



Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide

For the Red Hat Enterprise Linux Operating System

Sun Microsystems, Inc.
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Preface

The *Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide for the Red Hat Enterprise Linux Operating System* provides instructions for installing the Sun StorEdge™ Traffic Manager software on a Red Hat Enterprise Linux host.

This guide is designed for use with the documentation that came with your storage device and is written for experienced system administrators of the Red Hat Enterprise Linux operating environment and related disk storage systems.

Throughout this guide, *storage device* is used to designate the storage devices supported in this release. The supported devices are:

- Sun StorEdge T3B array
- Sun StorEdge 3510 FC array
- Sun StorEdge 6120 array
- Sun StorEdge 6320 system
- Sun StorEdge 6910/6960 systems
- Sun StorEdge 6920 system
- Sun StorEdge 9900 series

For the most-up-to-date information about device support, see “http://www.sun.com/storage/san/multiplatform_support.html”.

Before You Read This Guide

Read the documentation that came with your storage device and have an experienced system administrator’s knowledge of the supported Red Hat Enterprise Linux operating environment in which you are installing the Sun StorEdge™ Traffic Manager software.

How This Guide Is Organized

This guide is organized as follows:

Chapter 1 provides an overview of the Sun StorEdge™ Traffic Manager software.

Chapter 2 describes how to prepare, install, remove, build, and start the software for the driver.

Chapter 3 describes how to add and remove LUNs dynamically.

Chapter 4 contains information about accessing the log files and explains the information contained in them.

Chapter 5 provides troubleshooting information.

Glossary contains a list of words and phrases and their definitions.

Typographic Conventions

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

Related Documentation

Application	Title	Part Number
Late-breaking information	<i>Sun StorEdge™ Traffic Manager 4.5 Software Release Notes for IBM AIX, Hewlett-Packard HP-UX, Microsoft Windows 2000 and 2003, and Red Hat Enterprise Linux Operating Systems</i>	817-7038-10
Using	<i>Sun StorEdge™ Traffic Manager 4.5 Software User's Guide</i>	817-7033-10
SAN documentation	<i>Sun StorEdge SAN Foundation Configuration Guide</i>	817-3672-10

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Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide for the Red Hat Enterprise Linux Operating System, part number 817-7034-10

Sun StorEdge™ Traffic Manager Software Overview

This chapter provides an overview of the Sun StorEdge™ Traffic Manager.

About the Sun StorEdge™ Traffic Manager Software

The Sun StorEdge™ Traffic Manager is a system for managing multiple paths to storage devices. The Sun StorEdge™ Traffic Manager system is comprised of a graphical user interface (GUI) application, a command-line interface (CLI) application, and system device drivers for managing the multiple paths. If a failure occurs in one host data path, the Sun StorEdge™ Traffic Manager software automatically detects the failure and provides continuous access to your data through an alternate data path.

Refer to Chapter 2 of this guide for information about starting the GUI and CLI interfaces and to the *Sun StorEdge™ Traffic Manager 4.5 Software User's Guide* for a description of using the GUI and CLI interfaces. From the GUI, the User's Guide can be accessed by clicking on Help -> User's Guide. The UsersGuide.pdf can also be accessed directly from the `/usr/SunTrafficManager/docs` subdirectory using Adobe Acrobat Reader.

System Configuration

The Sun StorEdge™ Traffic Manager system maintains and presents storage system configuration information. FIGURE 1-1 shows an example of using the Sun StorEdge™ Traffic Manager GUI application to access the Sun StorEdge™ Traffic Manager system.

In FIGURE 1-1, each storage device and the LUNs associated with it are shown on the left side of the screen and the paths and host bus adapter (HBA) system names are shown on the right.

