6120 array, you must set up the array to mirror its `/syslog` messages to the host that is running the diagnostics package. The array messages can be mirrored to the `/var/adm/messages.t3` file on the host.

TABLE 5-24 describes the test mode options for the `6120LUN` test.

TABLE 5-24 `6120LUN` Test Options

Option	Description
Select Pattern Type	Selects which pattern to run. You will choose the user, critical pattern, or all patterns.
User Defined Pattern	User-defined test pattern.
Check RDLS Counts	Monitors the read link status (RDLS) counts.
Check T3 Log File	Scans Sun StorEdge T3 and T3+ array log file for errors during test.
W/R Device Buffer Test	Enables or disables the write/read actions of the Device Buffer Test. **Note:** Sun StorEdge T3+ 2.1 firmware must be installed to run this test.
W/R Device Buffer Iterations	Specifies the number of times the W/R Device Buffer Test runs.
Test Media	Enables or disables the Media subtest.
Partition	The partition for the Media subtest. If a partition is mounted, its mount point is appended after the partition number, such as `1(/usr)`, where `1` is the partition number and `/usr` is the mount point.
Test Method	Enables or disables the Test Method (SyncIO and AsyncIO).
Media Coverage (%)	Tests all or part of a partition (in percentages).
Media Transfer Size	The transfer size of the Media subtest.
Test File System	Enables or disables the File System subtest.
File System File Size	Creates two files, half the size of what is specified.
File System Transfer Size	The transfer size of the File System subtest.
Number of Passes	Specifies the number of times the test will run. The default is 1.

Sun StorEdge 6120 Array Test (`6120volverify`)

The `6120volverify`(1M) test enables array administrators to execute manual parity checks on existing volumes. Parity checking applies only to RAID 1 and RAID 5 volumes. Check data parity by using the `6120volverify` test before performing tape backup overwrite cycles, approximately once every 30 days.

Before you run the `6120volverify` test, you must first do the following:

- Run the Storage Automated Diagnostic Environment manually by following the procedure “When To Run the ras_install Script” on page 16.
- Generate a report for the device against which you are running the test (for example, Sun StorEdge 6120 arrays).

If the number of existing volumes do not match, an error message is displayed.

Caution – Ensure that system health is in optimal condition before running `6120volverify`. For example, make sure that no LUNs are under reconstruction, the status of all disks is zero, and other similar conditions are resolved before performing this procedure.

See the Sun StorEdge 6120 array documentation, which are listed in Related Documentation of the Preface of this document, for more information.

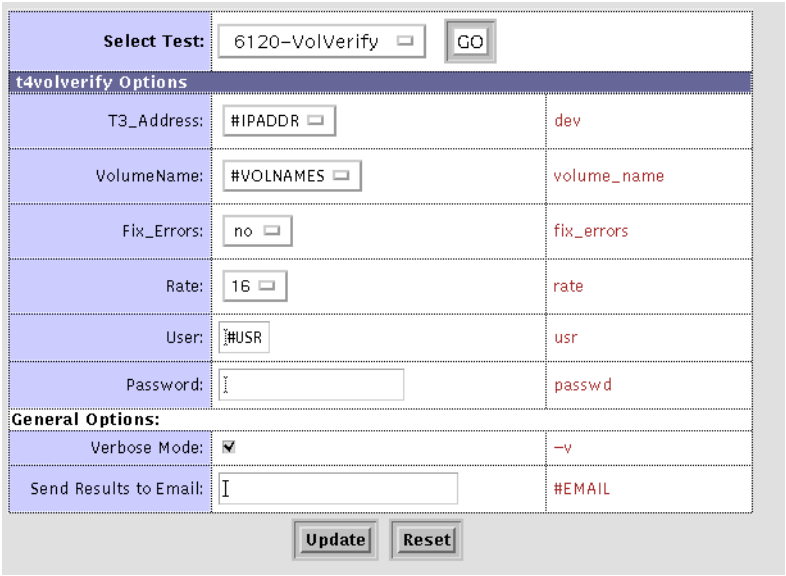


FIGURE 5-29 `6120volverify` Test Options Dialog Box

Sun StorEdge T3+ Array Passwords

The `6120volverify` test requires a user ID and password for the Sun StorEdge 6120 array that is being tested.

The Storage Automated Diagnostic Environment test uses the user ID and password that you set up according to the procedure “To Add a Device Manually” on page 48.

If no password exists for the Sun StorEdge 6120 array, you can add a password by using the information found in “To Update a Device Manually” on page 54.

TABLE 5-25 `6120volverify` Test Options

Option	Description
VolumeName	The name of the volume to verify. Note that the volume name is a name internal to the array and is not seen by the host.
Fix_Errors	Corrects parity errors on RAID 5 volumes and corrects mirrored data errors on RAID 1 volumes. If Fix_Errors is *not* specified, then `6120volverify` reports errors but does not correct them. If the Fix_Errors option is specified and an error is detected, the `6120volverify` command regenerates parity from the existing data on the volume.
Rate	The speed at which the `6120volverify` is run. The verification rate is *n*, where *n* equals any number from 1 to 16. The default rate is 1, which has the minimum performance impact on the data host. 16 has the highest performance impact on the data host.
Password	The Sun StorEdge 6120 array telnet password enables the Storage Automated Diagnostic Environment to log into the Sun StorEdge 6120 array device. The password is required. **Note:** You cannot change an existing Sun StorEdge 6120 array password. If no password exists, however, you can add a password using the information found in “Sun StorEdge T3+ Array Passwords” on page 185.

Revision Checking

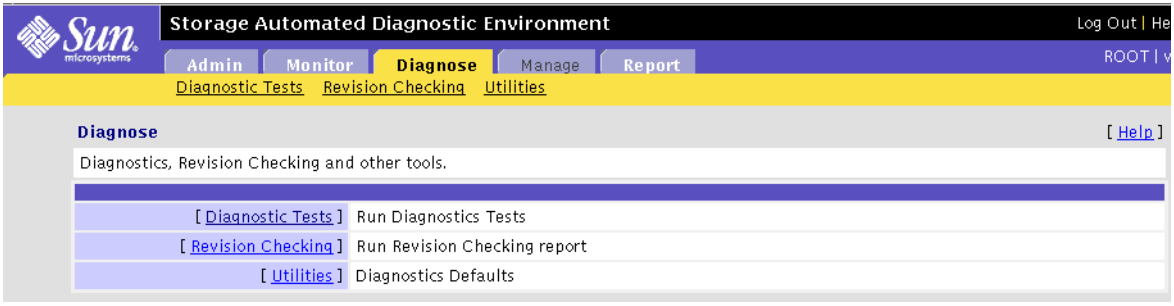
The Storage Automated Diagnostic Environment's revision checking feature checks the software, hardware, and firmware revisions of all user-selected components.

Revision checking is based on an updatable matrix, which you generate by using the PatchPro database. The matrix provides distributed revision checking across the system. Solaris operating system versions and component firmware versions are verified against the matrix.

▼ To Run Revision Checking Report

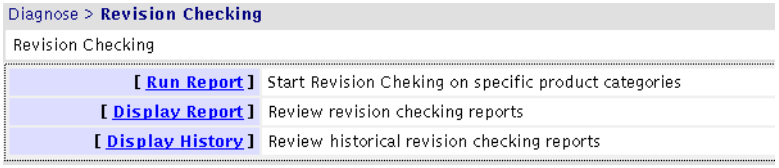
1. **Click the Diagnose tab from the main menu.**

   The Diagnose window is displayed.



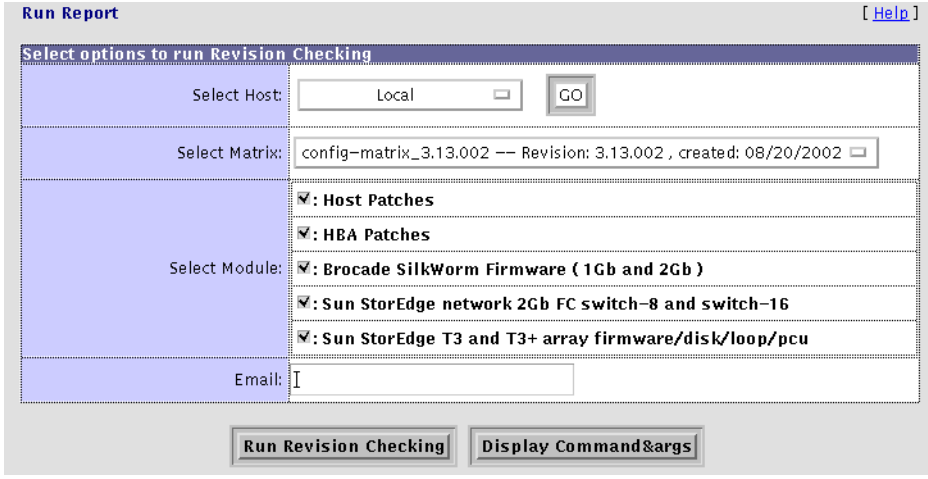
2. **Click Revision Checking from the Diagnose page.**

   The Revision Checking window is displayed.