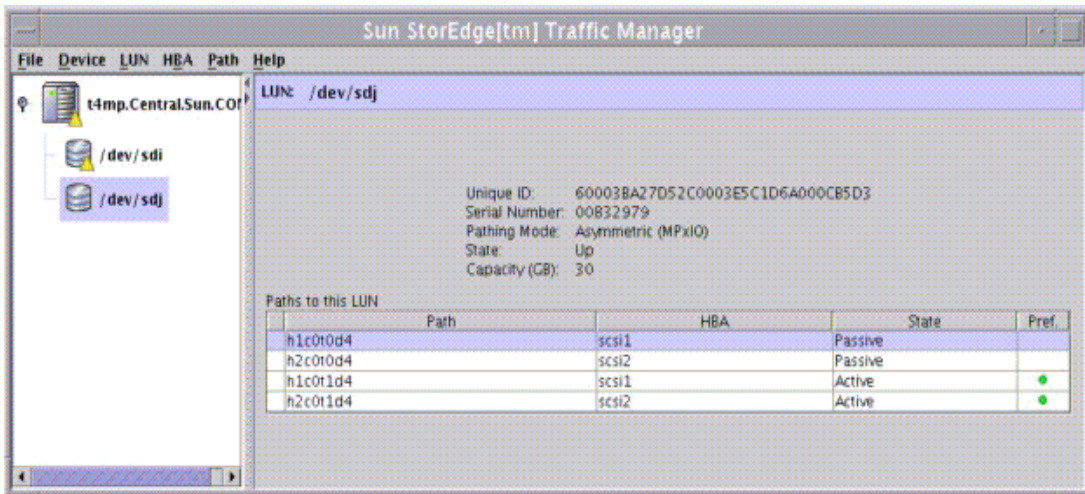


FIGURE 1-1 Host Data Paths Between HBAs and the Storage Devices

Asymmetric Device Path Management Description

For Asymmetric devices, the following description of failover and failback operations apply.

Failover

A LUN on an asymmetric device can only have one active controller at a time. The remaining controller is known as the passive controller. Paths to the active controller are known as active paths. Paths to the passive controller are known as passive paths. The process by which a LUN may force a passive controller to become its active controller is known as LUN failover. Upon successful LUN failover, passive paths to a controller become active and previous active paths become passive. On the Sun StorEdge 6120 array, failover is implemented per device volume. Therefore, if volume slicing is enabled, there may be multiple LUNs on the volume affected by a failover. Also in a multi-initiator environment, a LUN failover on one host is detected by all other hosts using LUNs on the same volume.

LUN failover can be initiated by both automatic and manual means.

Automatic Failover by Error Detection

If a path receives errors and fails, it is marked as Down or Removed. If all the active paths for a LUN are marked down and there are remaining passive paths, the driver automatically causes a LUN failover to activate the passive paths.

Manual Failover Initiated by the User *activate* Command

The user may use the *activate* command to manually initiate a LUN failover by activating a passive path. Previously active paths will become passive. If the LUN is a slice on a volume, all LUNs on that volume will failover for all hosts.

Manual Failover Initiated by User *restore* Command

On some devices, a LUN may have a default active controller. This is known as the preferred controller. A *restore* command will attempt to cause a failover of all LUNs that do not currently have active paths to their preferred controller.

Automatic Failback Initiated by an Automatic Restore

If the driver recognizes that a down path becomes passive, an automatic *restore* command may occur. This is currently known as autofailback. The autofailback parameter must be set to *enabled* in order for this to occur.

Note – Autofailback is not supported in a multi-initiator environment.

To learn how to perform failback, see the *Sun StorEdge™ Traffic Manager 4.5 Software User's Guide*. From the GUI, the User's Guide can be accessed by clicking on Help -> User's Guide. From the CLI, the UsersGuide.pdf can be accessed directly from the `/usr/SunTrafficManager/docs` subdirectory using Adobe Acrobat Reader.

Symmetric Device Path Management Description

For Symmetric devices, all paths are active unless a path is unhealthy and in which case, it is down. There is no failover or failback, an unhealthy path is just not used. Load balancing occurs across all active paths to improve performance by using all available paths to a storage device.