3. **Click Run Report.**

   The Run Report window is displayed.



4. **Select a host from the pull-down menu and click GO.**

   The window reloads, and returns updated information for the specified host.

5. **Select a configuration matrix from the pull-down menu.**

   The matrices are sorted by revision level and date, with the most recent matrix listed first.

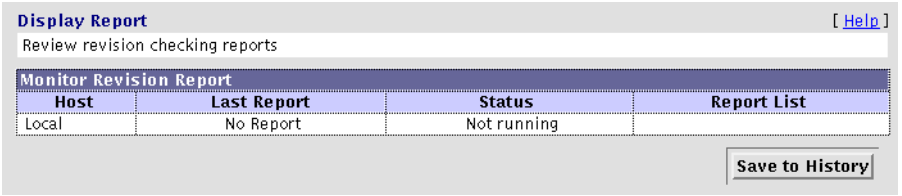
6. **Deselect a device or devices from the Select Module list. All the devices are selected by default.**

7. **In the email text box, type an email address or addresses to where Revision Checking results should be sent.**

8. **Click Run Revision Checking.**

▼ To Display Revision Checking Reports

1. **Check the Select check box that corresponds to the host for which you are displaying the report.**



2. **Click Display Report.**

3. **Click Save In History to keep track of the module's counters.**

   A report similar to the one shown in FIGURE 5-30 is displayed.

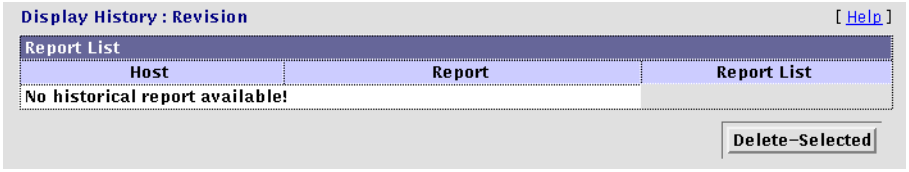


FIGURE 5-30 Display Revision History

CHAPTER 6

Reports

The Reports section summarizes system information, including agent statistics and system thresholds, on every device that is currently supported by the Storage Automated Diagnostic Environment.

This section also displays device-specific report information on the Sun StorEdge network FC switches. In addition, troubleshooting information is presented in the form of a tool called *Service Advisor*, which displays a customizable event grid or event report based on specified criteria.

General Reports

Using the SAN Traffic Report, you can display the status of each port on every switch. Using the FRU reports and Event reports, you can quickly display a summary of the status of your device and further customize the report using the filters provided.

This section contains the following topics:

- "Traffic Report" on page 197
- "FRU Report" on page 198
- "Event Reports" on page 200
- "Device Summary Report" on page 202

1. **Click the Report tab in the Storage Automated Diagnostic Environment main window.**

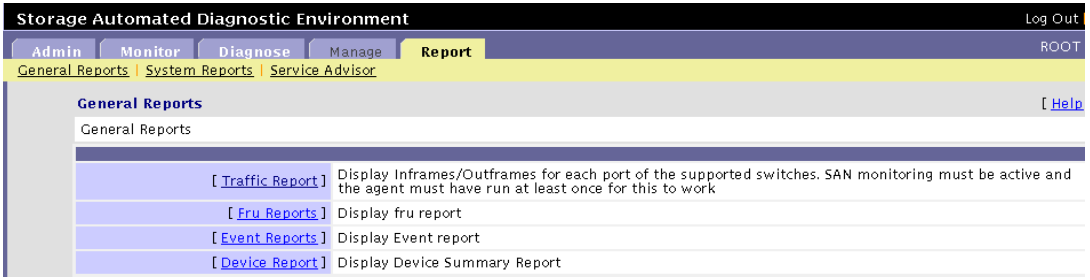


FIGURE 6-1 General Reports window

Traffic Report

Using the SAN Traffic Report, you can display the status of each port on every switch. SAN monitoring must be active and the Storage Automated Diagnostic Environment must have run at least once for port and switch traffic information to display.

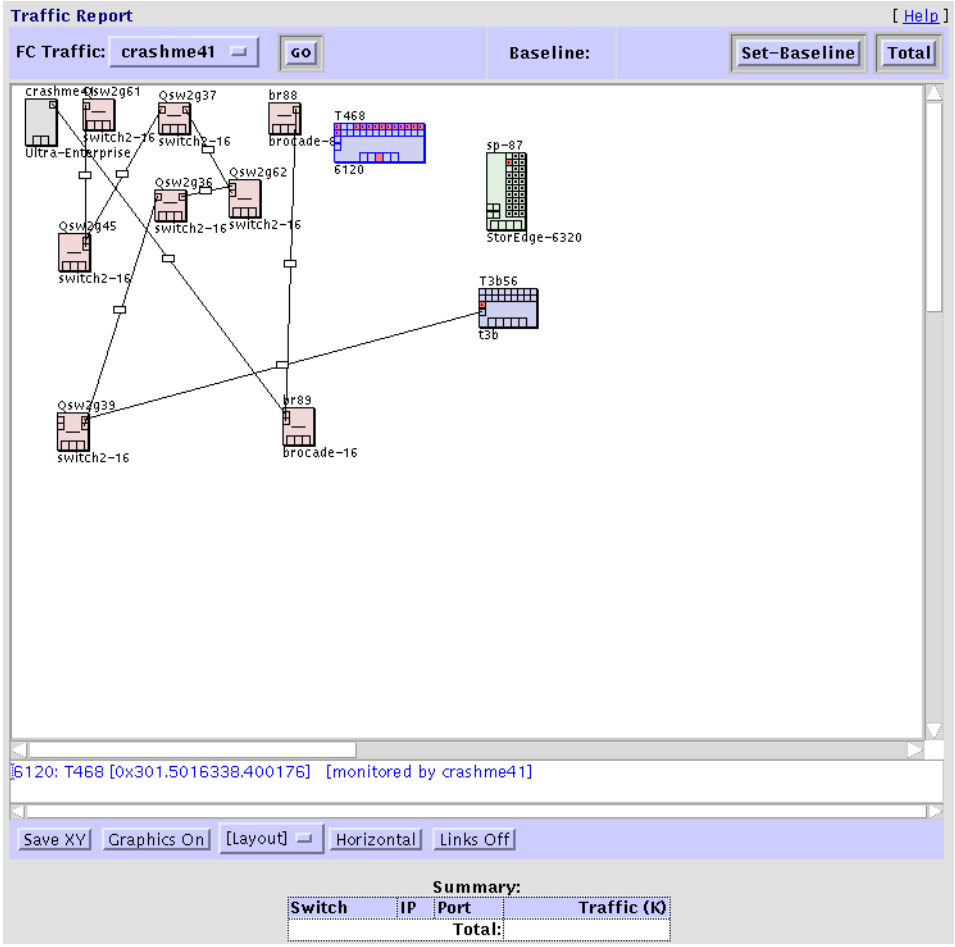


FIGURE 6-2 Traffic Report

FRU Report

▼ To Generate a Customized FRU Report

1. **From the General Reports menu, click FRU Reports.**
2. **Click New Report.**

   A screen like the one shown in FIGURE 6-3 is displayed.

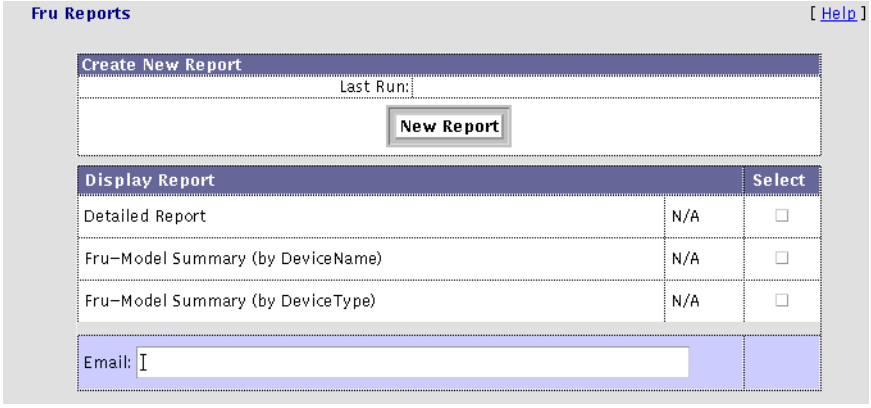


FIGURE 6-3 FRU Reports

3. **Enter an email address in the Email text field to where the FRU report will be sent.**

4. **Select one report and click Display.**

   - **Detailed Report**—displays a detailed list of FRU identifiers, as shown in TABLE 6-1. From the detailed FRU report, you can filter the FRU report using [device type] and [FRU type] filters.

TABLE 6-1 Detailed FRU Report Information

FRU Identifier	Description
Name	Host name
Device	Device type
FruType	Component FRU (for example, controller, disk, loopcard)
Fru	FRU identifier number
Vendor	FRU vendor (for example, Seagate for disks)
Model	Model number
Serial	Serial number
Revision	SUNWstads package
Status	Current device status

   - **Fru-Model Summary (by DeviceName)**

     Displays the FRU type, vendor name, model number, revision number, and number of FRUs per FRU type for a selected device name (for example, sp-87-t400).

   - **Fru-Model Summary (by DeviceType)**

     Displays the FRU type, vendor name, model number, revision number, and number of FRUs per FRU type for a selected device (for example, 6120).

Event Reports

▼ To Generate a Customized Event Report

1. **From the General Reports menu, click Event Reports.**
2. **Click New Report.**

   Click the Actionable Only checkbox if you want to display only events that are actionable.

   A screen like the one shown in FIGURE 6-3 is displayed

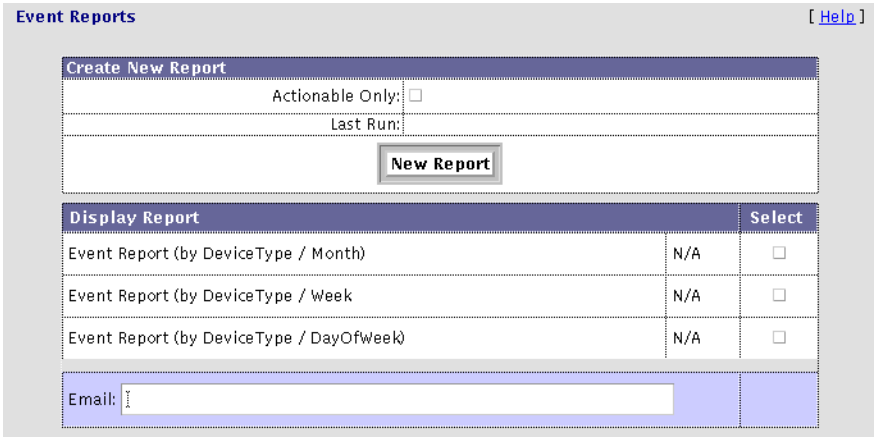


FIGURE 6-4 Event Reports

3. **In the Email text field, enter the email address where the Event Report should be sent.**

4. **Select one report from the following options.**

- **Event Report (by DeviceType / Month)**—Displays a summary of events sorted by:
  - Device-Type
  - Year-Month (for example, 2002-11)
  - Info—Click the number link in the Info column to launch a pop-up window with a summary of information available for that device. The summary includes the date, event type, topic, and description.
  - Severity level—Warning, Error, Down—Click the number link in a severity column to launch a pop-up window with a summary of that particular severity level. The summary includes the date, event type, topic, description, and severity.
- **Event Report (by DeviceType / Week)**—Displays a summary of events sorted by:
  - Device-Type
  - Year-Week (for example, 2002-11-03)
  - Info—Click the number link in the Info column to launch a pop-up window with a summary of information available for that device. The summary includes the date, event type, topic, and description.
  - Severity level (Warning, Error, Down)—Click the number link in a severity column to launch a pop-up window with a summary of that particular severity level. The summary includes the date, event type, topic, description, and severity.
- **Event Report (by DayOfWeek)**—Displays a summary of events sorted by:
  - Device-Type
  - DayOfWeek (for example, 1 Mon)
  - Info—Click the number link in the Info column to launch a pop-up window with a summary of information available for that device. The summary includes the date, event type, topic, and description.
  - Severity level (Warning, Error, Down)—Click the number link in a severity column to launch a pop-up window with a summary of that particular severity level. The summary includes the date, event type, topic, description, and severity.

Device Summary Report

▼ To Generate a Device Summary Report

- **From the General Reports menu, click Device Report.**

  A screen like the one shown in FIGURE 6-5 is displayed.

Device Report [He

Display Device Summary Report

+ Name	Type	Health	IP	Key	Monitoring
172.20.32.111	Switch2	**Warning**	172.20.32.111	100000c0dd00bfcc	On
	01-08 14:02:14 CRC-ERROR (1000 in 219 mins): Origin: port-10 on 'switch2 '172.20.32.111/172.20.32.111'. Destination: port 12 on switch2 'Qsw2g45/172.20.32.45':				
Carson	a5k	**Error**		5080020000001e618	On
	01-08 10:21:46 The state of 'interface_board.A.gbic1.status' on Carson (wwn=5080020000001e618) is 'Failed'				
Qsw2g36	Switch1	**Warning**	172.20.32.36	100000c0dd00bfa6	On
	01-08 14:02:14 CRC-ERROR (1000 in 219 mins): Origin: port-2 on 'switch2 'Qsw2g39/172.20.32.39'. Destination: port 1 on switch2 'Qsw2g36/172.20.32.36':				
Qsw2g37	Switch1	**Warning**	172.20.32.37	100000c0dd00c668	On
	01-08 14:02:15 CRC-ERROR (1000 in 219 mins): Origin: port-9 on 'switch2 'Qsw2g45/172.20.32.45'. Destination: port 6 on switch2 'Qsw2g37/172.20.32.37':				
Qsw2g39	Switch1	**Warning**	172.20.32.39	100000c0dd00bf92	On
	01-08 14:02:14 CRC-ERROR (1000 in 219 mins): Origin: port-2 on 'switch2 'Qsw2g39/172.20.32.39'. Destination: port 1 on switch2 'Qsw2g36/172.20.32.36':				
Qsw2g45	Switch1	**Warning**	172.20.32.45	100000c0dd00b7da	On
	01-08 14:02:15 CRC-ERROR (1000 in 219 mins): Origin: port-9 on 'switch2 'Qsw2g45/172.20.32.45'. Destination: port 6 on switch2 'Qsw2g37/172.20.32.37':				
Qsw2g62	Switch1	**Warning**	172.20.32.62	100000c0dd00be44	On
	01-08 14:02:14 CRC-ERROR (1000 in 219 mins): Origin: port-4 on 'switch2 'Qsw2g62/172.20.32.62'. Destination: port 3 on switch2 'Qsw2g37/172.20.32.37':				
T3b56	t3b	**Error**	172.20.32.56	slr-mi.501-5709-05-50.057138	On/NoReport
	01-06 09:52:55 'controller.u2ctr'(50020f230000de5d) in T3 T3b56 (ip=172.20.32.56) is now Not-Available (state changed from 'unknown' to 'ready-disable				
T468	6120	**Error**	172.20.32.68	0x301.5016338.400176	On/NoReport
	01-06 09:51:09 'power.u2pcu2'(0x3AD.3001562.Q00245) in 6120 T468 (ip=172.20.32.68) is now Not-Available (state changed from 'unknown' to 'fault-enabled')				
br88	2x00 Brocade	ok	172.20.32.88	1000006069221e70	On/NoReport
br89	3x00 Brocade	ok	172.20.32.89	1000006069514d3	On/NoReport
crashme41.central.sun.com	host	**Error**	172.20.32.41		On
	01-08 14:01:00 Found in logfile /var/adm/messages on crashme41.central.sun.com : Jan 8 13:38:53 Received 1 'Loop Offline' message(s) in 160 mins [threshold is 1 in 5mins] Last-Message: 'crashme41.Central.Sun.COM qlc: [ID 686697 kern.info] NOTICE: Qlogic qlc(6): Loop OFFLINE '				
sp-87	6320	**Error**	172.20.32.87	6320.830bd171	On
	01-06 09:54:29 Slot 1 of SE2-sp-87 (ip=172.20.32.87): The state of 'power.u2pcu2.fruPowerBatState' on sp-87-t400 is '[Undefined]'				
t4b106	t3b	**Error**	172.20.32.106	slr-mi.501-5709-05-.107792	On/NoReport
	01-06 09:53:24 'disk.u1d9' in T3 t4b106 (ip=172.20.32.106) is now Not-Available (state changed from 'unknown' to 'fault-enabled')				

Switches: 8, Storage: 5, Hosts: 1

FIGURE 6-5 Device Summary Report

System Reports

The System Reports section provides information about agent statistics, thresholds, and Fibre Channel counters. In addition, the device policy feature shows all the attributes used for monitoring devices and event severity.

This section contains the following topics:

- "Agent Statistics" on page 204
- "Email/Events Maximums" on page 204
- "Thresholds List" on page 205
- "Switch Data" on page 206
- "Event and Severity Mapping" on page 207

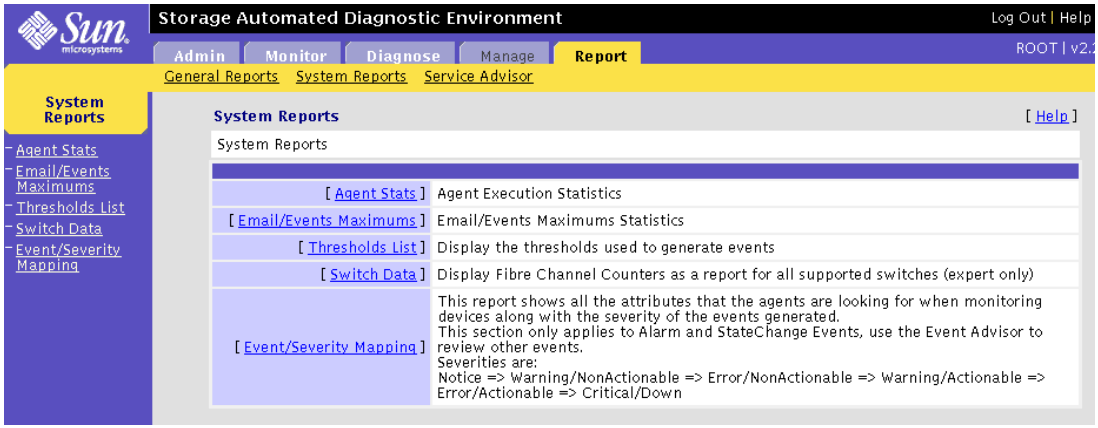


FIGURE 6-6 System Reports

Agent Statistics

Using the Agent Stats functionality, you can determine the average time required to run the modules for each device the Storage Automated Diagnostic Environment monitors. The statistical information can be used to detect bottlenecks in the agent functions. The information is generated on every run of Storage Automated Diagnostic Environment's host.