Installing, Removing, Building, and Starting the Sun StorEdge™ Traffic Manager Software

This chapter contains the following topics:

- “Preparing for Installation” on page 5
- “Installing the Software” on page 6
- “Removing the Software” on page 8
- “Building and Verifying the Linux Kernel” on page 9
- “Starting the Sun StorEdge™ Traffic Manager Application Manager Software” on page 11

Preparing for Installation

Before you install the driver, make sure that you have the correct versions of the hardware and software. For the most up-to-date information, see:

http://www.sun.com/storage/san/multiplatform_support.html.

▼ Operating System Preparation

Sun StorEdge™ Traffic Manager requires installation of both the kernel-headers and kernel-source packages. These packages can be installed either during or after the Red Hat Enterprise Linux installation.

- 1. When installing Red Hat Enterprise Linux, select the Kernel Development package.**

2. If Red Hat Enterprise is already installed, verify that the Kernel Development packages are installed.

```
# rpm -qa |grep kernel
```

3. If either of the kernel packages is not installed on the system, locate the Red Hat Enterprise Linux distribution CDs and install the packages by typing the following commands:

```
# rpm -i kernel sources*
```

```
# rpm -i kernel headers
```

▼ HBA Installation

Before installing a new version of the HBA driver, remove older versions. This includes both currently built drivers (located under the `/lib/modules` directory) and future driver builds specified by the kernel configuration.

In addition, SSTM requires the installation of the HBA API. Refer to the HBA installation instructions for the steps to install the HBA API.

Installing the Software

Locate the Sun StorEdge™ Traffic Manager software. The software package name is `SunTrafficMgr-X.Y-Z.tgz` (where X.Y-Z is the release number).

Perform the following steps, as a superuser, after you have located and identified the software:

1. Create a temporary directory.

```
# mkdir /tmp/SSTM
```

2. Change the directory to the temporary directory.

```
# cd /tmp/SSTM
```

3. Copy or download the Sun StorEdge Traffic Manager installation package to the temporary directory.

```
# cp SunTrafficMgr-X.Y-Z.tgz
```

4. Extract the SSTM installation files.

```
# tar xvfz SunTrafficMgr-X.Y-Z.tgz
```

5. Install SSTM

```
# ./installsstm
```

6. Remove the temporary directory

```
# cd /; rm -rf /tmp/SSTM
```

7. Change the directory to the kernel source

```
# cd /usr/src/linux-<version>
```

8. Reconfigure the kernel

```
# make xconfig
```

9. Go to SCSI Support and enable SSTM by setting the 'SSTM multipath support' configuration item to 'y'. See Figure 2-1 "Configuring the Linux Kernel to Add SSTM Multipath Support"

10. Click on "Save and Exit".

11. Build the Linux kernel. See "Building and Verifying the Linux Kernel" on page 9 for details.

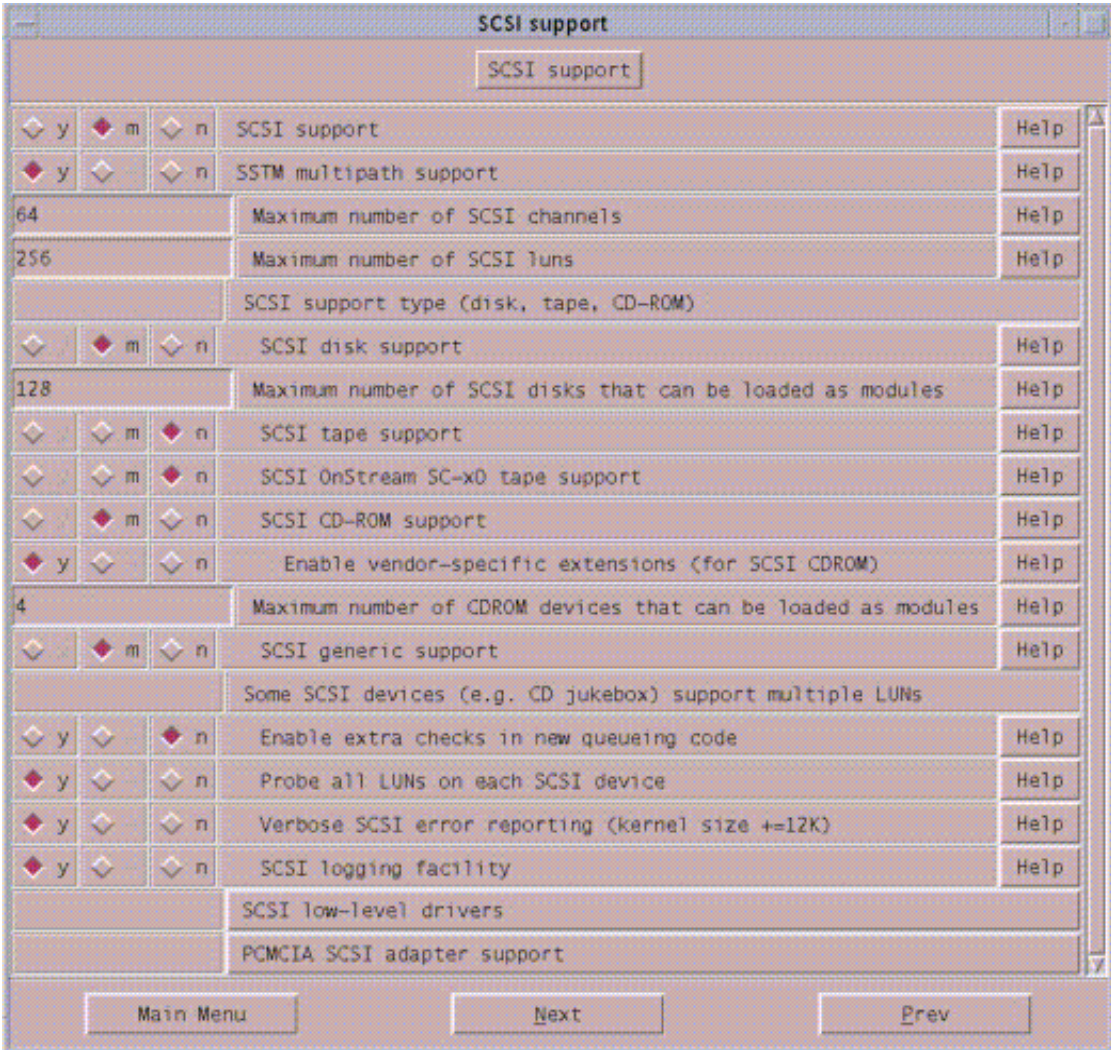


FIGURE 2-1 Configuring the Linux Kernel to Add SSTM Multipath Support

Removing the Software

Perform the following steps to remove the Sun StorEdge™ Traffic Manager software.

1. Change the directory to /usr/SunTrafficManager.

```
# cd /usr/SunTrafficManager
```

2. Remove SSTM.

```
# ./removesstm
```

3. Change the directory to the kernel source.

```
# cd /usr/src/linux-<version>
```

4. Reconfigure the kernel.

```
# make xconfig
```

See Figure 2-2 “Reconfiguring the Linux Kernel to Remove SSTM Multipath Support”