▼ To Check Storage Automated Diagnostic Environment Statistics

1. **Click Agent Stats in the System Reports window.**

Agent Execution time by Host / Module (Mins:Secs)								
Host	6120	HOST	MESSAGE	SE	SE2	SWITCH	T3MESSAGE	Total
	00:08	00:00	00:00	00:00	00:00	00:00	00:00	00:09
Average:	00:08	00:00	00:00	00:00	00:00	00:00	00:00	00:09

FIGURE 6-7 Agent Statistics

2. **Click an existing host.**

The execution time for each agent, measured in minutes and seconds, is displayed.

Email/Events Maximums

The Email/Events Maximums window, shown in FIGURE 6-8, displays the database that keeps track of the number of email messages and events sent per device or component.

You can adjust the maximum number of email messages by using the functionality in "Config Options" on page 76. The maximum number of events cannot be adjusted and is always 8.

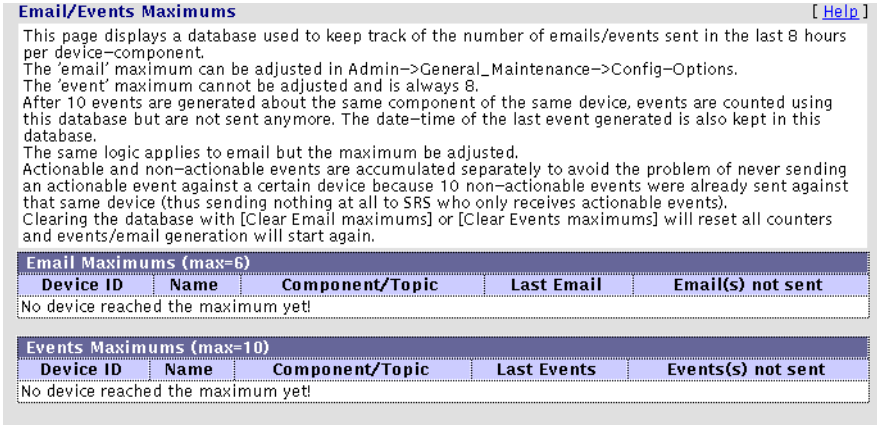
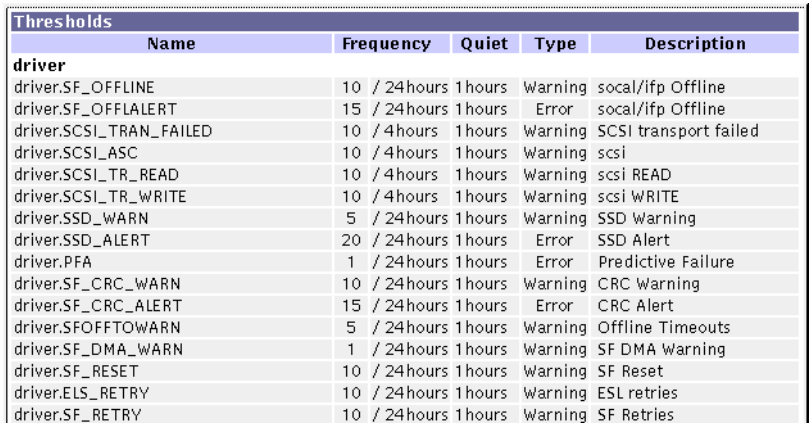


FIGURE 6-8 Email/Events Maximums

Thresholds List

The Thresholds window displays the thresholds that are used to monitor entries related to I/O interfaces in the `/var/adm/messages` file.

- Frequency is the number of alerts and hours required to generate a new message.
- Quiet is the quiet time between messages, which is used to avoid sending too many messages at once.



Name	Frequency	Quiet	Type	Description
driver				
driver.SF_OFFLINE	10 / 24hours	1hours	Warning	socal/ifp Offline
driver.SF_OFFLALERT	15 / 24hours	1hours	Error	socal/ifp Offline
driver.SCSI_TRAN_FAILED	10 / 4hours	1hours	Warning	SCSI transport failed
driver.SCSI_ASC	10 / 4hours	1hours	Warning	scsi
driver.SCSI_TR_READ	10 / 4hours	1hours	Warning	scsi READ
driver.SCSI_TR_WRITE	10 / 4hours	1hours	Warning	scsi WRITE
driver.SSD_WARN	5 / 24hours	1hours	Warning	SSD Warning
driver.SSD_ALERT	20 / 24hours	1hours	Error	SSD Alert
driver.PFA	1 / 24hours	1hours	Error	Predictive Failure
driver.SF_CRC_WARN	10 / 24hours	1hours	Warning	CRC Warning
driver.SF_CRC_ALERT	15 / 24hours	1hours	Error	CRC Alert
driver.SFOFFTOWARN	5 / 24hours	1hours	Warning	Offline Timeouts
driver.SF_DMA_WARN	1 / 24hours	1hours	Warning	SF DMA Warning
driver.SF_RESET	10 / 24hours	1hours	Warning	SF Reset
driver.ELS_RETRY	10 / 24hours	1hours	Warning	ESL retries
driver.SF_RETRY	10 / 24hours	1hours	Warning	SF Retries

FIGURE 6-9 Thresholds List

Switch Data

Use the Switch Data functionality to view the values of Fibre Channel counters in a report format.

1. **Click Switch Data in the General Reports window.**
2. **Select a switch from the Select Switch pull-down menu and click Display.**

   After you have set the Set-Baseline field, the Switch FC Data report will display counter increments and the start time and the duration of the baseline, as shown in FIGURE 6-10.

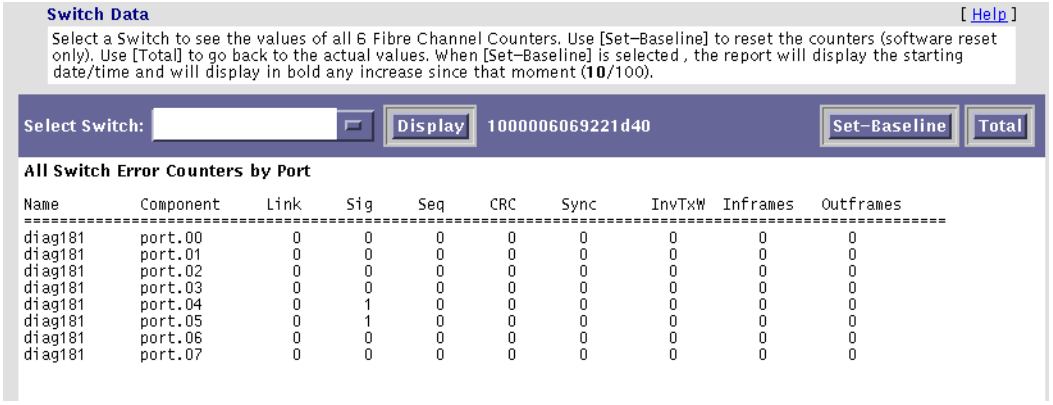


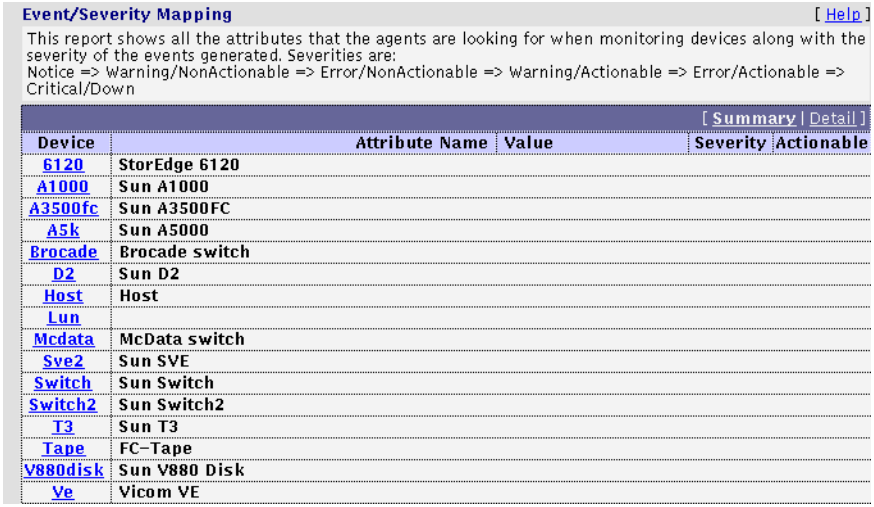
FIGURE 6-10 Switch Data Report

3. **Click Total to erase the values saved by Set-Baseline and to display the total Fibre Channel counters.**

Event and Severity Mapping

The Event and Severity Mapping page displays every device attribute the agent looks for when monitoring the devices.