5. Click on “Save and Exit”

6. Build the Linux Kernel. See “Building and Verifying the Linux Kernel” on page 9 for details.

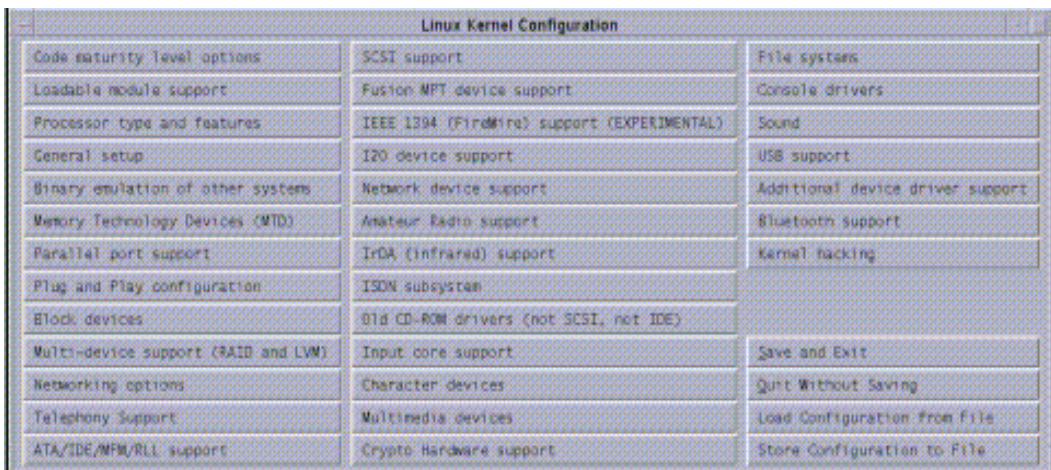


Figure 2-2 Reconfiguring the Linux Kernel to Remove SSTM Multipath Support

Building and Verifying the Linux Kernel

This section describes how to build and verify the Linux kernel.

1. If you have not built a Linux Kernel, read the following files.

```
/usr/src/linux-<version>/README  
/usr/src/linux-<version>/Documentation/modules.txt  
/usr/src/linux-<version>/Documentation/initrd.txt
```

2. Change the directory to the kernel source.

```
# cd /usr/src/linux-<version>
```

3. Build the kernel.

```
# insmod loop; make clean dep bzImage modules modules_install install
```

4. Build the boot kernel RAM disk image.

```
# mkinitrd -f /boot/initrd-<kernel_ver>custom.img <kernel_ver>custom
```

<kernel_ver> matches the kernel version number displayed with a “uname -r” command. The “custom” or “smp” suffix should be dropped.

5. Update the boot loader to start a new kernel build. For example, if GRUB is the boot loader; type:

```
# vi /etc/grub.conf
```

Copy the four lines from the “smp” stanza and paste those line between the splashimage line and the smp line.

Change the “smp” to “custom”. A display of that information looks as follows:

```
splashimage=(hd0,0)/grub/splash.xpm.gz  
title Red Hat Enterprise Linux ES (2.4.9-e.12custom)  
    root (hd0.0)  
    kernel/vmlinuz-2.4.9-e.12custom ro root=/dev/sda3 console=ttyS1, 9600  
    initrd/initrd-2.4.9-e 12 custom.img  
title Red Hat Enterprise Linux ES (2.4.9-e.12smp)
```

6. Verify that the vmlinuz and intrd files are located in /boot and have the expected date associated with the files.

```
# ls -alt /boot
```

7. Reboot

8. Verify that “uname -r” is “<kernel version>custom”

Starting the Sun StorEdge™ Traffic Manager Application Manager Software

This section describes how to start the Sun StorEdge™ Traffic Manager application software from the GUI or the CLI.

Starting the Traffic Manager GUI

To start the Sun StorEdge™ Traffic Manager GUI:

1. **Open a terminal window and login as superuser.**
2. **Type the following command from anywhere:**

```
# trafficmgr
```

3. **Click Help on the Sun StorEdge™ Traffic Manager window.**
4. **Select the User's Guide from the pull-down menu. The UsersGuide.pdf file is accessible by Adobe Acrobat Reader.**

Starting the Traffic Manager CLI

To start the Sun StorEdge™ Traffic Manager CLI:

1. **Open a terminal window and log in as superuser.**
2. **Type the following command from anywhere:**

```
# sstm
```

3. **Type `sstm -?` to get a full list of available CLI options.**

The Sun StorEdge™ Traffic 4.5 Software User's Guide is loaded in the Sun StorEdge Traffic Manager directory when Sun StorEdge Traffic Manager software is installed. For information about the Sun StorEdge™ Traffic Manager software, refer to the `UsersGuide.pdf` which can be accessed directly from the `/usr/SunTrafficManager/docs` subdirectory using Adobe Acrobat Reader.