The Event and Severity Mapping Report displays the monitored devices on which you can click to gather event details.



Event/Severity Mapping [Help]

This report shows all the attributes that the agents are looking for when monitoring devices along with the severity of the events generated. Severities are:
Notice => Warning/NonActionable => Error/NonActionable => Warning/Actionable => Error/Actionable => Critical/Down

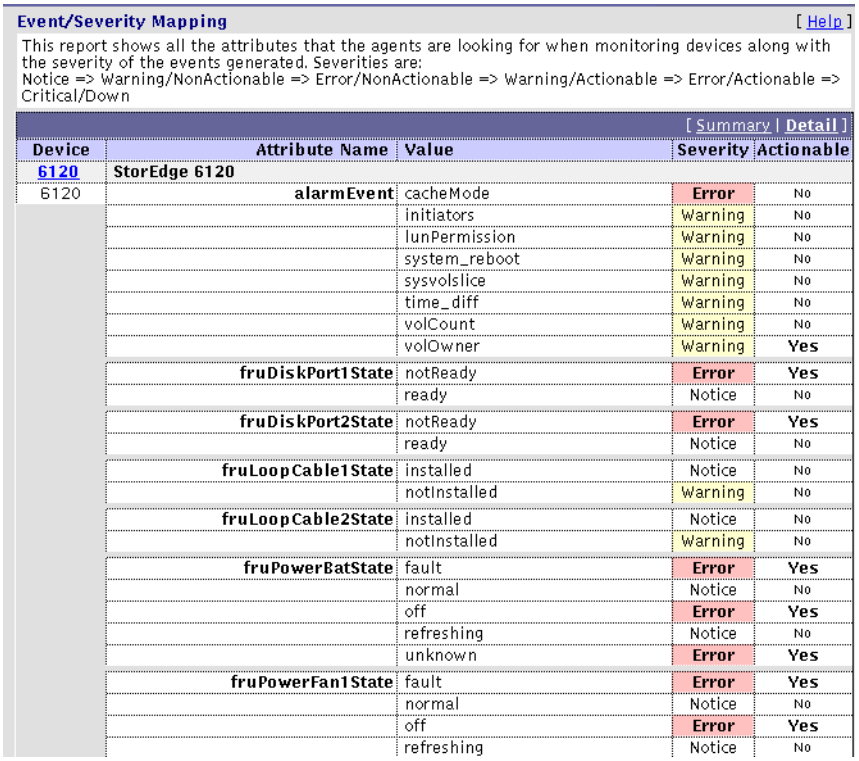
[Summary | Detail]

Device	Attribute Name	Value	Severity	Actionable
6120	StorEdge 6120			
A1000	Sun A1000			
A3500fc	Sun A3500FC			
A5k	Sun A5000			
Brocade	Brocade switch			
D2	Sun D2			
Host	Host			
Lun				
Mcdata	McData switch			
Sve2	Sun SVE			
Switch	Sun Switch			
Switch2	Sun Switch2			
T3	Sun T3			
Tape	FC-Tape			
V880disk	Sun V880 Disk			
Ve	Vicom VE			

FIGURE 6-11 Event and Severity Mapping Report

The Event and Severity Mapping Detail Report, shown in FIGURE 6-12, displays the severity of each event and whether or not the event is actionable.

For more detailed information about events and recommended action, See “Service Advisor” on page 209.



Event/Severity Mapping [Help]

This report shows all the attributes that the agents are looking for when monitoring devices along with the severity of the events generated. Severities are:
Notice => Warning/NonActionable => Error/NonActionable => Warning/Actionable => Error/Actionable => Critical/Down

[Summary | Detail]

Device	Attribute Name	Value	Severity	Actionable
6120	StorEdge 6120			
6120	alarmEvent	cacheMode	Error	No
		initiators	Warning	No
		lunPermission	Warning	No
		system_reboot	Warning	No
		sysvolslice	Warning	No
		time_diff	Warning	No
		volCount	Warning	No
		volOwner	Warning	Yes
	fruDiskPort1State	notReady	Error	Yes
		ready	Notice	No
	fruDiskPort2State	notReady	Error	Yes
		ready	Notice	No
	fruLoopCable1State	installed	Notice	No
		notInstalled	Warning	No
	fruLoopCable2State	installed	Notice	No
		notInstalled	Warning	No
	fruPowerBatState	fault	Error	Yes
		normal	Notice	No
		off	Error	Yes
		refreshing	Notice	No
		unknown	Error	Yes
	fruPowerFan1State	fault	Error	Yes
		normal	Notice	No
		off	Error	Yes
		refreshing	Notice	No

FIGURE 6-12 Event and Severity Mapping Detail Report

Service Advisor

The Service Advisor shows all the actionable and non-actionable events the Storage Automated Diagnostic Environment generates. It lets you customize an event grid by selecting device type, FRU-level components, event type, and the type of output (report, grid, or .pdf format). In all cases, the following information is displayed:

- Category (device type)
- Component (FRU-level)
- Event Type
- Severity Level
  - green—an error has occurred
  - yellow—A serious error has occurred.
  - red—A serious error has occurred that requires your immediate attention.
  - down—A fatal, nonrecoverable error has occurred and the device is offline or unreachable.
- Diagnostic information and recommended action, if applicable.

▼ To Access the Service Advisor

1. **Click Service Advisor from the Report menu.**

   The Service Advisor window is diplayed.

FIGURE 6-13 Service Advisor Window

2. **To customize an event report, click Event Advisor.**

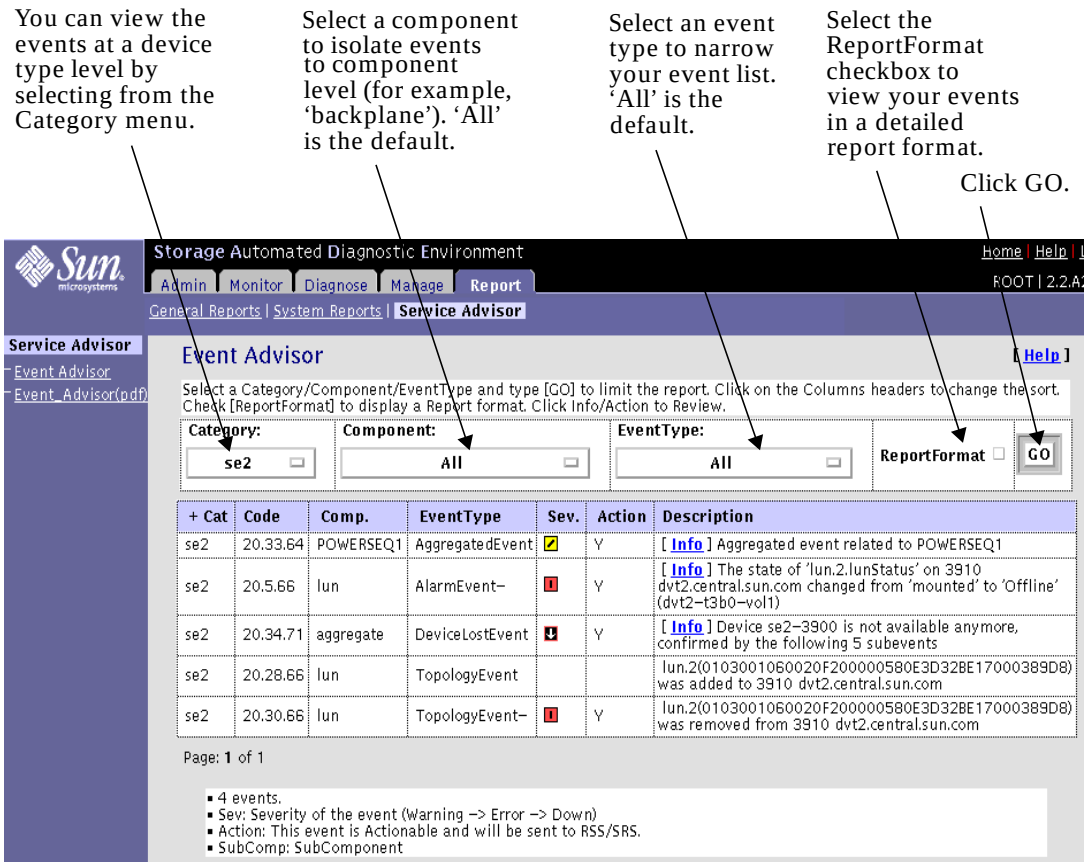


FIGURE 6-14 Event Advisor

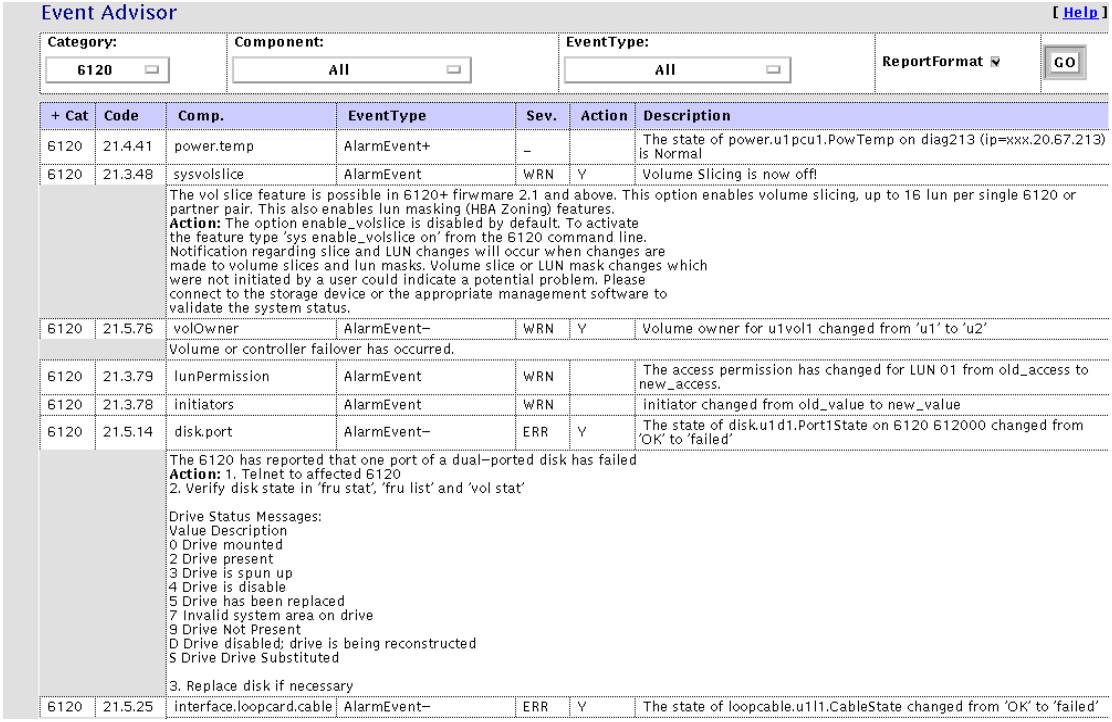
To obtain more information, click the [Info / Action] link from the Description field on the Event Advisor. A pop-up menu displays the information for that event and the action recommended for problem resolution.

Note – The Storage Automated Diagnostic Environment Event Advisor is intended to be used interactively, but it is also printable. To see all details about each event, run the Event Advisor with the ReportFormat checkbox enabled (see FIGURE 6-14).

If you do not run the Event Advisor with the ReportFormat checkbox enabled, you must click the [Info / Action] details link, one event at a time.

---

3. **To view the events in a detailed report format, check the ReportFormat box after you have specified your parameters and click GO.**



Event Advisor [Help]

Category: 6120 | Component: All | EventType: All | ReportFormat | GO

+ Cat	Code	Comp.	EventType	Sev.	Action	Description
6120	21.4.41	power.temp	AlarmEvent+	–		The state of power.u1pcu1.PowTemp on diag213 (ip=xxx.20.67.213) is Normal
6120	21.3.48	sysvolslice	AlarmEvent	WRN	Y	Volume Slicing is now off!
		The vol slice feature is possible in 6120+ firwmare 2.1 and above. This option enables volume slicing, up to 16 lun per single 6120 or partner pair. This also enables lun masking (HBA Zoning) features. **Action:** The option enable_volslice is disabled by default. To activate the feature type 'sys enable_volslice on' from the 6120 command line. Notification regarding slice and LUN changes will occur when changes are made to volume slices and lun masks. Volume slice or LUN mask changes which were not initiated by a user could indicate a potential problem. Please connect to the storage device or the appropriate management software to validate the system status.			
6120	21.5.76	volOwner	AlarmEvent–	WRN	Y	Volume owner for u1vol1 changed from 'u1' to 'u2'
		Volume or controller failover has occurred.				
6120	21.3.79	lunPermission	AlarmEvent	WRN		The access permission has changed for LUN 01 from old_access to new_access.
6120	21.3.78	initiators	AlarmEvent	WRN		initiator changed from old_value to new_value
6120	21.5.14	disk.port	AlarmEvent–	ERR	Y	The state of disk.u1d1.Port1State on 6120 612000 changed from 'OK' to 'failed'
		The 6120 has reported that one port of a dual–ported disk has failed **Action:** 1. Telnet to affected 6120 2. Verify disk state in 'fru stat', 'fru list' and 'vol stat' Drive Status Messages: Value Description 0 Drive mounted 2 Drive present 3 Drive is spun up 4 Drive is disable 5 Drive has been replaced 7 Invalid system area on drive 9 Drive Not Present D Drive disabled; drive is being reconstructed S Drive Drive Substituted 3. Replace disk if necessary			
6120	21.5.25	interface.loopcard.cable	AlarmEvent–	ERR	Y	The state of loopcable.u1l1.CableState changed from 'OK' to 'failed'

Event Advisor—Customized Report

CHAPTER 7

Storage Automated Diagnostic Environment Help

This chapter explains the GUI online help and the command-line utilities help associated with the Storage Automated Diagnostic Environment. The Help option links are displayed in FIGURE 7-1.

▼ To Access the Online Help

1. **Click the Help link in the upper right hand corner of the Storage Automated Diagnostic Environment main window.**

   The Help Content window is displayed.

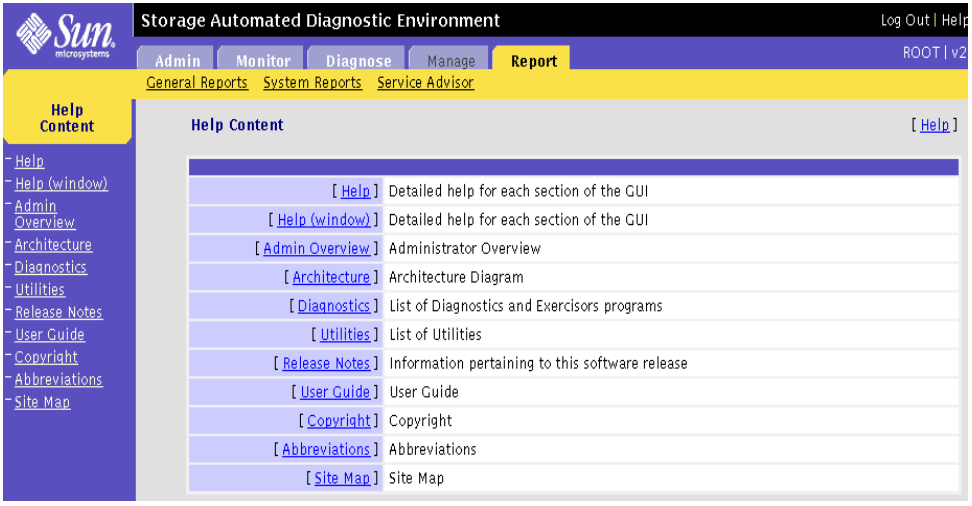


FIGURE 7-1 Help Content

2. **For online help on Storage Automated Diagnostic Environment's main topics, click the Help link on the Help Content menu.**

   The Help Summary window is displayed.

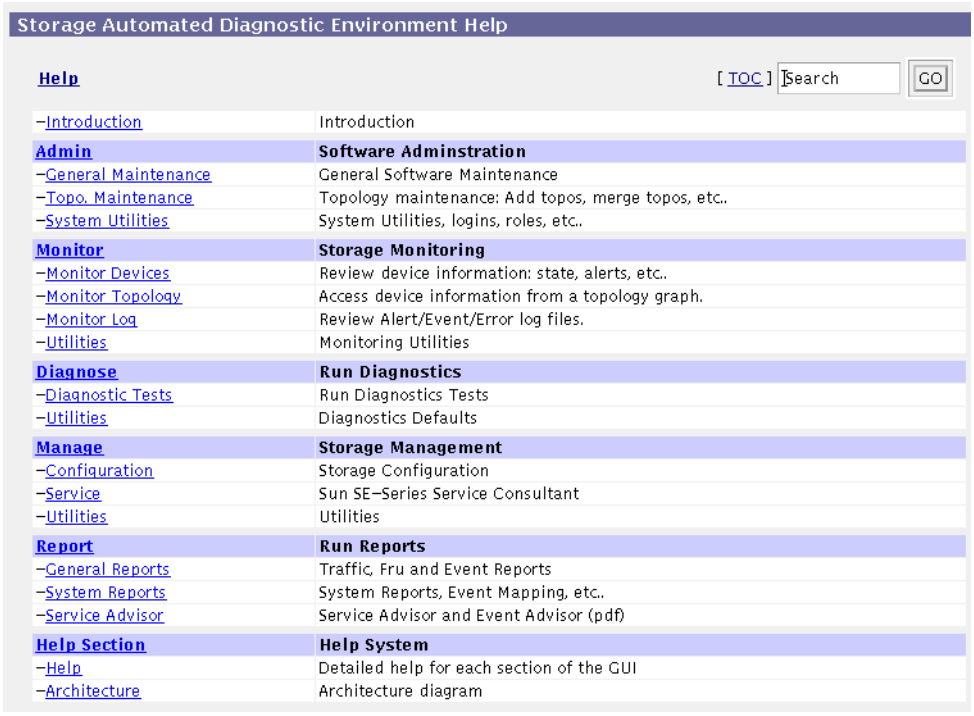


FIGURE 7-2 Storage Automated Diagnostic Environment GUI Online Help

3. **Click the topic for which you need information from the Help Summary list.**

Storage Automated Diagnostic Environment Event Grid

The Event Grid shows all the actionable and non-actionable events Storage Automated Diagnostic Environment can generate.