Adding and Removing LUNs

This chapter contains the following topics:

- “Adding LUNs Dynamically” on page 13
 - “Removing LUNs Dynamically” on page 14
-

Adding LUNs Dynamically

For each HBA installed in the system, do the following:

- 1. Determine the host ID (H) associated with the HBA.**

```
# ls /proc/scsi/qla2300
```

Each installed HBA has a numeric filename that is the host identifier.

- 2. Rescan for all the LUNs on all the ports.**

```
# echo "scsi-qlascan" > /proc/scsi/qla2300/H
```

H is the host identifier associated with HBA.

- 3. Determine the target ID (T) associated with the new LUN.**

```
# cat /proc/scsi/qla2300/H
```

This file lists the ID:LUN numbers recognized by the QLA driver. T is the target ID value.

- 4. Add the LUN to HBA.**

```
# echo "scsi add-single-device H 0 T L" > /proc/scsi/scsi
```

H is the host identifier associated with the HBA; T is the target identifier obtained in Step 3; and L is the LUN identifier.

Removing LUNs Dynamically

Complete the following steps to remove a LUN.

1. **Determine the SSTM paths associated with the LUN to be removed.**

```
# sstm
```

2. **Locate the LUN to be removed and identify the path name. The path name should have the following format: hHcCtTdL**

H is the host ID, C is the channel ID, T is the target ID, and L is the LUN ID.

3. **Remove each path associated with the LUN.**

```
# echo "scsi remove-single-device H C T L" > /proc/scsi/scsi
```

4. **For each HBA installed in the system, rescan for all ports.**

```
# echo "scsi-qlascan" > /proc/scsi/qla2300/H
```

H is the host identifier associated with HBA.

Log File Information

This chapter describes the log files for the Red Hat Enterprise Linux operating environment and the log levels logged in the system log file. See the Sun StorEdge™ Traffic Manager 4.5 User's Guide for a description of setting the log levels.

Topics in this section include:

- “Accessing the Log Files” on page 15
- “Log Level” on page 16

Accessing the Log Files

The Sun StorEdge™ Traffic Manager writes status information to the following text file:

```
/var/log/messages
```

Use a text editor or the 'cat' command to display the contents of the Linux log file. To view only Sun StorEdge™ Traffic Manager-related messages, type:

```
grep "JAFO" /var/log/messages
```

Log Level

This section describes the various log messages at the various logging levels as configured by the GUI or CLI. See the Sun StorEdge™ Traffic Manager 4.5 Software User's Guide for a description of setting the logging level for all devices attached to the current host. The Sun StorEdge™ Traffic Manager 4.5 Software User's Guide is displayed by selecting `Help` from the Sun StorEdge™ Traffic Manager window and selecting `User's Guide` from the drop down list.

You can configure the following logging levels:

- Informational messages - These include all critical error messages as well as non-critical alerts. Non-critical alerts are usually when something has changed but no functionality is lost.
- Data path change messages - changes to the state of a host data path.
- Critical error messages - Unrecoverable errors, such as when the Sun StorEdge Traffic Manager software loses access to a LUN or is out of memory.
- Caution and internal error messages - Errors the Sun StorEdge™ Traffic Manager software encounters but does not handle.

If logging level `Data Path Changes` is not set, data path change messages are not shown.

If logging levels `Data Path Changes` and `Critical Error` messages are set, only critical information is shown.

If logging levels `Data Path Changes` and `Internal Errors` are set, only non-critical information is shown.