▼ To Customize an Event Report

1. **Click the Event Grid link on the Help menu.**
2. **Select the criteria from the Storage Automated Diagnostic Environment event grid, like the one shown in** FIGURE 7-3**.**

Event Grid [Help]

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

Category:	Component:	EventType:	ReportFormat	
a5k	All	All	☐	GO

+ Cat	Comp.	EventType	Sev.	Action	Description
a5k	backplane	Alarm–	✓	Y	[Info/Action] backplane.rear status changed from '[undefined]' to OK on DPL3 (wwn=5080020000007a608)
a5k	driver	log	✓		Found 5 'driver.SSD_WARN' warnings(s) in logfile: /var/adm/messages on a5k:5080020000001e618
a5k	backplane.fan	Alarm–	!	Y	[Info/Action] Fan 0 status changed from OK to [undefined] on DPL3 (wwn=5080020000007a608)
a5k	disk	Alarm–	✓	Y	'disk_front.10' in A5K DPL2 (wwn=5080020000007ca18) is now Not–Available (status– state changed from 'unknown' to 'No_path_found–On')
a5k	interface.iboard	Alarm–	!	Y	The state of interface_board.A.mpx.state on Leno (wwn=5080020000032510) is 'Not OK'
a5k	interface.gbic	Alarm–	!	Y	The state of interface_board.A.mpx.state on Leno (wwn=5080020000032510) is 'Not OK'
a5k	enclosure	Audit			[Info] Auditing a new A5K called DPL4 (wwn=5080020000001de30)
a5k	ib	Comm_Established			Communication regained with A5K called DPL4
a5k	ib	Comm_Lost	↓	Y	[Info/Action] Lost communication with A5K called DPL4
a5k	disk	Topology–	✓	Y	disk_front.1(2000002037049776) was removed from (wwn=5080020000001e618)
a5k	a5ksestest	DiagnosticTest–	!		a5ksestest on DPL3 (wwn=50800200000a3) failed
a5k	a5ktest	DiagnosticTest–	!		a5ktest on DPL3 (wwn=50800200000a3) failed
a5k	enclosure	Discovery			[Info] Discovered a new A5K called DPL4 (wwn=5080020000001de30)
a5k	disk	InsertComponent			'disk_front.0'(200000203718ac0) was added to A5K DPL4
a5k	enclosure	LocationChange			Location of a5k called DPL4 was changed
a5k	disk	RemoveComponent	!	Y	[Info/Action] 'disk_front.0'(200000203718ac0) was removed from A5K DPL4
a5k	disk	StateChange+			'disk_front.0'(200000203718ac0) in A5K DPL4 (wwn=5080020000001de30) is now Available, status–state changed from 'Bypassed–On' to 'Ok–On'
a5k	interface.iboard	StateChange+			'interface_board.B' in A5K DPL4 (wwn=5080020000001de30) is now Available, status–state changed from [undefined] to OK

FIGURE 7-3 Storage Automated Diagnostic Environment Event Grid

3. **For more diagnostic information, click the Info/Action link from the Description field.**

   A pop-up menu displays the information for that event and the action recommended for problem resolution.

Note – The Storage Automated Diagnostic Environment Event Grid is intended to be used interactively, but it is also printable. Before printing the Event Grid, run the page with the ReportFormat checkbox enabled; to see all the details about each event. Otherwise, you must click the **[details]** link to see details, one event at a time.

Storage Automated Diagnostic Environment Architecture

1. **Click Architecture on the Help menu.**

   The Storage Automated Diagnostic Environment Architecture Diagram, as shown in FIGURE 7-4, is displayed.

2. **For details of the component, move your mouse over the section within the diagram, or See** TABLE 7-1**.**

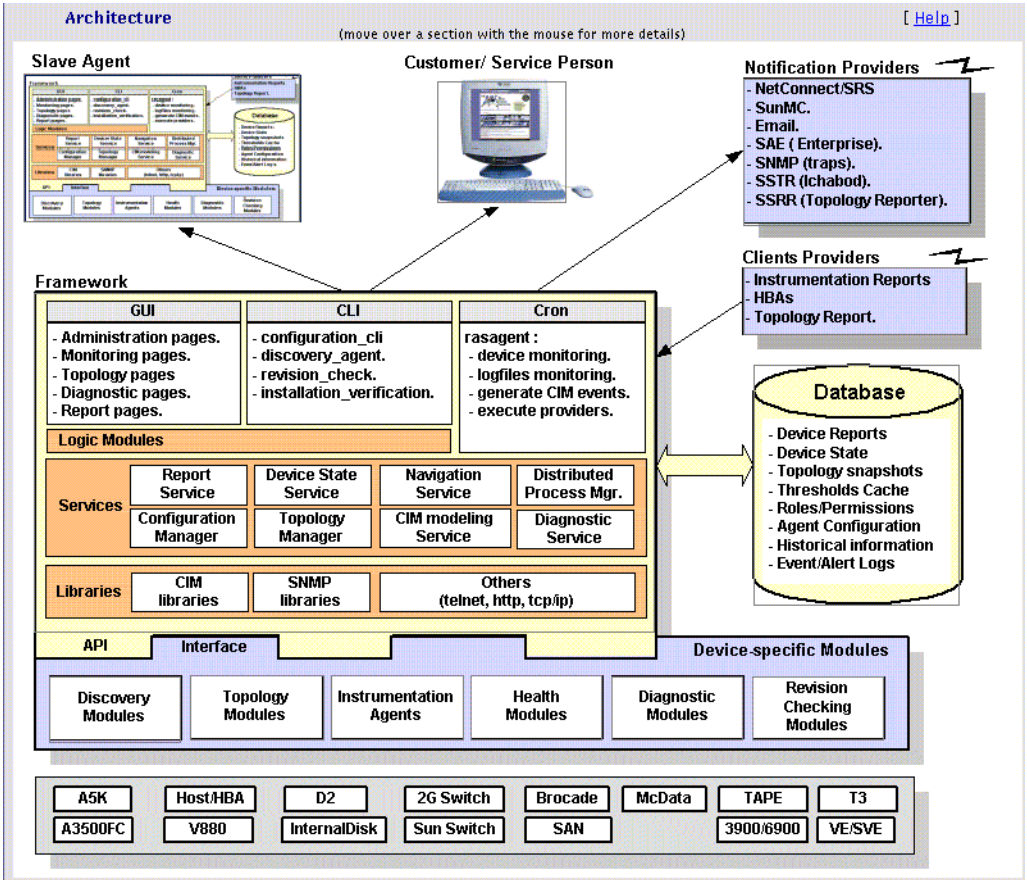


FIGURE 7-4 Storage Automated Diagnostic Environment Architecture Diagram

TABLE 7-1 Storage Automated Diagnostic Environment Component Definitions

Component Name	Component Definition
Slave Agent	Each slave agent includes the same functionality as the master agent: • Tests • Instrumentation • Event Generation Slave agents are scheduled from the cron. They generate CIM events that are transmitted to the Master.
Notification Providers	• HTTP—Sends HTTP calls to an HTTP server and transfers CIM data in the appropriate format. Internal to Sun only. • SSTR —The SSTR Provider sends events to the Sun StorEdge Enterprise Storage Manager 1.0 Topology Reporter console. • NetConnect—A common information model (CIM) provider that requests information, converts the information to the appropriate format, and relays it to NetConnect. • SRS—The Sun Remote Services (SRS) provider accepts and sends information in xml format. • SNMP Traps—Enables the Storage Automated Diagnostic Environment to send traps for all actionable events that occur during monitoring to external management systems. • SSRR—Uses modem technology with Unix-to-Unix Communication Protocol (UUCP). Sun StorEdge Remote Response (SSRR) software is required on the host and must be configured accordingly. • *Local Provider (Email)*—The local provider can email events to administrators. Events can be filtered per administrator using event-type, severity level, or device-type filters.
Browser UI	The user interface (UI) uses HTML browsers. Using the UI, administrators can configure the agents, monitor storage devices, review the topology, execute diagnostic tests, and verify the configuration.
Storage Automated Diagnostic Environment Services	The services are the core of the framework. They provide logic and persistence to all agents, monitors, and user interface functions. The services include: • A database of current instrumentation reports • All CIM schemas (.MOF files) required to generate events • The current configuration of all agents • Topology functions • The current state of each storage device • A database of diagnostic processes • Logic and persistence for timers, threshold, transitions, and revision matrix

TABLE 7-1 Storage Automated Diagnostic Environment Component Definitions

Health Monitors	Health monitors read instrumentation reports and generate CIM events that are stored and sent to Notification providers. Events are generated using a cache database that stores previous reports, timers, and thresholds.
Diagnostic Modules	Diagnostic tests can be executed locally or remotely to test different components.
Instrumentation Agents	Instrumentation agents probe storage devices and monitor log files to generate detailed reports on the state of each component of the device. Agents are scheduled to execute by crons. Instrumentation reports are stored and compared by the health monitors to generate CIM events.