TABLE 4-1 Log Informational Messages

Message	Message Explanation	Information in the Message
Driver loaded.	The operating system has loaded the Traffic Manager driver.	<ul style="list-style-type: none">• Major version• Minor version• Point version• Release version

TABLE 4-2 Log Data Path Changes and Log Critical Errors

Message	Message Explanation	Information in the Message
Path state change.	This message is logged when the state of any path changes for critical reasons.	<ol style="list-style-type: none"> 1. Old state and new state. Valid values are: <ul style="list-style-type: none"> • Active • Passive • Down 2. Path name 3. Unique LUN ID 4. Reason string, valid values are: <ul style="list-style-type: none"> • I/O status—state change as a result of I/O status. There will also be detail data consisting of operating system specific SCSI status. • User initiated—state change as a result of user initiated action, for example, activate or disable • AutoFailback initiated—state change as a result of auto failback action • Failover initiated—state change due to the need for passive to active action

TABLE 4-3 Critical Log Messages

Message	Message Explanation	Information in the Message
Failover command sent to:	This message is logged when the state of any path changes for critical reasons and the logging levels Log Data Path Changes is set in addition to Log Critical Error.	<ol style="list-style-type: none"> 1. Path name on which the failover command was sent 2. Unique LUN ID 3. Unique array ID 4. Controller ID 5. Reason string, valid values are: <ul style="list-style-type: none"> • User initiated—failover command sent as a result of user initiated action. For example, activate or disable. • AutoFailBack initiated—failover command sent as a result of auto restore failback action • Failover initiated—failover command sent due to the need for passive to active action

TABLE 4-4 Log Data Path Changes and Log Internal Errors

Message	Message Explanation	Information in the Message
Path state changed to:	This message is logged when the state of any path changes for critical or non-critical reasons and the logging levels Log Data Path Changes and Log Internal Errors are set.	<ol style="list-style-type: none"> 1. Old state and new state. Valid values are: <ul style="list-style-type: none"> • Unknown • Active • Passive • Transition • Down • Admin • Removed 2. Path name 3. Unique LUN ID 4. Reason string, valid values are: <ul style="list-style-type: none"> • IO status—state change as a result of I/O status. There will also be detail data consisting of operating system specific SCSI status. • Device added—state change as a result of a new path • Device removed—state change as a result of a path removed • User initiated—state change as a result of a user initiated action. For example, activate or disable. • AutoFailBack initiated—state change as a result of auto failback action • Failover initiated—state change due to a need for passive to active action

TABLE 4-5 Log Internal Messages

Message	Message Explanation	Information in the Message
LUN state changed.	This message is logged when any noncritical LUN state changes occur.	<ol style="list-style-type: none"> 1. Old LUN state and new LUN state. Valid values are: <ul style="list-style-type: none"> • Unknown • Up • Transition • Down_Grace • Down • Removed 2. LUN unique ID

Troubleshooting

TABLE 5-1 provides Sun StorEdge™ Traffic Manager troubleshooting information in the Red Hat Enterprise Linux operating system.

TABLE 5-1 Troubleshooting Tips for the Sun StorEdge™ Traffic Manager Software

Problem	Solution
You want to use the command-line interface.	From a terminal session, type <code>sstm</code> to start the Sun StorEdge™ Traffic Manager CLI utility.
The physical connection between the host and array(s) is correct, but the host still does not see the array devices.	Check the log file. Look for messages logged by the driver named <code>JAF0</code> .

Glossary

active path	A path that is healthy and ready for I/O.
array	A Sun StorEdge array that contains an internal RAID controller and disk drives with Fibre Channel connectivity to the data host.
failback	The process of making a LUN's preferred controller the active controller. Also known as restore.
failover	The process of sending a failover command down a passive path to change the active controller for a LUN.
host bus adapter (HBA)	A controller board that connects the host computer bus and the FC-AL that manages the transfer of information between the two channels.
logical unit number (LUN)	A piece of logical storage presented by the device to the host.
passive path	For an asymmetric device, a path to a passive controller. Can be made active by sending a failover command.
preferred controller	On an asymmetric device, the default active controller for a LUN.
restore	The process of making a LUN's preferred controller the active controller. Also known as failback.
volume	One or more drives configured into a RAID group. May be sliced into smaller LUNs to be presented to the host.
worldwide name (WWN)	Unique number assigned to each device on a Fibre Channel loop.

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