Utilities

The explanations of the various diagnostics tests associated with the Storage Automated Diagnostic Environment, shown in TABLE 7-2, are available from the command line. These utilities also have man(1M) pages.

Storage Automated Diagnostic Environment Diagnostics Tests

The Storage Automated Diagnostic Environment diagnostics tests are defined in TABLE 7-2 and are located in `/opt/SUNWstade/Diags/bin`. See the man pages for more detail.

TABLE 7-2 Storage Automated Diagnostic Environment Diagnostic Commands

Diagnostic Command	Command Description
`a3500fctest`(1M)	Verifies the functionality of the Sun StorEdge A3500FC array using the two subtests provided
`a5ksestest`(1M)	Provides configuration verification, fault isolation, and repair validation of Sun StorEdge A5200 array
`a5ktest`(1M)	Verifies the functionality of the Sun StorEdge A5200 array
`brocadetest`(1M)	Verifies the functionality of the Brocade Silkworm switch ports
`d2disktest`(1M)	Verifies the functionality of the internal Sun StorEdge D2 array disk
`daksestest`(1M)	Tests the Sun Fire 880 FC-AL disk backplane.
`daktest`(1M)	Verifies the functionality of the internal Fibre Channel disk
`fcdisktest`(1M)	Verifies the functionality of the Sun Fire 880 FC-AL disk
`fctapetest`(1M)	Tests the Fibre Channel tape drive
`ifptest`(1M)	Tests the functionality of the Sun StorEdge PCI FC-100 host adapter board.
`linktest`(1M)	Tests two end points of a Fibre Channel link segment and assists in FRU isolation of the link segment. This test is typically run when the FCAL topology indicates a problem.
`qlctest`(1M)	Tests the functions of the Sun StorEdge PCI 1 Gbit and 2 Gbit Single and Dual and cPCI Dual Fibre Channel host adapter board.
`socaltest`(1M)	Validates and performs fault isolation on the Sun StorEdge SBus FC-100 host adapter board.
`switchtest`(1M)	Diagnoses the Sun StorEdge network FC switch-8 and switch-16 switches
`switch2test`(1M)	Diagnoses the Sun StorEdge network 2 Gbit FC switch-16
`t3LUN`(1M)	Verifies the functionality of the Sun StorEdge T3 and T3+ array
`t3ofdg`(1M)	Tests all of the FRUs within the Sun StorEdge T3 and T3+ array enclosure. The `t3ofdg` is an out-of-band diagnostic test for Sun StorEdge T3 and T3+ array LUNs attached through an Ethernet connection.
`t3volverify`(1M)	Out-of-band diagnostic for T3 and T3+ LUNs attached through an Ethernet connection. `t3volverify` executes the volume verify function on the selected Sun StorEdge T3 and T3+ array.

TABLE 7-2 Storage Automated Diagnostic Environment Diagnostic Commands

`6120loop`(1M)	Tests the functions of the Sun StorEdge 6120 array controller and the sims that run the Fibre Channel loops inside and outside the array.
`6120volverify`(1M)	Out-of-band diagnostic for 6120 LUNs attached through an Ethernet connection. `6120volverify` executes the volume verify function on the selected Sun StorEdge 6120 array.
`veluntest`(1M)	In-band diagnostic for virtualization engine attached storage. Verifies the functionality of the in-band virtualization engine LUN(s).

Storage Automated Diagnostic Environment Agent Utilities

The Storage Automated Diagnostic Environment agent utilities that are defined in TABLE 7-3 are located in the `/opt/SUNWstade/bin` directory. See the man pages for more detail.

TABLE 7-3 Storage Automated Diagnostic Environment Agent Commands

Utilities Command	Command Description
`checkcron`(1M)	Verifies whether the Storage Automated Diagnostic Environment main program is entered in the `crontab`(1M) file
`clearcache`(1M)	Clears the Storage Automated Diagnostic Environment cache files that contain the current report for each device being monitored
`disk_inquiry`(1M)	Identifies devices on the data path that are using SCSI commands
`rasagent`(1M)	Calls the modules for network storage devices supported by Storage Automated Diagnostic Environment. It is automatically executed by `cron`, or it can be run manually from the command line.
`ras_admin`(1M)	Performs common Storage Automated Diagnostic Environment administrative tasks from the command line interface (CLI).
`ras_fccheck`(1M)	Checks available Fibre Channel counters to verify link integrity.
`ras_install`(1M)	Sets up the HTTP service, adds a `cron`, and registers with the master agent during a slave install. It must be run manually upon executing the `pkgadd` command.
`ras_revcheck`(1M)	Checks the hardware, software, and firmware revision levels.
`sanbox`(1M)	Displays Fibre Channel switch information
`testt3`(1M)	Retrieves tokens from a Sun StorEdge T3, T3+, and 6120 array. It verifies whether the IP address used is correct and whether the IP address points to a Sun StorEdge T3 and T3+ array that can provide tokens.

Glossary

alarm A message with an attached level of severity

array A disk subsystem, comprised of multiple disk drives, that functions as a single large, fast, super-reliable device. Arrays are designed to provide high performance, high availability, and increased storage capacity.

DAS Direct Access Storage

diagnosis A process to determine the fault cause and corrective action

diagnostic A test to uncover faults

DMA Direct Memory Access. The transfer of data directly into memory without supervision of the processor. The data is passed on the bus directly between the memory and another device.

domain On the Internet, a domain is part of a naming hierarchy. An Internet domain consists of a sequence of names (labels) separated by periods (dots). For example, `eng.sun.com`.

In RAS, a domain is a logical partition of system components, including CPUs, memory, and I/O devices. Each domain supports a separate Solaris image.

Ethernet hub Hardware used to network computers together. Ethernet hubs serve as a common wiring point, enabling information to flow through one central location to any other computer in the network.

EOT End of Tape

fault coverage The percentage of faults detected against all possible faults or against all faults of a given type.

fault detection The ability of a diagnostic to uncover a fault, given that a fault exists.

FC-AL Fibre Channel-Arbitrated Loop. FC-AL is implemented as either a loop or a fabric. A loop can contain up to 126 nodes, accessible through only one or two servers.

Fibre Channel A cost-effective gigabit communications link deployed across a wide range of hardware. Commonly used for SAN configurations.

fibre channel switch A networking device that can send packets directly to a port associated with a given network address.

FRU Field Replaceable Unit. An assembly that a manufacturer replaces on failure of an assembly component.

GBIC Gigabit Interface Converter. A hot-swappable input/output (I/O) device that plugs into a Gigabit Ethernet port or Fibre Channel.

HBA Host Bus Adapter. A controller board connecting the I/O expansion bus to the fibre channel subsystem.

HTTP HyperText Transfer Protocol

IP Internet Protocol

LUN Logical Unit Number. The major and minor device numbers make up the logical unit numbering sequence for a particular device connected to a computer.

NSCC Sun's Network Storage Command Center

PCI Peripheral Component Interconnect. This is a high-performance 32-bit or 64-bit local bus that provides a host-processor-independent interface and an interconnect mechanism between highly integrated peripheral components.

RAS Reliability, Availability, and Serviceability

RDLS Read Link Status

remote monitoring The ability to monitor the functionality and performance of a hardware system from a location other than where the hardware resides.

remote support The ability to directly or indirectly troubleshoot, diagnose, and service computer hardware from a location other than where the hardware resides.

RSS Remote Support Service. Software delivered with the service processor bundle.

SAN Storage Area Network

SCSI Small Computer Systems Interface. An industry standard for connecting disk and tape devices to a workstation.

SES SCSI Enclosure Services device. An interface to SCSI enclosure services devices. These devices sense and monitor the physical conditions within an enclosure, as well as enable access to the status reporting and configuration features of the enclosure (such as indicator LEDs on the enclosure).

SRS Sun Remote Services (SRS) is Sun's portfolio of services, comprised of SRS Event Monitoring and SRS NetConnect, customizable Sun storage self-management, and 24/7, proactive, mission-critical system monitoring by Sun.

storage service processor Sun's rack-mountable Netra X1 server, preconfigured with advanced remote management and monitoring capabilities. The service processor monitors the SAN and provides service and support access for Sun engineers.

T3 and T3+ Array Sun's hardware-based array, featuring Fibre Channel architecture that provides the basis for modular network storage.

UUCP UNIX-to-UNIX Communication Protocol. UUCP is a protocol that transfers files, news, and mail, and executes remote commands between UNIX machines.

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